GALGOTIAS UNIVERSITY

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COURSE BOOK

School of Polytechnic-**2020**

Volume-I

Curriculum and syllabus for School of Polytechnic

GALGOTIAS UNIVERSITY
(Under the Uttar Pradesh Private Universities Act No. 12 of 2019)

CONTENTS

GALGOTIAS UNIVERSITY

(Established under Galgotias University Uttar Pradesh Act No. 14 of 2011)

Program: **Diploma in Chemical Engineering**

Scheme: 2020-2021

Vision: To be a cradle for inventions and innovations that provides transformative education to create leaders and innovators, and generating new knowledge for society and industry.

Mission

1. To impart need based chemical engineering knowledge through relevant curriculum.
2. To prepare employable personnel and entrepreneurs through industry institute interaction.
3. Enrich departmental infrastructure and facilities.
4. To inculcate sense of discipline, responsibility towards society and promote lifelong learning

Program Educational Objectives

PEO1: Chemical Engineering graduates will be well prepared for successful careers in industry and/or in government in one or more of the following areas: chemical process plant and equipment design, reactor and control systems, process safety, process modelling and optimum analysis.

PEO2: The graduates will be academically prepared to use modern and innovative tools and will contribute effectively to the growth and development of their respective organization.

PEO3: The graduates will engage in multidisciplinary professional activities including ethical practices to simultaneously contribute to the profession and the society at large.

PEO4: The graduates will be able to recognize the importance of self improvement and be committed to lifelong learning while enhancing their own growth.

Program Specific Objectives

- PSO1: The ability to apply chemical engineering principles to multidisciplinary problem solving in areas such as energy, biomedicine, materials and the environment with safety and environmental aspects.
- PSO2: The ability to do experimental research and simulations in the design and operation of process plant engineering systems.
- PSO3: The ability to enhance engineering skills and knowledge through industrial exposure by training, projects and applications of chemical engineering software.

Program Outcomes

Program Outcomes	Diploma in Chemical engineering students will be able to:
PO1	**Engineering knowledge: An ability to apply knowledge of basic mathematics, science and engineering to solve the engineering problems.**
PO2	**Discipline knowledge: An ability to apply discipline specific knowledge to solve core and/or applied engineering problems.**
PO3	**Experiments and practice: An ability to plan and perform experiments and practices and to use the results to solve engineering problems.**
PO4	**Engineering tools: Apply appropriate technologies and tools with an understanding of the limitations.**
PO5	**The engineer and society: Demonstrate knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.**

PO6	**Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.**
PO7	**Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.**
PO8	**Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.**
PO9	**Communication: An ability to communicate effectively.**
PO10	**Lifelong learning: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the context of technological changes.**

Curriculum

Semester 1									
Sl. No	**Course Code**	**Name of the Course**					**Assessment Pattern**		
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**
1	PHYE1001	APPLIED PHYSICS-I	3	2	0	4	20	50	100
2	MATD1002	APPLIED MATHEMATICS-I	4	0	0	4	20	50	100
3	SLPC1003	PROFESSIONAL COMUNICATION-I	2	0	0	2	20	50	100
4	DPCS1004	COMPUTER FUNDAMENTALS	3	0	0	3	20	50	100
5	DPME1005	ENGINEERING GRAPHICS	0	0	6	3	20	50	100
6	PHYE1006	APPLIED PHYSICS-I LAB	0	0	2	1		50	50
7	SLPC1007	PROFESSIONAL COMUNICATION-I LAB	0	0	4	2		50	50
8	DPCS1008	COMPUTER FUNDAMENTALS LAB	0	0	2	1		50	50
9	DPME1009	WORKSHOP PRACTICE	0	0	6	3		50	50
		Total				23			
Semester II									
Sl No	**Course Codee**	**Name of the Course**					**Assessment Pattern**		
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**
1	PHYE1010	APPLIED PHYSICS-II	3	2	0	4	20	50	100
2	MATD1011	APPLIED MATHEMATICS-II	4	2	0	5	20	50	100
3	SLPC1012	PROFESSIONAL COMUNICATION-II	3	0	0	3	20	50	100
4	DPCH1013	MECHANICAL OPERATION & SOLID HANDLING	3	0	0	3	20	50	100
5	CHEM1014	BASIC CHEMISTRY	3	2	0	4	20	50	100
6	PHYE1015	APPLIED PHYSICS-II LAB	0	0	2	1		50	50
7	SLPC1016	PROFESSIONAL COMUNICATION-II LAB	0	0	4	2		50	50
8	CHEM1017	BASIC CHEMISTRY LAB	0	0	4	2		50	50
9	DPCH1018	MECHANICAL OPERATION & SOLID HANDLING LAB	0	0	2	1		50	50
		Total				25			
Semester III									
Sl No	**Course Code**	**Name of the Course**					**Assessment Pattern**		
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**
1	MATD2001	APPLIED MATHEMATICS-III	3	2	0	4	20	50	100
2	DPME2001	APPLIED MECHANICS	3	2	0	4	20	50	100
3	DPCH2001	HEAT TRANSFER	3	2	0	4	20	50	100
4	DPEE2010	BASICS OF ELECTRICAL & ELECTRONIC ENGG.	3	0	0	3	20	50	100
5	DPCH2002	CHEMICAL ENGINEERING THERMODYNAMICS	3	2	0	4	20	50	100
6	EEDM2001	ENVIRONMENT EDUCATION & DISASTER MANAGEMENT	2	0	0	2	20	50	100
7	DPME2006	APPLIED MECHANICS LAB	0	0	2	1		50	50
8	DPCH2003	HEAT TRANSFER LAB	0	0	4	2		50	50

9	DPEE2011	BASICS OF ELECTRICAL & ELECTRONIC ENGG. LAB	0	0	2	1		50	50
		Total				**25**			
Semester IV									
Sl No	**Course Code**	**Name of the Course**					**Assessment Pattern**		
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**
1	DPCH2004	FLUID MECHANICS	3	2	0	4	20	50	100
2	DPCH2005	INDUSTRIAL ASPECTS OF CHEMISTRY	3	0	0	3	20	50	100
3	DPCH2006	CHEMICAL TECHNOLOGY	3	2	0	4	20	50	100
4	DPCH2007	CHEMICAL PROCESS CALCULATION	3	2	0	4	20	50	100
5	DPCH2008	CHEMICAL REACTION ENGINEERING	3	0	0	3	20	50	100
6	DPCS2009	PETROLEUM REFINING PROCESS	3	0	0	3	20	50	100
7	DPCH2010	FLUID MECHANICS LAB	0	0	2	1		50	50
8	DPCH2011	CAD LAB	0	0	4	2		50	50
9	DPCH9001	DISRUPTIVE TECHNOLOGY	0	0	2	1		50	50
		Total				25			
Semester V									
Sl No	**Course Code**	**Name of the Course**					**Assessment Pattern**		
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**
1	IMED3001	INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT	3	0	0	3	20	50	100
2	DPCH3001	MASS TRANSFER	3	2	0	4	20	50	100
3	DPCH3002	TRANSPORT PHENEMENON	3	0	0	3	20	50	100
4	DPCH3003	POLLUTION CONTROL AND INDUSTRIAL SAFETY	3	0	0	3	20	50	100
5	DPCH3004	AUTOMATIC CONTROL PROCESS	3	0	0	3	20	50	100
6	DPCH 3005/ DPCH3006	WASTE WATER TEATMENT/ POLYMER TECHNOLOGY	3	2	0	4	20	50	100
7	DPCH3007	MASS TRANSFER LAB	0	0	4	2		50	50
8	DPCH3008	TECHNICAL ANALYSIS LAB	0	0	2	1		50	50
9	PDSS3008	PERSONALITY DEVELOPMENT & SOFT SKILLS	0	0	4	2		50	50
		Total				**25**			
Semester VI									
Sl No	**Course Code**	**Name of the Course**					**Assessment Pattern**		
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**
1	DPCH3009	FIELD VISIT AND PRESENTATION	0	0	0	3		50	50
2	DPCH9999	PROJECT	0	0	0	14		50	50
		Total				**17**			

List of Electives

Basket-1

Sl No	Course Code	Name of the Electives					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	DPCH3006	WASTE WATER TEATMENT	3	2	0	4	20	50	100
2	DPCH3007	POLYMER TECHNOLOGY	3	2	0	4	20	50	100
Total Credits						**8**			

Detailed Syllabus

Name of The Course	Mechanical Operations and solid handling				
Course Code	DPCH1013				
Prerequisite	None				
Co-requisite	DPCH1018				
Anti-requisite	None				
		L	**T**	**P**	**C**
		3	2	0	4

Course Objectives

1. To study the different laws for Mechanical operations and various size separation equipments.

2. To apply the fundamental laws to formulate governing equations for size reduction operations

Course Outcomes

CO1	Learn fundamentals of mechanical operations
CO2	Identify the equipments for various mechanical operations.
CO3	Learn principles of operations of experiments
CO4	Calculate the characteristic parameters through group tasks.
CO5	Identify the difficulties associated with experimental set through group tasks.
CO6	Develop an understanding of size analysis, size reduction, and solid handling

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Characterization of Solid Particles 6 hours
Particle shape, particle size, mixed particle sizes and size analysis, expressions for specific surface of mixture, average particle size, number of particles in mixture (no derivation).
Unit-2 Size Reduction 10 hours
Energy and power requirements in crushing, crushing efficiency, mechanical efficiency, expression for power required by machines. Crushing laws: Rittinger's law, Bond's law and Kick's law: Size reduction equipment- classification and names; study of machines: Blake crusher, Jaw crusher, Dodge crusher, Grinding rolls, Roll crusher Impactor, Attrition mill, Ball mill, Fluid energy mill, Colloid mill, Rotary knife cutter
Unit-3 Screening and Filtration (Qualitative treatment only) 10 hours
Screen analysis, Screening equipment: Gyrating screens, Stationary screens and Grizzlies vibrating screens; Classification of filtration, filter media, filter aids, mechanisms of filtration, discontinuous pressure filters, Filter press, Shell and leaf filters; Continuous: Vacuum filters, Rotary drum filters, Centrifugal filters; Suspended batch centrifuges; Clarifying filters.
Unit-4 Separation Methods 5 hours
Separation based on the motion of particles through fluids; Gravity classifiers, Sorting classifier; Thickeners: Batch sedimentation, rate of 66 sedimentation; centrifugal settling process: Cyclone, Hydro-cyclone, Tabular centrifuge, Disk centrifuge, Nozzle discharge centrifuge.
Unit-5 Mixing 5 hours
Mixing of solids and pastes, Change can mixer, Double motion paste mixers, Two arm Kneader, Kneader and disperser blades.

Suggested Reading

1. Narayanan C.M. and Bhattacharya B.C., "Mechanical Operation for Chemical Engineers – Incorporating Computer Aided Analysis", 1992, Khanna Publishers

2. Geankoplis C.J., Transport Processes and Separation Process Principles, 4th Ed., 2003, Prentice Hall.

3. Badger and Banchero, "Introduction to Chemical Engineering", Tata Mc.Graw Hill, 2006.

4. W.L.Mc.Cabe, J.C.Smith and P.Harriot, "Unit operations of chemical engineers", McGraw Hill International edition, V edition, 1995.

Reference Book (s)

1.Coulson J.M and Richerdson J.F, "Chemical Engineering - Volume 2", Elsevier Press, V Edition, 2006. 2. Foust Wenzel, "Principle of Unit Operations", John Wiley and sons, II Edition, 1980.

Name of The Course	Mechanical Operations and solid handling Lab				
Course Code	DPCH1018				
Prerequisite	None				
Co-requisite	DPCH1013				
Anti-requisite	None				
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives

The main objective of this MOSH subject is to study the basics of mechanical operation (crushing, grinding, screening, filtration, etc.) takes place during the process in chemical industry while MOSH Lab provides the experimental knowledge and practice of the subject. The main objective is to train the students towards the fundamental knowledge regarding to particle size reduction and enlargement by various methods.

Course Outcomes

CO1	Learn fundamentals of mechanical operations
CO2	Identify the equipments for various mechanical operations.
CO3	Learn principles of operations of experiments
CO4	Calculate the characteristic parameters through group tasks.
CO5	Identify the difficulties associated with experimental set through group tasks.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
	50	50	100

Course Content:

Experiment-1	To draw a layout of Chemical Engineering lab.
Experiment-2	To analyse the given sample on a set of screens and report the analysis.
Experiment-3	To determine the critical speed of a ball mill.
Experiment-4	To determine the efficiency of disintegrator.
Experiment-5	To determine filtration constant by a plate and frame filter press
Experiment-6	To determine the rate of settling of slurries of various concentration draw a height VS time curve.
Experiment-7	To determine the efficiency of Jaw crusher.
Experiment-8	To study and sketch a Rotary filter.

Suggested Reading

1. Narayanan C.M. and Bhattacharya B.C., "Mechanical Operation for Chemical Engineers – Incorporating Computer Aided Analysis", 1992, Khanna Publishers

2. Geankoplis C.J., Transport Processes and Separation Process Principles, 4th Ed., 2003, Prentice Hall.

3. Badger and Banchero, "Introduction to Chemical Engineering", Tata Mc.Graw Hill, 2006.

4. W.L.Mc.Cabe, J.C.Smith and P.Harriot, "Unit operations of chemical engineers", McGraw Hill International edition, V edition, 1995.

Reference Book (s)

1. Coulson J.M and Richerdson J.F, "Chemical Engineering - Volume 2", Elsevier Press, V Edition, 2006.

2. Foust Wenzel, "Principle of Unit Operations", John Wiley and sons, II Edition, 1980.

Name of The Course	Heat Transfer
Course Code	DPCH2001
Prerequisite	None
Co-requisite	DPCH2003
Anti-requisite	None

	L	T	P	C
	3	2	0	4

Course Objectives

1. To learn the basics and advanced concepts of heat transfer

2. To design methodologies involved in various types of heat transfer devices.

Course Outcomes

CO1	Explain the basic concepts of conduction, convection and radiation heat transfer.
CO2	Generalize and formulate and be able to solve one and two dimensional conduction heat transfer problems.
CO3	Determine the fundamentals of the relationship between fluid flow, convection heat transfer and mass transfer.
CO4	Study the concept of heat exchangers..
CO5	Explain the basic concepts of radiation heat transfer to include both black body radiation and gray body radiation.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Introduction **6 hours**
Introduction: Definition, Analogy between flow of heat and electricity, Modes of heat transfer.
Unit-2 Conduction **10 hours**
Conduction: The thermal conductivity, Fourier's law of heat conduction, Unsteady state equation, Steady state equation, Heat flow equation for composite walls, Composite cylinders, Optimum insulation thickness.
Unit-3 Convection **8 hours**
Convection: Natural and forced convection, Energy transfer mechanism through the boundary layer, Thermal and hydrodynamic boundary layer.
Unit-4 Heat Exchangers **8 hours**
Classification of heat exchangers – parallel and counter flow and cross flow heat exchanger overall heat transfer Coefficient and fouling factor - Concepts of LMTD and NTU methods - Problems using LMTD and NTU methods.
Unit-5 Radiation Heat Transfer **8 hours**
Emission characteristics and laws of black-body radiation - laws of Planck, Wien, Kirchoff, Stefan and Boltzmann- heat exchange between two blackbodies - concepts of shape factor .

Suggested Reading

1. Heat and Mass transfer-D.S.Kumar

2. Heat Transfer - P.K.Nag/ TMH

Reference Book (s)

1. Heat Transfer: A Practical Approach Y. A. Cengel

2. Heat Transfer / HOLMAN/TMH

Name of The Course	Chemical Engineering Thermodynamics				
Course Code	DPCH2002				
Prerequisite	None				
Co-requisite	None				
Anti-requisite	None				
		L	**T**	**P**	**C**
		3	2	0	4

Course Objectives

To understand the theory and applications of classical thermodynamics, thermodynamic properties, equations of state, methods used to describe and predict phase equilibria.

Course Outcomes

CO1	Explain the basic concepts of conduction, convection and radiation heat transfer.
CO2	Generalize and formulate and be able to solve one and two dimensional conduction heat transfer problems.
CO3	Determine the fundamentals of the relationship between fluid flow, convection heat transfer and mass transfer.
CO4	Study the concept of heat exchangers..

CO5	Explain the basic concepts of radiation heat transfer to include both black body radiation and gray body radiation.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Introduction and Basic Concepts **8 hours**
Systems, processes and surroundings, homogenous and heterogeneous systems, closed, open and isolated, intensive and extensive properties, state and path functions. Concept of internal energy, enthalpy, entropy, free energy and equilibrium equation of state, ideal gas law, Vander Waals equation. Amagat's law, Dalton's law, Henry's law, Zeroth law of thermodynamics.
Unit-2 First Law of Thermodynamics for Open and Closed System 8 hours
Statement of first law of thermodynamics, use of steam tables, calculation of internal energy, enthalpy, heat and work for ideal gas undergoing reversible, isothermal, Isobaric, adiabatic and polytrophic process. T-V, P-V and P-T diagrams.
Unit-3 Second Law of Thermodynamics **10 hours**
Statement of second law of thermodynamics: Kelvin Plank statement and Classius statement, Carnot cycle and its efficiency, concept of entropy and entropy change for closed and open system. Heat pump and heat engine (coefficient of performance and efficiency). Reversible and irreversible process. Thermodynamic temperature scale. Thermal thermodynamic equation, Maxwell relation
Unit-4 Entropy **6 hours**
Inequality of Classius, entropy-a property of a system entropy change in reversible process, entropy change for an open system, principle of increase of entropy, efficiency, irreversibility.
Unit-5 Chemical Reaction Equilibrium and Vapor Liquid Equilibrium 6 hours
Concept of chemical potential, Gibb's Duhen Equation, Raoul's law, Gibb's phase rule, vapor liquid equilibrium, dew point and bubble point, calculations for two component systems, fugacity, fugacity, fugacity coefficient, activity and activity coefficient.

Suggested Reading

Text Book (s)

1. Introduction to Chemical Engineering Thermodynamics by Smith and Vanness; McGraw Hill.

2. Chemical Engineering Thermodynamics by K.V. Narayanan; Prentice Hall India.

3. Chemical Engineering Thermodynamics by Dodge; McGraw Hill.

Reference Book (s)

1.Chemical Engineering Thermodynamics by YVC Rao

2. Engineering Thermodynamics by PK Nag

3. Thermal Engineering by Ballaney

4. Chemical Engineering Thermodynamics by K.A. Gavhane, Nirali Publication.

Name of The Course	Heat Transfer Lab				
Course Code	DPCH2003				
Prerequisite	None				
Co-requisite	DPCH2001				
Anti-requisite	None				
		L	**T**	**P**	**C**
		0	0	4	2

Course Objectives

1. Understand the basics of conduction convection and radiation.

2. To prepare students to know the characteristics heat exchangers.

3. Understand the basics of operations of different heat transfer instruments.

4. Students will be able to differentiate different working equipments

Course Outcomes

CO1	Understand the basic laws of heat transfer.
CO2	Evaluate heat transfer coefficients for natural convection

CO3	Analyze heat exchanger performance by using the method of log mean temperature difference.
CO4	Analyze heat exchanger performance by using the method of heat exchanger effectiveness.
CO5	Calculate radiation heat transfer between black body surfaces.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
	50	50	100

Course Content:

Experiment-1	Study of heat transfer through composite wall.
Experiment-2	Study of heat transfer in natural convection.
Experiment-3	Study of heat exchanger (plain tube type).
Experiment-4	Experimental study of thermal conductivity of metal rod.
Experiment-5	Experimental study of heat transfer from a pin-fin apparatus.
Experiment-6	Study of emissivity measurement apparatus.
Experiment-7	Blackbody radiation : determination of stefan boltzmann constant.
Experiment-8	To determine heat transfer coefficient in shell and tube heat exchanger using counter flow
Experiment-9	To determine the rate of evaporation in a jacketed bottle (open pan evaporation)
Experiment-10	To determine heat transfer rate in finned tube heat exchanger
Experiment-11	To study dropwise and filmwise condensation.
Experiment-12	To study Stefan Boltzmann law.

Suggested Reading

Text Book (s)

1. Heat and Mass transfer-D.S.Kumar

2. Heat Transfer - P.K.Nag/ TMH

Reference Book (s)

1. Heat Transfer: A Practical Approach Y. A. Cengel

2. Heat Transfer / HOLMAN/TMH

Name of The Course	Fluid Mechanics				
Course Code	DPCH2004				
Prerequisite	DPCH1013, DPCH1018				
Co-requisite	DPCH2009				
Anti-requisite	None				
		L	**T**	**P**	**C**
		3	2	0	4

Course Objectives

This course is designed to provide a basic understanding of present-day Fluid mechanics. Through lectures, demonstrations, and practical applications, the student will be introduced to various use and applications of fluid mechanics. Topics will include press and types of fluid and its properties, pressure measuring device like manometers, flow measuring devices, Bernoilis equation applications and different losses in general life of fluids related problems.

Course Outcomes

CO1	Recognize basic principles of fluid mechanics
CO2	Analyze fluid flow problems with the application of the momentum and energy equations
CO3	Analyze pipe flows as well as fluid machinery
CO4	Study about different types of pipes, fittings and valves

CO5	Analyze the performance aspects of fluid machinery specifically for centrifugal pump and reciprocating pump

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 INTRODUCTION TO FLUIDS 10 hours
Properties of fluids- Density and viscosity (absolute and kinematic), Vapour pressure and surface tension, cohesion and adhesion, Principle of Hydrostatic Equilibrium. Manometers- Types of Manometers (U, Inclined, Differential), Equations, Uses Types of Fluids- Ideal and Actual fluids, Compressible and Incompressible Fluids, Newtonian and Non-Newtonian fluids including time dependent and time independent fluids. Fluid flow phenomena : Laminar flow, shear rate, shear stress, rheological properties of fluid and turbulence
Unit-2 FLOW OF INCOMPRESSIBLE FLUIDS 8 hours
Continuity equations, Calculation of mass flow rate, volumetric flow rate, average velocity and mass velocity, Bernaulli's theorem, fluid heads and power requirement calculation, Friction factor, Fanning equation and Hagen Poiseuille equation friction losses in pipes, Calculation of friction loss due to enlargement and contraction. Reynolds experiment and its significance in determining turbulent, laminar and transition regime
Unit-3 MEASUREMENT OF FLOWING FLUIDS 6 hours
Orifice meter, venturimeter, pitot tube, rotameter, weirs and notches (Their construction and derivation of formulae, simple numerical problems, Definition:-Coefficient of contraction, Coefficient of velocity, coefficient of discharge.
Unit-4 PIPE, FITTING AND VALVES 8 hours
Tubes, Pipes, Schedule Number, Difference between tube and pipes, Standard sizes of pipes, wall thickness, Joints and fittings, Gate valve, Globe valve, Ball valve, Needle valve, Non return value, Butterfly valve, Diaphragm valve Pipe fittings (Flange, Socket, Albow, Tees, Star, etc.).
Unit-5 TRANSPORTATION OF FLUIDS 8 hours
Classification of pumps , Centrifugal Pump: Parts of centrifugal pump, working of Centrifugal pump, Performance of centrifugal pump (Characteristics of centrifugal pump), Characteristics curves, priming, Developed Head, Cavitations, Net Positive Suction Head (NPSH) Priming. Introduction to Fan, blower and compressor- Reciprocating & centrifugal compressor, Vacuum Pump, jet ejector - its working and application.

Suggested Reading

Text Book (s)

1. Hydraulics, Hydraulic Machine and Fluid Mechanics by R. S. Khurmi.

2. A.K.Upadhay, Fluid mechanics (hydraulics) ,'Katson publications.

Reference Book (s)

1. Unit operation of chemical engineering by Mc Cabe and Smith

2. Chemical Engineering Vol I & II by Coulson & Richardson

Name of The Course	Industrial Aspects of Chemistry				
Course Code	DPCH2005				
Prerequisite	CHEM1014,CHE1017				
Co-requisite	None				
Anti-requisite	None				
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

1. Analyze the industrial use of spectroscopy

2. Apply the concept of metallurgy in research and developme

3. Determine the industrial uses of alloys, lubricants and polymers.

4. Apply the use of paints and varnishes in industry.

Course Outcomes

CO1	Explain the basic concept of metallurgy and its application.
CO2	Explain the basic concept of alloys and its application.
CO3	Explain and analyze the lubricants and its uses
CO4	Explain and analyze the polymers and its uses.
CO5	Explain and analyze the composition and uses of paints.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Metallurgy **10 hours**
Definition of Metallurgy, General metallurgical processes-Concentration by Gravity Separation, Electromagnetic Separation, Froth Floatation; Chemical Processes - Calcination, Roasting. Reduction – Smelting, Aluminothermic Process, Electrolysis; Refining – Poling, Liquation, Distillation, Electrolytic Refining. Metallurgy of iron-Occurrence of Iron, Extraction of iron by Blast Furnace; Classification of steel – Based on its carbon content and its applications; Properties of cast iron, wrought iron and steel; Effects of elements on properties of steel; Heat treatment of steel – Hardening tempering, annealing and normalizing
Unit-2 Alloys **8 hours**
Definition, Preparation of Alloys, Classification of Alloys, Purposes of Alloying, Properties, composition and application of following non-ferrous alloys: (i) Duralumin (ii) Magnalium (iii) Monel metal (iv) Alnico (v) Babbit metal (vi) Gun metal (vii) Brass (viii) Bronze
Unit-3 Lubricants **7 hours**
Definition, Functions of Lubricants, Types of lubricants,Types of lubrication, Fluid Film Lubrication, Boundary lubrication, Extreme pressure lubrication, Classification of Lubricants; Characteristics of Lubricants, Degree of acidity, Saponification number, Viscosity & Viscosity index, Flash and fire point, Pour point & Cloud point; Selection of Lubricants
Unit-4 Polymer Chemistry **7 hours**
Plastics-Definition,Types of plastics, Properties of plastics, Engineering applications of plastics; Rubber-Natural and Synthetic Rubber, Properties – elasticity, abrasion, resistance, Tack,Rebound, Hardness, Stress, Strain, Vulcanization of Rubber, Applications of Rubber.
Unit-5 Paints **8 hours**
Purposes of applying Paints; Characteristics of good paints; Constituents of paints-Pigments, Vehicle, Thinners, Driers, Fillers, Plasticizers; Application of Paints; Failure of Paint Film; Varnishes; Types of Varnishes; Characteristics of Good Varnish; Applications of Varnishes; Distinction between Paints & Varnishes

Suggested Reading

Text Book (s)

1. Organic Chemistry Bahel and Tuli

2. Organic Chemistry Kumar and Mahenot

Reference Book (s)

1. Organic Chemistry Shivharae and Lawania

2. Organic Chemistry Morrison and Boyd

Name of The Course	Chemical Technology				
Course Code	DPCH2006				
Prerequisite	None				
Co-requisite	None				
Anti-requisite	None				
		L	**T**	**P**	**C**
		3	2	0	4

Course Objectives

1. To understand the chemical principles.

2. To understand the fundamentals and their importance of chemical operations.

3. To train our students well so that can communicate effectively both orally and in writing.

Course Outcomes

CO1	Industrial applications of various gases, Chemicals Refining products and polymers.
CO2	Understand the chemical processes, units and corresponding equipments.
CO3	Understand the Importance of fertilizer industry, Portland cement and Refinery products.
CO4	Analyse the capabilities to assess and manage these vulnerabilities through disaster planning and policy-making
CO5	Train our students with advanced technical skills to translate fundamental discoveries related to the subject

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Exam (MTE)**	**End Term Exam (ETE)**	**Total Marks**
20	30	50	100

Course Content:

Unit-1 Introduction **6 hours**
1.1 Introduction of Chemical process industries with reference to Indian resources, trade and export potential. 1.2 Process symbols used for various equipment 1.3 Uses of different process equipment 1.4 Introduction to Good Manufacturing practices (GMP) and Good Laboratory Practices (GLP)
Unit-2 Sugar Industry and Polymer Industry **10 hours**
2.1 Manufacturer of cane sugar 2.2 Various engineering problems encountered in sugar industry 2.3 Pollution abatement in sugar industry. 2.4 Types of polymer 2.5 polymerization process 2.6 manufacture of polyethylene, styrene nylon 6, nylon 66, rayon. Manufacture of rubber
Unit-3 Fermentation Industry **8 hours**
3.1 Introduction of fermentation industry 3.2 Types of fermentation processes 3.3 Production of ethyl alcohol by fermentation 3.4 Industrial alcohol, manufacture of industrial alcohol-beers, wines and liquors, 3.5 Various engineering problems encountered in fermentation industry 3.6 Pollution abatement in fermentation industry.
Unit-4 Soaps and Detergent Industry **6 hours**
4.1 Manufacturing of soap, glycerin as by products from soap 4.2 Manufacturing of detergents (including raw material and manufacturing process) 4.3 Manufacturing of House disinfectants 4.4 Various engineering problems encountered in soaps and detergent industry.
Unit-5 Petroleum Refining Industry **6 hours**
Constituents of petroleum, crude oil distillation-atmospheric and vacuum distillation. Pollution abatement in petroleum refining plant.

Suggested Reading

Text Book (s)

1. Outline of Chemicals Technology by M. Gopala Rao.

2. Chemical Technology Vol I & II by G. N. Pandey

Reference Book (s)

1. Chemical Process Industry by Shreve and Austin

2. Industrial chemicals by Faith, Keyes and Clark.

Name of The Course	Chemical Process Calculation				
Course Code	DPCH2007				
Prerequisite	None				
Co-requisite	None				
Anti-requisite	None				
		L	**T**	**P**	**C**
		3	2	0	4

Course Objectives

1. To understand and apply the basics of calculations related to material and energy flow in the processes
2. To study process technologies of various organic and inorganic process industries.
3. Perform mass balance calculations on existing processes (involving single and multiple units)
4. Use basic, applied chemistry/ thermodynamics in material balance calculations.

Course Outcomes

CO1	Exhibit critical and creative thinking skills for analysis and evaluation of problems and cause-effect relationships.
CO2	Introduce them to how environmental considerations are incorporated into engineering problem solving.
CO3	Understand the phase behavior of pure substances in relationship to the variables T, P, and density (including vapor pressure, critical point, freezing line, triple point, etc.).
CO4	Solve steady-state, overall, material and energy balances for systems which include one or more of the following: recycle, multiple units, chemical reactions.
CO5	Explain systems of units and measurement scales, chemical process types, process flow diagrams, steady-state mass and energy balance calculations

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Dimension and Units **8 hours**
Dimensions, Units and their conversion factors, S.I units, mole unit, Concept of gm mole, gm atom. Density & specific gravity, mole fraction (or percent) mass fraction (or percent). Conversion of the composition of a mixture from mole fraction (or percent) to mass (wt.) fraction (or percent) and reverse. Transform a material from one measure of concentration to another, including mass/volume, moles/volume, PPM, molality, normality and molarity.
Unit-2 Basic Chemical Calculations **6 hours**
P V T relationship, standard conditions, partial pressure and pure component volume. Dalton's and Amagt's laws, average molecular weights of a gaseous mixture. Problems related to calculation of composition, average molecular weight, density and molar density, and concentration of a gaseous mixture.
Unit-3 Stoichiometric Relationship **6 hours**
Definition of excess and limiting reactant, conversion, degree of completion and yield in a reaction. Relating problems. Identification of limiting and excess reactant and calculation of percent excess reactant, the percent conversion, Degree of completion of reaction, Yield for a chemical reaction with reactants being in non-stoichiometric proportion.
Unit-4 Combustion **6 hours**
Analysis of products of combustions: - Proximate and ultimate analysis, Problems of fuel analysis, Air-fuel ratio, and Theoretical oxygen/air required, Problems on flue gas analysis, Oxidation of sulphur and its compounds.
Unit-5 Material Balance and Energy Balance **10 hours**
Tie substance, bye pass streams, recycle and purge, simple problems relating various chemical reactions and without chemical reactions. Forms of Energy, Definition of Exothermic and endothermic reaction, Standard heat of reaction, Heat of combustion, Heat of formation, Heat capacity &mean heat capacity, Net and gross heating value. Calculation of: Enthalpy changes (without change of phases), Standard heat of reaction from heat of formation and combustion data, Heat of formation and combustion from, combination of heat of reactions at reference temperature, Heat of reaction at constant pressure or constant volume

Suggested Reading

Text Book (s)

1. Stoichiometry by B. L. Bhatt & S. M. Vora

2. Chemical Process Principles Part - I by O. A. Hougen & K. M. Watson

3. Chemical Process Principles Part - I by R. A. Rastogi

Reference Book (s)

1. "Chemical Process Calculations" by K Asokan

2. "Stoichiometry and Process Calculations" by Narayanan K V and Lakshmikutty B

Name of The Course	Chemical Reaction Engineering				
Course Code	DPCH2008				
Prerequisite	None				
Co-requisite	None				
Anti-requisite	None				
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

1. To learn about reaction kinetics for single, multiple, isothermal, non-isothermal reactions.

2. To understand the basics of reactor design procedures.

Course Outcomes

CO1	Know about rate of chemical reaction.
CO2	Understand various types of reactors.
CO3	Know the fundamentals of reactor design.
CO4	Know the fundamentals of heterogeneous reacting system
CO5	Understand the concept of catalysis

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Introduction to Chemical Kinetics 8 hours
1.1 Concept of rate of reaction, rate equation, rate constant, order of reaction,Molecularity of reaction, Chain reaction, Non chain reaction. 1.2 Type of intermediate form in non-chain reaction. 1.3 Single reaction multiple reaction, non-elementary reaction. 1.4 Theories of reaction rates constant- Arrhenius law and problems based on it, from Thermodynamic, from Collision theory, from Transition state theory. 1.5 Activation Energy.
Unit-2 Interpretation of batch reactor data. 8 hours
2.1 Concept of batch reactor, semi Batch reactor, constant and variable volume reactions. Type of intermediate form in non-chain reaction. 2.2 Integral and Differential method of analysis of batch reactor data. 2.3 Integral method of analysis of irreversible unimolecular first order reaction, bimolecular second order reaction, nth order, zero order and auto catalytic reaction. Problem based on zero order, first order and second order reactions. 2.4 Half-life concept for the overall order of irreversible reactions and problem based on that.
Unit-3 Introduction to Reactor Design. **8 hours**
3.1. Type of reactor (Batch reactor, Continuous reactor, Plug flow reactor, Mixed flow reactor, Biological reactor, Fixed (packed) bed reactor, fluidized bed reactor. 3.2. Concept of space-time, space velocity and holding time. 3.3. Performance equation for ideal batch reactor, mixed flow reactor and plug flow reactor for constant volume and variable volume irreversible first order reaction. Problems based on the above topic.
Unit-4 Introduction to Heterogeneous Reacting System **8 hours**
4.1. Rate Equation for Heterogeneous Reaction 4.2. Contacting pattern for two phase system 4.3. Factor affecting heterogeneous reaction
Unit-5 Catalysis **8 hours**
5.1. Definition, types and classification of catalyst 5.2. Preparation of catalyst, ingredients (Promoter, inhibitor, accelerator) 5.3. Catalyst Poisoning, regenerator. 5.4. Theories of catalysis-Adsorption, Intermediate compound formation theory. 5.5. Desired properties of catalyst.

Suggested Reading

Text Book (s)

1. Chemical Reaction Engineering by Octave Levenspiel.

2. Chemical Engineering Kinetics by J. M. Smith.

Reference Book (s)

1. Reaction Engineering by Walas. 2. Chemical Reaction Engineering I & II by K. A. Gavhane.

Name of The Course	Petroleum Refining Process				
Course Code	DPCH2009				
Prerequisite	DPCH2006				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

1. Indicate what crude oils consist of and how crude oils are characterized based on their physical properties

2. Express the objectives of petroleum refining and classify the processes used in petroleum refining

Course Outcomes

CO1	Analyze petrochemical processes to describe existing and innovative emerging technologies for the production of synthesis gas, olefins, aromatics and their derivatives including industrial polyolefin' s and polyesters..
CO2	Apply fundamental chemical engineering knowledge to industrial processes, such as steam reforming, steam cracking and catalytic reforming etc.
CO3	Explain energy integration in a refinery: Pump rounds and side slips
CO4	Describe the chemistry of petroleum and its characterization
CO5	Explain about the Charges and products and yield estimation techniques of a refinery.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Origin, Composition Of Petroleum, and Sedimentary Environment 4hours
Introduction, Occurrence of Petroleum by Biological method - Composition of Petroleum, Properties of -Paraffin's, Olefins, Naphthalene, Aromatics and Inorganic impurities -sulphur, nitrogen, chlorine- Source and reservoir rocks-Oil bearing rocks Continental environment-Transitional environment-Marine environment-Refineries & its capacity in India.
Unit-2 Evaluation of Properties 6 hours
Evaluation of Petroleum, U.O.P Characterization factor, Correlation Index - TBP Apparatus and its necessity in Refinery - Testing methods and its importance – ASTM Distillation, Reid vapor pressure, Oxidation stability, Smoke Point, Aniline Point - Carbon residue by Rams bottom method, Copper Corrosion test and Softening point Test - Refinery Products and its uses.
Unit-3 Fractionation of Petroleum 10 hours
Dehydration and Desalting of crude by settling and electric Desalting method; Coking and Thermal process, Delayed coking; Catalytic cracking, Cracking reactions, Zeolite catalysts; Cracking Feed stocks and reactors, Effect of process variables; FCC Cracking, Catalyst coking and regeneration; Catalytic Cracking Units; Objective and application of catalytic reforming process reforming catalysts; Hydro treating and Hydro cracking; Isomerization,Alkylation and Polymerization
Unit-4 Treatment Techniques Of Lubes, Thermal And Catalytically Processes 10 hours
Flow diagram and Process description of: Hydrodesulphurization Process, Hydro fining Process - Phenol Extraction of Lubes, Furfural Extraction of lubes – Catalytic Reforming- Flow diagram and Process description of: Vis breaking, Dubs Two coil Cracking Process- Fluid Catalytic Cracking, Hydro cracking- Coking definition, Delayed coking operation, Decoking.
Unit-5 Environmental issues and New Trends in petroleum refinery operations 6 hours
Ecological consideration in petroleum refinery, Waste water treatment, Control of air pollution, New trends in refinery, Alternative energy

sources, Biodiesel, Hydrogen energy from biomass.

Suggested Reading

Text Book (s)

1. F. Self, E. Ekholm, and K. Bowers, Refining Overview - Petroleum, Processes and Products, AIChE CD-ROM, 2000.

2. Richard Dawe, “Modern Petroleum Technology”, Vol.l, Upstream,6th Edition, John and Wiley Sons Ltd,2000.

3. Bhagan Sahay “Petroleum Exploration and Exploitation Practices” Allied Publishers Ltd., Chennai, 1994.

Reference Book (s)

1. Petroleum Refining, by J. H. Gary, G. E. Handwerk, M. J. Kaiser, 5th Edition, CRC Press NY, 2007

2. B.K. BhaskaraRao “Modern Petroleum Refining Process” OXFORD & IBH Publishing Co. Pvt. Ltd.

Name of The Course	Fluid Mechanics Lab				
Course Code	DPCH2010				
Prerequisite	DPCH1013, DPCH1018				
Co-requisite	DPCH2004				
Anti-requisite	None				
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives

1. Encourage creativity in the use of experimental apparatus and data-acquisition.

2. Foster self-reliance required for open-ended experiments and reduce dependence on a cookbook approach

3. Develop the ability for team work

4. Illustrate the physical concepts of fluid flows and introduce students to experimental techniques for fluid mechanics

Course Outcomes

CO1	Grasp compare the results of analytical models introduced in lecture to the actual behavior of real fluid flows.
CO2	Perform standard measurement techniques of fluid mechanics and their applications.
CO3	Understanding of fluid flow through packed and fluidized beds.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
	50	50	100

Course Content:

Experiment-1	Identification of laminar and turbulent flows (Reynolds apparatus)
Experiment-2	Measurement of point velocities (Pitot tube)
Experiment-3	Verification of Bernoulli’s equation
Experiment-4	Variation of Orifice Coefficient with Reynolds Number
Experiment-5	Determination of Venturi Coefficient
Experiment-6	Friction losses in fluid flow in pipes
Experiment-7	Pressure drop and void fraction in a fluidized bed
Experiment-8	Pressure drop in a packed bed for different fluid velocities
Experiment-9	To Study the coefficient of contraction for a given open orifice
Experiment-10	To Study the coefficient of discharge in a V – notch.

Suggested Reading

Text Book (s)

1. Likhi S.K., Hydraulics Laboratory Manual, New Age International Publishers, New Delhi.

2. A.K.Upadhay, Fluid mechanics(hydraulics) ,'Katson publications

Reference Book (s)

1. Fluid Mechanics & Hydraulic Machines, Laxmi Publication (P) Ltd., New Delhi.

2. Vijay Gupta & Gupta S.K., Fluid Mechanics, New Age International Publishers, New Delhi.

Name of The Course	CAD Lab				
Course Code	DPCH2011				
Prerequisite	DPCH2001				
Co-requisite	DPCH2004, DPCH2007				
Anti-requisite	None				
		L	**T**	**P**	**C**
		0	0	4	2

Course Objectives

Use full-scale CAD/CAM software systems designed for geometric modeling of machine components and automatic generation of manufacturing information.
Understand the basic analytical fundamentals that are used to create and manipulate geometric models in a computer program
Improve visualization ability of machine components and assemblies before their actual fabrication through modelling, animation, shading, rendering, lighting and coloring
Understand the possible applications of the CAD/CAM systems in motion analysis, structure analysis, optimization, rapid prototyping, reverse engineering and virtual engineering

Course Outcomes

CO1	Perform the different techniques of graphical representation for simple parts and assemblies
CO2	Apply/develop solutions or to do research in the areas of Design and simulation in Chemical Engineering
CO3	Review and document the knowledge developed by scholarly predecessors and critically assess the relevant technological issues.
CO4	Write the key information contained in different plans for activities within the engineering and defense sector, learning and applying correctly the current technical drawing rules.
CO5	Design and validate technological solutions to defined problems and communicate clearly and effectively for the practical application of their work

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
	50	50	100

Course Content:

Experiment-1	Introduction to Auto CAD
Experiment-2	Different Software for CAD
Experiment-3	Design of simple flow network consisting of fittings and piping
Experiment-4	Design of complex flow network consisting of fittings, pumps and (horizontal, vertical & inclined) piping
Experiment-5	Design of CSTR reactor without heat transfer
Experiment-6	Design of CSTR reactor with heat transfer
Experiment-7	Design of multicomponent distillation column
Experiment-8	Design of TEMA type shell and tube heat exchanger (no phase change)
Experiment-9	Design of TEMA type shell and tube heat exchanger (with phase change)
Experiment-10	Steady state flow sheeting of a specific process

Suggested Reading

Text Book (s)

1. “Automation, Production systems and Computer Integrated Manufacturing” by M P Groove

2. “Introduction to Automated Process Planning” by T C Chang and R A Wysk

3. “Concurrent Design of Products and Processes” by V L Nevins and D E Whiteney

Reference Book (s)

1. “Computer Aided Manufacturing” by P N Rao

2. Mastering CAD/CAM by Ibrahim Zeid, ISBN 978-0-07-286845-6, McGraw-Hill

3. Solid Works 2011 for Designers by Prof. Sham Tickoo, ISBN: 978-1-932709-89-6, CADCAM Technologies, USA.

Name of The Course	Disruptive Technology				
Course Code	DPCH9001				
Prerequisite	DPCS1004, DPCS1008				
Co-requisite	None				
Anti-requisite	None				
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives

1. Knowledge of pertinent business use-cases related to specific technologies, and ability to assess these use-cases.
2. Ability to successfully participate in a tech-hackathon, in cross-disciplinary teams, aiming at producing a working prototype addressing a use-case or industry challenge.
3. Awareness of the importance of cross industry collaboration and engagement in the process of ongoing standards-building for new technologies.
4. Understanding of issues and dilemmas in the development of disruptive technologies related to ethics, privacy, sustainability, and legislation

Course Outcomes

CO1	Understand the processes that have enabled certain technologies to change our lives.
CO2	Review those current technologies with the greatest potential to change the world.
CO3	Understand the positive and negative consequences of disruptive technologies.
CO4	Conclude on leading processes in a world full of opportunities.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
	50	50	100

Course Content:

Experiment-1	Course Introduction: 1. Intro to disruption & exponential technologies 2. Technology trends: Determining technology 3. Emerging technologies: overview of how technological disruption happens trends by a historical review. Disruptive and emerging technologies: Advances that will transform life, business, and the global economy.
Experiment-2	Introduction to Artificial Intelligence
Experiment-3	Applications of Artificial Intelligence: Security, Transparency and Traceability
Experiment-4	Introduction to Internet of Things
Experiment-5	Applications of Internet of Things: Smart Cities, Agriculture etc
Experiment-6	Introduction to Robotics
Experiment-7	Applications of Robotics in manufacturing process
Experiment-8	Introduction to 3D Printing
Experiment-9	Applications of 3D Printing in Industries
Experiment-10	Introduction to Android App Development
Experiment-11	Develop an app using Android Studio

Suggested Reading

Text Book (s)

1. "S. Russell and P. Norvig. Artificial Intelligence: A Modern Approach. Prentice Hall, Second Edition(2003)."

2. Francis daCosta, “Rethinking the Internet of Things:

3. Cloud Computing Bible. Barrie Sosinsky. John Wiley & Sons.

4. Anand Rajaraman , "Mining of Massive Datasets", Cambridge University Press, 2012.

5. Android programming: The big nerd ranch guide. Bill Philips

Reference Book (s)

1. Goodfellow,I. Bengio, Y. Courville. Deep Learning.MIT Press,2016

2. Vijay Madisetti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”,

3. Android Design Patterns.Greg Nudelman.

Name of The Course	Mass Transfer				
Course Code	DPCH3001				
Prerequisite	None				
Co-requisite	DPCH3008				
Anti-requisite	None				
		L	**T**	**P**	**C**
		3	2	0	4

Course Objectives

1. Introduce the students with the most important separation equipments in the process industry, and provide proper understanding of unit operations.

2. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

3. Comprehensive, theory based understanding of the underpinning natural and physical science and the engineering fundamentals applicable to the engineering discipline.

Course Outcomes

CO1	Understand the applications of different mass transfer processes.
CO2	Understand the diffusion mass transfer.
CO3	Operation of cooling tower will be clearly understood.
CO4	Operation of Dryer will be understood.
CO5	Understand the mechanism of distillation, extraction and absorption

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 DIFFUSION 6 hours
Definition of diffusion, Rate of diffusion in Mass Transfer, Fick's law, diffusion in the gas phase- Equimolecular counter diffusion, diffusion through a stationary gas (Stefan's Law), Mass Transfer Coefficient, Film theory and penetration theory of Mass Transfer.
Unit-2 ABSORPTION 10 hours
Introduction, importance, Gas absorption equipment’s - Plate and packed column, Spray towers,bubble column, Choice of solvent for absorption, Height of Transfer Unit (HTU), Number of Transfer Unit (NTU), Meaning and their relationship (Simple Numerical Problems).
Unit-3 DISTILLATION 12 hours
Equilibrium or flash distillation, Differential distillation, Batch distillation, Vacuum and Steam, distillation, Azeotropic and Extractive distillation. Types of distillation columns-Packed and tray column, Types of Trays/plate- Perforated plate or sieve, valve plate , Bubble cap plate. Entrainment, weeping, Vapor liquid equilibrium diagram, Raoult's law; Relative volatility, equilibrium diagram and construction of equilibrium diagram, equilibrium plate, Location of feed plate; Mc-able Thiele diagram- section above and below feed plate; Intersection of operating line. Location of q-line, calculation of no. of equilibrium plate by Mc-Cable Thiele diagram. Overall plate efficiency.
Unit-4 EXTRACTION 6 hours
Applications of this operation, Choice of solvent, Steps of extraction operation, Solid Liquid extraction, construction and description of Bed Basket type oil seed extractor or Bollman extractor, Rotocel extractor. Liquid extractor; description and construction of Mixer settler

extraction system, perforated plate and baffle towers.
Unit-5 DRYING & HUMIDIFICATION 5 hours
General drying behavior-Critical moisture content, equilibrium moisture content: Description and construction of dryer. Tray dryer, Screen conveyor dryer, Rotary dryer. Definition and calculation of Humidity, Percentage humidity, Relative humidity, Dry bulb and wet bulb-temp, Adiabatic saturation temperature, Use of humidity chart, Dew point, simple numerical problem using humidity chart, construction and description of cooling towers.

Suggested Reading

Text Book (s)

1. Mass Transfer Operation by R. Treybal

2. Chemical Engineering Vol. II by Richardson & Coulson

Reference Book (s)

1. Introduction to Chemical Engineering by Badger & Bancher

2. Unit Operations-II- K A GAVHANE

Name of The Course	Transport Phenomena				
Course Code	DPCH3002				
Prerequisite	DPCH3001, DPCH2001				
Co-requisite	DPCH3007				
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

1. Introduce the students with the most important separation equipments in the process industry, and provide proper understanding of unit operations.

2. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

3. Comprehensive, theory based understanding of the underpinning natural and physical science and the engineering fundamentals applicable to the engineering discipline.

Course Outcomes

CO1	Understand transports of momentum, energy and mass in chemical and mechanical systems.
CO2	Explain transport processes.
CO3	Analyze to do heat, mass and momentum transfer problems.
CO4	Analyze industrial problems along with appropriate boundary conditions.
CO5	Analyze to develop steady and time dependent solutions along with their limitations.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Introduction 4hours
Definition of Transport phenomena, Analogy between mass, heat and momentum transfer, Definition of viscosity, diffusivity and conductivity, Reynolds analogy, Chilton - Colburn analogy.
Unit-2 Transport in Laminar Flow 6 hours
Shell balances for momentum, energy and mass transfer, One-dimensional velocity, temperature and concentration profiles.
Unit-3 Mechanism of Heat Transfer 10 hours
Diffusion in gas phase, Equimolecular counters diffusion, Diffusion through a stationary gas, Comparison of mass transfer rates in equimolecular counter diffusion and diffusion through a stationary gas, Maxwell's law of diffusion, Diffusivities of various vapors, Mass transfer across a phase boundary-Two film theory, Penetration theory, Mass transfer coefficients.

Unit-4 Mechanism of Heat Transfer 8 hours
Heat transfer by conduction, Steady state heat transfer through- Single flat wall, Composite wall, Thick walled tube and Spherical shell, Unsteady state transfer of heat, Heat transfer by convection, Determination of film coefficient, Forced convection inside tubes, Forced convection outside tubes, Natural convection.
Unit-5 Mechanism of Momentum Transport 6 hours
Law of viscosity, Equation of continuity, Newtonian and Non-Newtonian fluids, Boundary layers and pipe flow, the momentum equation.

Suggested Reading

Text Book (s)

1. Transport Phenomena Bird, Stewart & Light foot.

2. Unit operations of chemical Engg. Mc Cabe & Smith

3. Chemical Engineering Vol. I,II & III Coulson & Richardson.

Reference Book (s)

1. Introduction to Chemical Engineering by Badger & Bancher

2. Unit Operations-II- K A GAVHANE

3. Chemical Engineering, Volume-2, Coulson and Richardson

Name of The Course	Pollution Control and Industrial Safety				
Course Code	DPCH3003				
Prerequisite	DPCH2005, EEDM2001				
Co-requisite	None				
Anti-requisite	None				
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

1. To assess air pollution: sources and effects

2. To assess sources and classification of water pollutants

3. To assess sources of soil contamination

Course Outcomes

CO1	Explain the classification of land, water and air pollution.
CO2	Explain the various methods to control pollution.
CO3	Apply the concept of safety in industries.
CO4	Explain the factory rule and acts.
CO5	Apply Safety laws and its applications in industries.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Introduction 4hours
What is Pollution? Classification of pollution, land pollution, Water pollution, Air pollution and Noise pollution. Impact assessment of development projects. Character and origin of industrial wastes
Unit-2 Pollution Control and Measures 6 hours
Environment Pollution, Environment Pollution Causes, Environment pollution problems, Techniques of pollution control, biological methods ,implementation to control pollution, applications of pollution control
Unit-3 Safety And hazard 10 hours
Concepts of safety, biological and noise hazards, Hazards from utilities like air, water, steam, Hazard identification - & Safety Audits, Checklists method of hazard Analysis, HAZAN – HAZOP - Vulnerability models.
Unit-4 Fire and Explosion 8 hours
Introduction to Consequence Analysis, Fire and Explosion models, (P2), Radiation - Tank on fire Flame length – Risk analysis, Radiation intensity calculation and its effect to plant, people & Property, UCVCE - Explosion due to Deflatration, Detonation, TNT, TNO & DSM model - Over pressure, Methods for determining consequences effects - Effect of fire, Effects of

explosion - Risk contour, Flash fire - Jet fire - Pool fire - BLEVE - Fire ball.
Unit-5 Factory Rules & Acts and Safety laws 6 hours
Solid Factory rule act 1948, U.P factory rule 1950, gas cylinder rule 2004, boiler act1923, petroleum act 1934, Manufacture, storage, import of hazardous chemicals rules, 1989, Event tree and Fault tree Analysis, (P3), Past accident analysis - Flixborough , Mexico - Bhopal – tragedy, Safety in plant design and layout, Safety provisions in the factory act 1948, Indian explosive act 1884, ESI act 1948, Advantages of adopting safety laws.

Suggested Reading

Text Book (s)

1. Arcadio P. Sincero and Geogoria Sincero ., "Environmental Engineering"

2. S.P.Mahajan., " Pollution control in process Industries." Tata McGraw Hill Publishing Co.,

3. Environmental pollution control., By C.S.Rao., Wiely Eastren Ltd.,

Reference Book (s)

1. Gilbert M. (2007) An Introduction to Environmental Engineering and Science, Pearson Education.

2. Harrison R.M. (2001) Pollution: Causes, Effects and Control, Fourth Edition, Royal Society of Chemistry.

3. Perkins H.C. (1974) Air Pollution, McGraw Hill.

Name of The Course	Automatic Control Process				
Course Code	DPCH3004				
Prerequisite	None				
Co-requisite	None				
Anti-requisite	None				
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

1. Specify the required instrumentation and final elements to ensure that well-tuned control is achieved.

2. Explain the use of block diagrams & the mathematical basis for the design of control systems.

3. Explain the importance and application of good instrumentation for the efficient design of process control loops for process engineering plants.

4. Explain the use of block diagrams & the mathematical basis for the design of control systems.

Course Outcomes

CO1	Apply the knowledge gained in basic mathematics, physical sciences and engineering courses to derive mathematical models of typical engineering processes.
CO2	Learn the role of a control engineer in multi-disciplinary teams.
CO3	Acquire basic knowledge of control system analysis and design tools, with emphasis on computer aided design.
CO4	Use the techniques, skills and modern control engineering tools necessary for engineering practice.
CO5	Design a system, component or process to meet desired needs

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 INTRODUCTION & ELEMENTS OF CONTROL SYSTEM 6 hours
What is Automatic control, Advantage of Automatic control, manual and automatic control, physical and block diagram. Definition-Input means, controlling means, actuating means, measuring means, final control elements.
Unit-2 PROCESS CHARACTERISTICS 10 hours

Process Variables, process degree of freedom, forcing function, step fn., ramp, impulse, sinusoidal function, Laplace transformation. Elements of process dynamics:- Proportional, Capacitance. Time constant and oscillatory element, determination of system function or transfer function of the following:- (Sketch physical diagram and block diagram) 1st order system or time constant element :-(i) Naked bulb thermometer. (ii) Stirred tank heater. (iii) Mixing process. (iv) R.C. Circuit. (v) Liquid levels. 2nd order system or oscillatory type element. (i) Bulb in thermo well. (ii) Mechanical damper. (iii) Fluid manometer or U tubes. Response of Ist order system to step, ramp, impulse and sinusoidal inputs, Response of IInd order system to step change (Transient response).
Unit-3 CONTROLLER CHARACTERISTEIC OR MODES OF CONTROL ACTION 6 hours
Elements of controller, proportional control, Integral control, proportional-integral control, proportional derivative control, proportional-integral-derivative control, Two positions control.
Unit-4 PROGRAMMABLE LOGIC CONTROLER (PLC) 5 hours
Introduction, Principle of operation, Architecture of programmable controller, Programming the programmable controller, Application of programmable control.
Unit-5 DISTRIBUTED CONTROL SYSTEM (DCS) 5 hours
Real time computer control system - concept, functional requirements of distributed process control system, configuration some popular DCS.

Suggested Reading

Text Book (s)

1. Johnson, C.D.(2006)."Process control instrumentation technology," Prentice-Hall, New Delhi

2. Smith, C.A. and Corripio,A.B.(1997)."Principles and practice of automatic process control," Wiley

3. “Discrete-time Control Systems” by K Ogata

Reference Book (s)

1. Seborg, D.E.,Edgar, T.F. and Mellichamp, D.A.(2003). "Process dynamics and control," Wiley,

2. Stephanopoulos, G.(1984)."Chemical process control: an introduction to theory and practice," Prentice-Hall, New Delhi.

Name of The Course	Wastewater Treatment				
Course Code	DPCH3005				
Prerequisite	DPCH2005, EEDM2001				
Co-requisite	None				
Anti-requisite	None				
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

1. Understand about the quantification and analysis of wastewater and treatment.

2. Understand about analysis and quantification of hazardous and nonhazardous solid waste wastes, treatment and disposal.

3. Understand the different unit operations and unit processes involved in conversion of highly polluted water to potable standards.

4. Understand the different types of wastes generated in an industry, their effects on living and non-living things.

Course Outcomes

CO1	Determine the BOD, COD & TOC of waste water.
CO2	Explain the different terminologies used in waste water treatment.
CO3	Explain the different methods used in sewage water treatment.
CO4	Express the applications of solid waste management.
CO5	Apply the use of biotechnological applications for the treatment of waste water.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Introduction **7 hours**
Types of emissions from chemical industries and effects on environment, Type of pollution and their sources, Effluent guide lines and standards. Characterization of effluent streams, Oxygen demands and their determination (BOD, COD, and TOC) (P1), Oxygen sag curve, BOD curve mathematical, Controlling of BOD curve,Self-purification of running streams.
Unit-2 Important terminologies in waste water treatments systems **10 hours**
Sludge, aerobic treatments, anerobic treatments, bioengineering, biosolids, clarifiers, sewers, wetland, retention time, disinfection, influent, effluent, scum, anaerobic digestion, trickling filter, root zone treatment technology. Sources and effects of sludge on environment. Methods of sludge disposal.
Unit-3 Sewage and waste water treatments systems **5 hours**
Primary treatment methods, Secondary treatment methods, Tertiary treatment methods
Unit-4 Biotechnological application of hazardous waste management and management of Resources **4 hours**
Use of microbial systems. Waste water treatment using root zone treatment by plants. Reclamation of wasteland: biomass production for Biogas
Unit-5 Solid waste management **8 hours**
Solid waste management: Sources and classification, Methods of collection (HCS and SCS), Disposal methods (Landfill and incineration), Hazardous waste management; nuclear wastes; Health and environment effects, sources and disposal methods, Chemical wastes; Health and environment effects, Treatment and disposal. Pollution control in selected process industries: Fertilizer industries, Petroleum refineries and Thermal power plants.

Suggested Reading

Text Book (s)

1. Bio treatment Systems, Volume II; D.L. Wise

2. Advances in Biotechnological Process; Mizrahi & Wezel.

3. Metcalf & Eddy, Inc. (2003). Wastewater Engineering: Treatment and Reuse (4th ed.). New York: McGraw-Hill. ISBN 0-07-112250-8.

Reference Book (s)

1. Milton Wainwright. An Introduction to Environmental Biotechnology. Kluwer Academic Publishers, Boston. Hardbound, ISBN 0-7923-8569-1.July 1999, 192.

2. Gabriel Bitton (Author). Wastewater Microbiology, 2nd Edition. Wiley-Liss; 2nd edition (February 16, 1999).

Name of The Course	Polymer Technology				
Course Code	DPCH3006				
Prerequisite	DPCH2005, CHEM1014, CHEM1017				
Co-requisite	None				
Anti-requisite	None				
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

1. To deal with identification and characterization of raw materia along with different techniques of processing.

2. To develop the skills required for working in production, proces of plastics, rubbers and fibres manufacturing Industries.

Course Outcomes

CO1	Student should be able to understand the basic concepts of monomer, polymer, degree of polymerization, and repeating units and their properties
CO2	Understand the techniques and their characteristics/limitations of synthesis of polymers
CO3	Produce plastics using appropriate reactions and unit operations steps

CO4	Produce rubbers using appropriate reactions and unit operations steps.
CO5	Produce fibres using appropriate reactions and unit operations steps.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Introduction and to polymers 9 hours
Introduction, Classification of polymers according to chemical and geometrical structure of polymer molecules, General remarks on polymer microstructure, Microstructure based on the chemical structure – Organic and inorganic polymers, Homochain and heterochain polymers, Homopolymers and copolymers, Microstructure based on the geometrical structure – Linear, branched and cross-linked polymers, Random, alternating, block and graft co-polymers, Stereo-regular polymers – Optical isomerism, Geometrical isomerism.
Unit-2 Chemistry of Polymerisation and Polymerization Techniques 7 hours
Introduction, Chain polymerisation – Free radical polymerisation, Ionic polymerisation, Introduction to catalytic polymerisation, Step polymerization. Bulk polymerisation, Solution polymerisation, Suspension polymerisation, Emulsion polymerisation, Interfacial polymerization
Unit-3 Plastics 7 hours
Introduction, Classification of Plastics, Raw Materials, Preparation, properties, and applications for the Addition Polymerization Products like Poly Ethylene, LDPE, HDPE, PVC, Poly Styrene, Alloys, blends, and composites, Engineering Plastics like Nylon, ABS, Poly Carbonates, TEFLON etc, Recent trends in plastics like bio degradable plastics etc
Unit- 4 Rubbers 8 hours
Introduction and classification of rubber, vulcanization, reinforcement with carbon black, Natural rubber, Preparation, properties, and applications of synthetic rubbers like SBR, Poly Butadiene, PolyEthylene Propylene & Butyl Rubber, Brief of some important rubbers.
Unit-5 Fiber and Film 5 hours
Introduction to fiber, Properties of fiber, Cellulosic fiber: Viscose Rayon and Cellulose Acetate, Polyamide fibers, Polyester fiber, Acrylic fibers, carbon fibers, Films: Viscose & Cellulose Acetate, Polyolefins, Poly Vinyl Chloride

Suggested Reading

Text Book (s)1. Polymer Science by V R Gowarikar

2. Outlines of polymer Technology by R Sinha

Reference Book (s)

1. Textbook of polymer scince by Fred W Billmeyer Jr.

2. Experimental methods of Polymer by A Ya. Malkin et al.

Name of The Course	Mass Transfer Lab				
Course Code	DPCH3007				
Prerequisite	DPCH3001				
Co-requisite	None				
Anti-requisite	None				
		L	**T**	**P**	**C**
		0	0	4	2

Course Objectives

1. Understand the basics of mass transfer.
2. Understand the basic operations of different mass transfer instruments.

Course Outcomes

CO1	Understand the applications of different mass transfer processes.
CO2	Understand the mechanism of crystallization and absorption.
CO3	Operation of various mass transfer equipments.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
	50	50	100

Course Content:

Experiment-1	Steam distillation.
Experiment-2	Differential distillation.
Experiment-3	Absorption process.
Experiment-4	Extraction process.
Experiment-5	Tray vs packed tower.
Experiment-6	Height of a transfer unit.
Experiment-7	Drying Characteristics.
Experiment-8	Cooling tower.
Experiment-9	Number of tray calculation in distillation (Mc Cabe Thiele method)
Experiment-10	Bollman Extractor

Suggested Reading

Text Book (s)

1. Mass Transfer Operation by R. Treybal

2. Mass Transfer by B.K.Dutta

Reference Book (s)

1. Unit Operation of Chemical Engineering by Mc Cabe & Smith.

2. Introduction to Chemical Engineering by Badger & Bancher.

Name of The Course	Technical Analysis Lab
Course Code	DPCH3008
Prerequisite	DPCH2005, CHEM1014, CHEM1017
Co-requisite	None
Anti-requisite	None

L	T	P	C
0	0	2	1

Course Objectives

1. To train the students on basic principles involved in estimation and characterization of industrially important materials
2. To learn chemical engineering principles and their practical applications in the areas of mass transfer, reaction engineering and particle mechanics.

Course Outcomes

CO1	Perform the different tests or experiment for checking the water quality (Drinking Water) parameters to access its quality and its different uses.
CO2	Apply/develop solutions or to do research in the areas of Pure fresh Drinking water and Different lubricant properties in terms of Chemical Engineering
CO3	Analyze the knowledge developed by Researchers and critically assess the relevant technological issues.
CO4	Interpretate the need for, and have the preparation and ability to engage life-long learning in the context of technological changes

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
	50	50	100

Course Content:

Experiment-1	Determine the acidity of water.
Experiment-2	Determine the chloride content of water
Experiment-3	Determine the total dissolved solids in water.
Experiment-4	Determine the BOD & COD of water
Experiment-5	Determine the moisture content in the given soap sample

Experiment-6	Determine the % of fatty matters content in soap sample by wax cake method.
Experiment-7	Determine the calcium carbonate in the given sample of limestone.
Experiment-8	Determine the Iodine value of given sample of oil.
Experiment-9	Determine the acid value of the given oil sample.
Experiment-10	Determine the specific gravity of given sample oil.

Suggested Reading

Text Book (s)

1. Badger W.L. and Banchero J.T., "Introduction to Chemical Engineering", 6th Edition, Tata McGraw Hill, 1997.
2. Dryden, C.E., "Outlines of Chemicals Technology", Edited and Revised by Gopala Rao, M. and M.Sittig, 2nd Edition, Affiliated East-West press, 1993.
3. Randolph Norris Shreve, George T. Austin, "Shreve'e Chemical Process Industries", 5th edition, McGraw Hill, 1984

Reference Book (s)

1. Finlayson, B. A., Introduction to Chemical Engineering Computing, John Wiley & Sons, New Jersey, 2006
2. Introduction to Chemical Engineering by Badger & Bancher.
3. McCabe, W.L., Smith, J. C. and Harriot, P. "Unit operations in Chemical Engineering", McGraw Hill, 7th Edition, 2001

Name of The Course	Industrial Field Visit & Presentation				
Course Code	DPCH3009				
Prerequisite	None				
Co-requisite	None				
Anti-requisite	None				
		L	**T**	**P**	**C**
		0	0	0	3

Course Objectives

1. Learn to apply the values and ethics of the profession and develop the capacity to tolerate and work constructively with the value dilemmas, conflicts, and ambiguities inherent in the practice of social work.

2. Actively engage in the learning process and develop the capacity to reflect on the work and make active use of supervision and other feedback.

3. Develop a self-reflective and reflexive stance, which includes a growing awareness of self with clients, staff and larger systems, in relation to practice.

Course Outcomes

CO1	Recognize the process units – Boiler, Pump, Condenser, Steam turbine, Generator. Generate the process flow diagram.
CO2	Identify input and output for the process.
CO3	Experience the importance of working safety.
CO4	Understand how does the product of the chemical plant is interfaced to the world.
CO5	Communicate effectively both orally and in writing.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
	50	50	100

Course Content:

1	Operation unit 1
2	Operation unit 2
3	Operation unit 3
4	Operation unit 4
5	Operation unit 5
6	Operation unit 6
7	Operation unit 7
8	Operation unit 8
9	Operation unit 9
10	Operation unit 10

Suggested Reading

Text Book (s)

1. Martyn S. Ray and Martin G. Sneesby (1998), Chemical Engineering Design Project: A Case Study Approach, 2nd Edition, Gordan and Breach Science Publishers

2. Richard Turton, Richard C. Bailie, Wallace B. Whiting and Joseph A. Shaeiwitz (2002), Analysis, Synthesis, and Design of Chemical Processes, 2nd Edition, Prentice Hall

Reference Book (s)

1. NPTEL Online courses

Name of The Course	Project				
Course Code	DPCH9999				
Prerequisite	None				
Co-requisite	None				
Anti-requisite	None				
		L	**T**	**P**	**C**
		0	0	0	14

Course Objectives

1. Overcome the gap between planning and execution
2. increase the presentation skill
3. Describe the different types of structure

Course Outcomes

CO1	Create own data or implementation on previous data project.
CO2	Create model to exhibit project
CO3	Understand basic concept of civil engineering from live project.
CO4	Describe presentation on project
CO5	Explain their project

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
	50	50	100

Course Content:

1	Planning the project
2	Creating the group to work on
3	Prepare plan of project include repor,drawing,ppt.
4	Creating model of project
5	Final project report

Suggested Reading

Text Book (s)

1. Chemical Engineering Books.

Reference Book (s)

1. NPTEL Online Resources

GALGOTIAS UNIVERSITY

(Established under Galgotias University Uttar Pradesh Act No. 14 of 2011)

Program: Diploma in Mechanical Engineering

Scheme: 2020-2021

Vision:

To be a cradle for inventions and innovations that provides transformative education to create leaders and innovators, and generating new knowledge for society and industry

Mission:

- **To impart need based Mechanical engineering knowledge through relevant curriculum.**
- **To prepare employable personnel and entrepreneurs through industry-institute interaction.**
- **Enrich departmental infrastructure and facilities.**
- **To inculcate sense of discipline, responsibility towards society and promote lifelong learning**

Program Educational Objectives:

The Diploma in Mechanical Engineering Undergraduate Program at Galgotias University has the following Program Educational Objectives (PEOs):

1. **Impart knowledge of Mathematics, Applied sciences and Engineering.**
2. **Ability to work in teams on multi-disciplinary projects in industry.**
3. **Ability to identify, formulate and solve mechanical engineering problems based on data Interpretation, experiment and analysis of results.**
4. **Develop awareness in the community through the application of knowledge of ethical responsibility to society, employers and employees.**

Program Specific Objectives:

Mechanical Engineering Diploma Students will able to:

PSO1- Ability to solve contemporary issues related to manufacturing, design, and Industrial automation through internship integrated program curriculum.

PSO2- Demonstrate and test Mechanical engineering related system for application with real time constraints.

Program Outcomes:

The Diploma holder of Mechanical Engineering will be able to:

Program Outcome	Diploma in Production engineering students will be able to:
PO1	**Basic knowledge: An ability to apply knowledge of basic mathematics, science and engineering to solve the engineering problems.**
PO2	Discipline knowledge: An ability to apply discipline - specific knowledge to solve core and/or applied engineering problems.
PO3	Experiments and practice: An ability to plan and perform experiments and practices and to use the results to solve engineering problems.
PO4	Engineering tools: Apply appropriate technologies and tools with an understanding of the limitations.
PO5	The engineer and society: Demonstrate knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.
PO6	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO7	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO8	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO9	**Communication: An ability to communicate effectively.**
PO10	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the context of technological changes.

Curriculum

Semester 1									
Sl. No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	PHYE1001	APPLIED PHYSICS-I	3	2	0	4	20	50	100
2	MATH1002	APPLIED MATHEMATICS-I	4	0	0	4	20	50	100
3	SLPC1003	PROFESSIONAL COMUNICATION-I	3	0	0	3	20	50	100
4	DPME1005	ENGINEERING GRAPHICS	0	6	0	3	20	50	100
5	DPCS1001	INTERNET OF THING	2	0	0	2	20	50	100
6	PHYE1006	APPLIED PHYSICS-I LAB	0	0	2	1	50	-	50
7	SLPC1007	PROFESSIONAL COMUNICATION-I LAB	0	0	4	2	50	-	50
8	DPCS1008	COMPUTER FUNDAMENTALS LAB	0	0	2	1	50	-	50
9	SPYO1001	SPORTS AND YOGA	0	0	2	0	50	-	50
10	DPME1009	WORKSHOP PRACTICE	0	0	6	3			
11		Total Credits	10	8	20	23			

Semester II									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	PHYE-1010	APPLIED PHYSICS-II	3	2	0	4	20	50	100
2	MATD1011	APPLIED MATHEMATICS-II	3	2	0	4	20	50	100
3	SLPC1012	PROFESSIONAL COMUNICATION-II	3	0	0	3	20	50	100
4	DPME1013	ELEMENTRY WORKSHOP TECHNOLOGY	2	0	0	2	20	50	100
5	CHEM1014	BASIC CHEMISTRY	3	2	0	4	20	50	100
6	DPME-1006	ELEMENTS OF MECHANICAL ENGINEERING	3	0	0	3	20	50	100
7	PHYE1015	APPLIED PHYSICS-II LAB	0	0	2	1	50	-	50
8	SLPC1016	PROFESSIONAL COMUNICATION-II LAB	0	0	2	1	50	-	50
9	DPCS1009	ARTIFICIAL INTELLIGENCY	0	0	2	1	50	-	50
10	CHEM1017	BASIC CHEMISTRY LAB	0	0	2	1	50	-	50
		Total	17	6	8	24			

Semester III									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	MATD-2001	APPLIED MATHEMATICS-III	3	2	0	4	20	50	100
2	DPME-2001	APPLIED MECHANICS	3	0	0	3	20	50	100
3	DPME-2002	THERMAL ENGINEERING	3	0	0	3	20	50	100
4	DPEE-2010	BASICS OF ELECTRICAL & ELECTRONIC ENGG.	3	0	0	3	20	50	100
5	DPME-2003	MANUFACTURING PROCESS	3	0	0	3	20	50	100
6	DPME-2005	MACHINE DRAWING	0	4	0	2	20	50	100

7	DPME-2006	APPLIED MECHNICS LAB	0	0	2	1	50	-	50
8	DPME-2007	THERMAL ENGINEERING LAB	0	0	2	1	50	-	50
9	DPME-2026	MANUFACTURING PROCESS LAB	0	0	4	2	50	-	50
10	DPEE-2011	BASICS OF ELECTRICAL & ELECTRONIC ENGG. LAB	0	0	2	1	50	-	50
		Total	15	2	14	23			
Semester IV									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	DPME-2008	MECHANICS OF SOLID	3	2	0	4	20	50	100
2	DPME-2009	CONCEPT OF HEAT TRANSFER	3	2	0	4	20	50	100
3	DPME-2025	HYDRAULICS AND HYDRAULIC MACHINES	3	0	0	3	20	50	100
4	DPME-2012	INSPECTION & QUALITY CONTROL	3	0	0	3	20	50	100
5	EEDM-3002	ENVIRONMENT EDUCATION & DISASTER MANAGEMENT	2	0	0	2	50	-	50
6	DPME-2028	MECHANICS OF SOLID LAB	0	0	2	1	50	-	50
7	DPME-2014	CONCEPT OF HEAT TRANSFER LAB	0	0	2	1	50	-	50
8	DPME-2027	HYDRAULICS AND HYDRAULIC MACHINES LAB	0	0	2	1	50	-	50
9	DPME-2016	CAD LAB	0	0	4	2	50	-	50
10	DPME-2017	INSPECTION & QUALITY CONTROL LAB	0	0	2	1			
11	DPME-9001	DISRUPTIVE TECHNOLOGY	0	0	2	1	50	-	50
		Total	14	4	14	23			
Semester V									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	DPME-3001	THEORY OF MACHINE	3	2	0	4	20	50	100
2	DPME-3002	MACHINE DESIGN	3	2	0	4	20	50	100
3	IMED-3001	INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT	3	0	0	3	20	50	100
4	DPME-3003	MACHINE TOOL TECH. & MAINTENANCE	3	0	0	3	20	50	100
5	DPME-3005/DPME-3006	Elective –I (Theory)	3	0	0	3	20	50	100
6	DPME-3007/DPAE-3001	Elective –II (Theory)	3	0	0	3	20	50	100

7	DPME-3004	THEORY OF MACHINE LAB	0	0	2	1	50	-	50
8	DPME-3008/DPME-3009	Elective –I (Practical)	0	0	2	1	50	-	50
9	PDSS-3008	PERSONALITY DEVELOPMENT & SOFT SKILLS	0	0	4	2	50	-	50
10	DPME-3010/DPAE-3002	Elective –II (Practical)	0	0	2	1	50	-	50
		Total	18	4	10	25			
Semester VI									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	DPME-9998	FIELD VISIT AND PRESENTATION OR MINOR PROJECT	0	0	0	2	50	-	50
2	DPME-9999	MAJOR PROJECT	0	0	0	10	50	-	50
		Total	0	0	0	12			

List of Electives

Elective-1

Sl No	Course Code	Name of the Electives	L	T	P	C
1	DPME3005	REFRIGERATION AND AIR CONDITIONING	3	0	0	3
2	DPME3006	ROBOTICS	3	0	0	3
3	DPME3008	REFRIGERATION AND AIR CONDITIONING LAB	0	0	2	1
4	DPME3009	ROBOTICS LAB	0	0	2	1
		Total				8

Elective-2

Sl No	Course Code	Name of the Elective	L	T	P	C
1	DPME3007	POWER PLANT ENGINEERING	3	0	0	3
2	DPAE3001	AUTO.ENGG.	3	0	0	3
3	DPME3010	POWER PLANT ENGINEERING LAB	0	0	2	1
4	DPAE3002	AUTO.ENGG. LAB	0	0	2	1
		Total Credits				8

Detailed Syllabus

Name of The Course	**Engineering Graphics**				
Course Code	**DPME1005**				
Prerequisite	**None**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	6	0	3

Course Objectives

1. To develop the concept and applicability of engineering graphics to the industry. To develop the ideas, vision and its practical reality through engineering graphics.To follow basic drawing standards and conventions.
2. To develop skills in three-dimensional visualization of engineering component.

Course Outcomes

CO1	**Use the techniques and able to interpret the drawing in Engineering field.**
CO2	**Interpret engineering drawings using fundamental technical mathematics.**
CO3	**Construct basic and intermediate geometry.**
CO4	**To improve their visualization skills so that they can apply these skills in developing new products**
CO5	**Create and modify two-dimensional orthographic drawings using AutoCAD software, complete with construction lines and dimensions.**

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Exam (MTE)**	**End Term Exam (ETE)**	**Total Marks**
20	30	50	100

Course Content:

Unit I: Introduction 06 hours
Graphics: An Overview, its need and objectives. Introduction to Computer Aided Drafting- Introduction to AutoCAD; Initial setup commands, Utility commands, drawing aids, entity draw commands, display commands and edit commands
Unit II:Lettering, Numerals and dimensioning 6 Hours
Unit III: Geometrical Construction and Engineering Curves 9 Hours
To draw an ellipse by, Directrix and focus method , Arcs of circle method, Concentric circles method. To draw a parabola by: Directrix and focus method, Rectangle method, To draw a hyperbola by: Directrix and focus method , passing through given points with reference to asymptotes , Transverse Axis and focus method.
Unit IV: Principles of Projection 6 Hours
(a) Orthographic, Pictorial and perspective. Concept of horizontal and vertical planes. Difference between I and III angle projections. (b) Projections of points, lines and planes. Orthographic Projections of Simple Geometrical Solids. Orthographic views of simple composite solids from their isometric views. Exercises on missing surfaces and views
Unit V:Isometric Projections 9 Hours
Overview of Formal Languages : Representation of regular languages and grammars, finite state Machines

Suggested Reading

1. Bhatt N. D., “Engineering Drawing”, Charotar publishing House, 1998

Reference Book (s)

2. French and Vierk, "Fundamentals of Engineering Drawing", McGraw Hill, 2002.
3. John K.C., "Engineering Graphics for Degree", PHI Learning Private Limited, New Delhi, 2010.

Name of The Course	Workshop Practice				
Course Code	**DPME1009**				
Prerequisite	**None**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	6	3

Course Outcomes

CO1	**Operate the working principle of various machines used in manufacturing**
CO2	**Grasp the appropriate production process and machines**
CO3	**Perform ,Explain and Identify the basic welding concepts**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

Unit I: GENERAL INTRODUCTION:

(a) Scope of subject "Workshop" in engineering.
(b) Different shop activities and broad division of the shops on the basis of nature of work done such as
(i) Carpentry Shop
(ii) Painting, Polishing & Plumbing Shop
(iii) Sheet Metal & Soldering Shop
(iv) Fitting Shop
(v) Welding Shop (Elet ARC/ Brazing)
(vi) Machine Shop

Unit II: Carpentryshop

Fundamental of wood working operations:
Marking & Measuring.
Holding & Supporting.
Cutting & Sawing.
Drilling & Boring.
Turning/ Smoothing
Jointing.

Unit III: Painting, Polishing & Plumbing shop

Painting & Polishing
Its need, Introduction to methods of paintings (Classification only); Mannual, Machine (spray) and dip painting at room temperature, operations involved- discription of steps only eg. surface preparation method for old and new surface in timber and iron structure-sanding, derusting, deqreasing, filling of pore and dents, paint application- manual, machine (spray and dip painting drying of paint air drying and oven drying under coat and filler material (red oxide, putty, yellow clay), surface preparation materials (sand and emery papers); tools and equipments used (Name,size specification for indification). Brushes-Round and flat wire brush, scraper, trowel , spraygun, compressor. Defects likely to occur in painting and their remedies Safety of Personnel, Equipment & Tools to be observed.
Exp No-1 Introduction & demonstration of tools used in Painting & Polishing shop
Exp No-2 (Job No- PPS1) Painting on the wooden & metal surface
Exp No-3 (Job No- PPS2) Polishing on the plastic & metal sheet
(ii) Plumbing
Introduction, Study Of Plumbing Tools, Pipe Fittings, Types Of Pipe Joints, Pipe Threading
Exp No-1 Introduction & demonstration of tools used in Plumbing shop
Exp No-2 (Job No- PS1) Threading on G.I. pipe by die
Exp No-3 (Job No- PS2) Internal tapping by tap set

Unit IV: Sheet Metal shop

Sheet Metal
Tools and Operation:
(1) Operations involved (Names and concept only) Laying out, marking and measuring,cutting, Shearing and blanking, Straightening bending and seaming, Punching and piercing , burring and stamping,
(2) Sheet metal joints - Lap, seam, Locked

seam, cup or circuler, Flange, angular and cap.
(3) Tools and equipments used (Name, size, specification for identification only).
(4) Marking Tools- Scriber, Divider and Trammel, Protractor, Trysquare, Dot punch, Steel Rule, Steel tape, Sheet metal gauge.
(5) Cutting and shearing Tools-hand Shear and lever, Snips, Chisels.
(6) Straightening tool-Straight edge.
(7) Striking Tools-Mallet, Hammer.
(8) Holding Tools-Vice, Plier, C or G clamps, Tongs.
(9) Supporting Tools-Stakes and Anvil.
(10) Bending Tools-Crimpers, Form dies, Roundnose plier, Rails.
(11) Punching-Piercing and Drifting tools.
(12) Burring Tools-Files.
(13) Common defects likely to occur during and after operation-Their identification and remedy. Defects due to wrong operation or wrong tool.
(14) Safety of Personnel, Equipment & Tools to be observed.
Exp No-1 Introduction & demonstration of tools used in Sheetmetal shop
Exp No-2 (Job No- SMS1) Making a rectangular tray
Exp No-3 (Job No- SMS2) Making a hollow cylinder
Exp No-4 (Job No- SMS3) Making a hollow square
Exp No-5 (Job No- SMS4) Making a funnel
(ii)-Soldering

Unit V: Fitting shop

1- Introduction to fitting shop tools, common materials used in fitting shop, Identification of materials
2- Description and demonstration of various types of work benches, holding devices and files. Precautions while filing.
3- Description and demonstration of simple operation of hack-sawing, demonstration and description of various types of blades and their specifications, uses and method of fitting the blade.
4- Care and maintenance of measuring tools like calipers, steel rule, try square, vernier calipers, micrometer, height gauge, combination set. Handling of measuring instruments, checking of zero error, finding of least count (all gauges including dial gauge).
Exp No-1 Introduction & demonstration of tools used in Fitting shop
Exp No-2 (Job No- FS1)Filing, Hacksawing, Drilling & Tapping on the workpiece
Exp No-3 (Job No- FS2)Making a male & female workpiece

Unit VI: Welding shop

(i)Elet ARC Welding
1- (a) Introduction to welding and its importance in engineering practice; types of welding; common materials that can be welded, introduction to welding equipment e.g. a.c. welding set, d.c. rectifier, electrode holder, electrodes and their specifications, welding screens and other welding related equipment, accessories and gloves.
(b) Safety precautions during welding
(c) Hazards of welding and its remedies
2- Electric arc welding, (a.c. and d.c.) precautions while using electric arc welding, Practice in setting current and voltage for striking proper arc. Earthing of welding machine.
3- Various types of joints and end preparation.
Exp No-1 Introduction & demonstration of tools used in Welding shop
Exp No-2 (Job No- WS1) Making a T joint
Exp No-3 (Job No- WS2) Making a single V butt joint
Exp No-4 (Job No- WS3) Making a over lap joint

(ii) Brazing/Gas welding
Mild steel & steel sheet,brass sheet.
(1) Its concept, comparison with welding as joining method and classification, Brazing
(2) Brazing operation- edge preparation of joints,Pickling and degreasing, Fluxing, Tinning and brazing.
(3) Materials Used-Common fluxes, brazing rod, and their specifications and discription (For Identification Only), brazing
(4) Common defects likely to occurs during and after brazing.
(5) Safety of Personnel, Equipment & Tools to be observed.
Exp No-1 Introduction & demonstration of tools used in Brazing shop

Exp No-2 (Job No- BS1) Making a T joint **Exp No-3 (Job No- BS2) Making a single V butt joint** **Exp No-4 (Job No- BS3) Making a over lap joint**
Unit VII: Machine shop
Introduction to machine tools viz lathe, drilling machine, shaper and planer simple line and block diagram of components and their functions. **Safety of Personnel, Equipment, Tools & to be observed.** **Exp No-1 Introduction & demonstration of tools used in machine shop** **Exp No-2 (Job No- MS1) Facing** **Exp No-3 (Job No- MS2) Turning, Stap Turning, Chamfering** **Exp No-3 (Job No- MS3) Grooving, Knurling**

Suggested Reading:

1. Amitabh Ghosh and Ashok kumar Malik, 'Manufacturing science', Edition: 2nd Edition, 2010, Publisher: East West Press, ISBN: 9788176710633, 8176710636
2. Dr.P.C.Sharma, 'Production technology', (Manufacturing Processes).

Reference Book (s)

Serope Kalpakjian and Steven R.Schmid,' Manufacturing Engineering and Technology;4th Edition, 2001;Publisher: PEARSON,'ISBN: 9788177581706

Name of The Course	ELEMENTS OF MECHANICAL ENGINEERING				
Course Code	**DPME1006**				
Prerequisite	**None**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**

Course Objectives

1. Develop an ability to apply knowledge of mathematics, science, and engineering
2. To develop an ability to design a system, component, or process to meet desired needs within realistic constraints

Course Outcomes

CO1	**Identify various Energy sources, Fuel & combustion and lubrication systems**
CO2	**Define the basic concepts of units and dimensions, systems and its boundaries, properties, state, process, cycle, etc.- required as foundation for development of principles and laws of thermodynamics**
CO3	**Discuss application and usage of various engineering mechanical components.**
CO4	**Describe different lubrication system for lubricating the components of machine**
CO5	**Recognize Basic idea of Transmission of Motion by various drives.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Thermal Engineering: Sources of Energy **6 hour**
Definition, Concept of thermodynamic system and surroundings, Closed system, Open system, Isolated system, Thermodynamics definition of work. Zeroth low of thermodynamics Basic ideas, conventional and nonconventional forms Thermal, Hydel, Tidal, wind, Solar, Biomass and Nuclear and their uses.
Unit- 2 Thermal Engineering : Fuel and Combustion **10 hour**
Introduction to common fuels - solid, liquid and gases and their composition. Combustion of fuels- their higher and lower calorific values. Combustion equations for carbon, sulphur, hydrogen and their simple compounds

Unit-3 Machine Components **20 hours**
(i) Pins, Cottor and Knuckle Joints. **(ii) Keys, Key ways and spline on the shaft.** **(iii)Shafts, Collars, Cranks,** **(iv) Bearings-Plane, Bushed, Split-step, ball, Roller bearing, Journal bearing, Foot step bearing, thrust bearing, collar bearing and Special type bearings and their applications.** **(v) Gears: Different types of gears, gear trains and their use for transmission of motion. Determination of velocity ratio for spur gear trains; spur gear, single and double helical gears, Bevel gears, worms, Rack and Pinion. Simple and compound and epicyclic gear trains and their use. Definition of pitch and pitch circle & module.** **(vi) Springs: Compression, Tension, Helical springs , Torsion springs, Leaf and Laminated springs. Their use and material.** **(vii) Basic idea of Transmission of Motion By Belts, Ropes & Pulleys, Chain & Sprockets. Classification and uses of ropes in transmission operation, Chains and their classifications, their application in power transmission, their comparison with other drive systems**
Unit-4 Lubrication **4 hours**
Different lubrication system for lubricating the components of machines. Principle of working of wet sump and dry sump system of lubrication.

Suggested Reading

Text Book (s)

1. Elementary of Mechanical Engineering by Katsons Publications.

Reference Book (s)

1. Basics of Mechanical Engineering by Katsons publications .

Name of The Course	ELEMENTARY WORKSHOP TECHNOLOGY				
Course Code	**DPME1013**				
Prerequisite	**None**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	6	0	3

Course Objectives

1. To develop general machining skills in the students.

2. Develop a skill in dignity of labor, precision, safety at work place, team working and development of right attitude.

Course Outcomes

CO1	**Recognize different shops of central workshop on the basis of nature of work done**
CO2	**Analyze the operations involved in casting process**
CO3	**Determine the use of various machine tools**
CO4	**Apply the various welding processes**
CO5	**Differentiate between soldering, brazing and welding**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 General Introduction **5 hour**
Scope of subject "Workshop Technology" in engineering. Different shop activities and broad division of the shops on the basis of nature of work done - (i) Wooden Fabrication (Carpentry) (ii) Metal Fabrication (shaping and Forming,

Smithy, Sheet metal and Joining-welding, Riveting, Fitting and Plumbing.(c) Organization and layout of workshop.(d) General safety precaution in workshop
Unit-2 Casting 12 hour
Basic steps in making a casting, Pattern Materials, Patterns allowances, colour coding of pattern, Types of pattern, Pattern making tools. Mould materials, Types of sand, Moulding processes - Sand moulding, Pit moulding, machine moulding. Shell moulding. Cores and core classification, Testing of sand. Types of furnaces - Cupola furnace, Crucible furnace, Electric arc furnace, Cleaning of casting — Fettling, Shot blasting, Cutting & trimming, Casting defects Shrinkage, Hot tear, blow holes, misrun and cold shut, scabs, fins, rat tail. Special casting processes - die casting, centrifugal casting, Investment casting. Elements of gating system.
Unit-3Basic Machining Processes 10 hours
Lathe Introduction, Types of lathes — light duty, Medium duty and heavy duty geared lathe, CNC lathe, Specifications, Basic parts and their functions. Operations and tools — Turning, parting off, Knurling, facing, boring, drilling, threading, step turning, taper turning, Drilling Introduction, Classification, Types of operations, Specifications of drilling machine, Types of drills and reamers, Basic parts and their functions. introduction, Classification, Principle of operation, up and down milling. Types of milling cutters, Basic parts and functions of column and knee type milling machine.
Unit-4 Welding 10 hours
Introduction, Classification, Safety precautions, Gas welding techniques, Types of welding flames, Arc welding – principle, equipments, applications. Shielded metal arc welding, Submerged arc welding, TIG/MIG Welding, Electro slag welding, plasma arc welding, Resistance welding – spot welding, Seam welding, Projection welding, welding defects.
Unit-5 Soldering and Brazing 8 hours
Its concept, comparison with welding as joining method and classification, electric soldering and forge soldering. Soldering operation- edge preparation of joints, Pickling and degreasing, Fluxing, Tinning and Soldering. Materials Used-Common fluxes, soft and hard solder, solder wire (Plain and Resin core) and sticks, spelters and their specifications and description (For Identification Only), forge soldering bits. Electric soldering iron. Common defects likely to occurs during and after soldering. Safety of Personnel, Equipment & Tools to be observed.

Suggested Reading

Text Book (s)

1. S.K. Hajara Chaudhary - "Workshop Technology" - Media Promotors and Publishers,New Delhi

Reference Book (s)

1. B.S. Raghuwanshi - "Workshop Technology" - Dhanpat Rai and sons, New Delhi
2. H.S.Bawa - "Workshop Technology" -Tata McGraw Hill Publishers, New Delhi.

Name of The Course	APPLIED MECHANICS				
Course Code	**DPME2001**				
Prerequisite	**PHYE1001**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

1. To prepare students about to solve the mechanics problems.
2. Student able o analysis the performace of a mechanical machine.

Course Outcomes

CO1	**Describe basic knowledge of Engineering Mechanics where in Laws of Physics are applied to Solve Engineering problems.**
CO2	**Analyse force system and apply them to practical engineering system design and development.**
CO3	**Examine a mechanical system and derive all forces, couples and moment about it.**
CO4	**Calculate different parameters for a machine like mechanical advantage, velocity ratio and Machine law.**
CO5	**Recognize Concept of moment of inertia and its applications.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Introduction **2 hour**
Mechanics and its utility. Concept of scalar and vector quantities. Effect of a force. Tension & compression. Rigid body. Principle of physical independence of force. Principle of transmissibility of a force.
Unit-2 System of Forces, General Condition of Equilibrium 06 hour
Concept of coplanar and non-coplanar forces including parallel forces. Concurrent and non-concurrent forces. **Resultant force. Equilibrium of forces. Law of parallelogram of forces. Law of triangle of forces and its converse. Law of polygon of forces. Solution of simple engineering problems by analytical and graphical methods such as simple wall crane, jib crane and other structures. Determination of resultant of any number of forces in one plane acting upon a particle, conditions of equilibrium of coplanar concurrent force system.General condition of equilibrium of a rigid body under the action of coplanar forces, statement of force law of equilibrium, moment law of equilibrium, application of above on body.**
Unit-3 Moment & couple **06 hours**
Concept of Varignon's theorem. Generalized theorem of moments. Application to simple problems on levers-Bell crank lever, compound lever, steel yard, beams and wheels, lever safety valve, wireless mast, moment of a couple; Properties of a couple ; Simple applied problems such as pulley and shaft.
Unit-4 Friction **06 hours**
Definition of a machine. Mechanical advantage, velocity ratio, input, output, mechanical efficiency and relation between them for ideal and actual machines. Law of a machine Lifting machines such as levers, single pulley, three system of pulleys. Weston differential pulley, simple wheel and axle, differential wheel and axle. Simple screw jack, differential screw jack, simple worm and worm wheel..
Unit-5 Machines **06 hours**
Its concept, comparison with welding as joining method and classification, electric soldering and forge soldering. Soldering operation- edge preparation of joints, Pickling and degreasing, Fluxing, Tinning and Soldering. Materials Used-Common fluxes, soft and hard solder, solder wire (Plain and Resin core) and sticks, spelters and their specifications and description (For Identification Only), forge soldering bits. Electric soldering iron. Common defects likely to occurs during and after soldering. Safety of Personnel, Equipment & Tools to be observed.
Unit-6 Centre of Gravity **06 hours**
Concept, definition of centroid of plain figures and center of gravity of symmetrical solid bodies. Determination of centroid of plain and composite lamina using moment method only,

Centroid of bodies with removed portion. Determination of center of 'gravity' of solid bodies - cone, cylinder, hemisphare and sphere, composite bodies and bodies with portion removed.
Unit-7 Moment of Inertia **06 hours**
Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common geometrical section : rectangle, triangle, circle (without derivations). Second moment of area for L, T, I and channel section, section of modulus

Suggested Reading:

Text Book (s)

1. A Textbook of Engineering Mechanics by D.S. Kumar
2. **A Textbook of Engineering Mechanics, written by Dr. R. K. Bansal.**
3. **Engineering Mechanics, written by R. K. Rajput.**

Reference Book (s)

1. Beer – Johnson Engineering Mechanics Tata McGraw Hill, Delhi
2. Basu Engineering Mechanics Tata McGraw Hill, Delhi

Name of The Course	**THERMAL ENGINEERING**				
Course Code	**DPME2002**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

1. To This course aims to provide a good platform to mechanical engineering students to understand, model and appreciate concept of dynamics involved in thermal energy transformation.
2. To prepare them to carry out experimental investigation and analysis at later stages of graduation

Course Outcomes

CO1	**Define the fundamentals of laws of thermodynamics and its applications.**
CO2	**Calculate heat and work interactions for various system.**
CO3	**Use & Practice two property rule and hence thermodynamic tables, thermodynamic diagrams and concept of equation of state, also their simple application.**
CO4	**Evaluate change in entropy to determine reversibility and irreversibility.**
CO5	**Calculate efficiencies of Heat engine, Heat pump, Refrigerator and Vapour power cycle.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 FUNDAMENTAL OF THERMODYNAMICS **12 hour**
Definition, concept of thermodynamic system and surroundings. Closed system, open system, isolated system, and thermodynamics definition of work. Zeroth law of thermodynamics. First law of thermodynamics for cyclic and non-cyclic processes. Idea of internal energy and enthalpy. Thermodynamic processes - constant volume, constant pressure, constant temperature (Isothermal) processes, adiabatic process, polytrophic process, their representation on P-V diagram and calculation of work done.
Unit-2 SECOND LAW OF THERMODYNAMICS **08 hour**

Definition, concept of thermodynamic system and surroundings. Closed system, open system, isolated system, and thermodynamics definition of work. Zeroth law of thermodynamics. First law of thermodynamics for cyclic and non-cyclic processes. Idea of internal energy and enthalpy. Thermodynamic processes - constant volume, constant pressure, constant temperature (Isothermal) processes, adiabatic process, polytrophic process, their representation on P-V diagram and calculation of work done.
Unit-3 ENTROPY **06 hours**
Physical concept and significance, reversibility and efficiency, Irreversibility and entropy. Expression for change of entropy in various thermodynamic processes. Simple numerical problems concerning the above.
Unit-4 GAS POWER CYCLES **08 hours**
Air Standard cycles: Carnot, Otto, Diesel, Dual and Stirling cycles, P-V and T-S diagrams, description, efficiencies and mean effective pressures, Comparison of Otto, Diesel and dual cycles.
Unit-5 PROPERTIES OF STEAM **10 hours**
Idea of steam generation beginning from heating of water at 0°C to its complete formation into saturated steam. Pressure temperature curve for steam. Idea of dry saturated steam, wet steam and its dryness fraction, super-heated steam and its degree of super heat. Enthalpy, entropy, specific volume and saturation pressure and temperature of steam. Use of steam table and mollier chart. Simple numerical problems.

Suggested Reading:

Text Book (s)

1. "Thermal Engineering: Engineering Thermodynamics and Energy Conversion Techniques" by P L Ballaney
2. **Thermodynamics and Thermal Engineering" by J Selwin Rajadurai**
3. **Thermal Engineering" by R K Rajput**

Reference Book (s)

1. Nag, P.K., Engineering Thermodynamics, 3rd ed., Tata McGraw-Hill, 2005
2. Cengal, Y.A and Boles, M.A, Thermodynamics: An Engineering Approach, 5th ed., McGraw-Hill, 2006.

Name of The Course	**MANUFACTURING PROCESS**				
Course Code	**DPME2003**				
Prerequisite	**DPME1013**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

1. An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities
2. An ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes

Course Outcomes

CO1	**Identify and know basic press operations and tools.**
CO2	**Identify basic manufacturing processes like forging, rolling and extrusion, for required component**
CO3	**Discus process parameters for different operations**
CO4	**Classify the products simply in terms of their basic shape**
CO5	**Describe the difference between the hot and cold working of metals and give the advantages of each process**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks

20	30	50	100

Course Content:

Unit-1 METAL FORMING PROCESSES 18 hour
Press Working - Types of presses, type of dies, selection of press die, die material. Press Operations-Shearing, piercing, trimming, punching, notching, shaving, gearing, embossing, stamping **Forging -** Open die forging, closed die forging, Press forging, upset forging, swaging, up setters, roll forging, Cold and hot forging.**Rolling -** Elementary theory of rolling, Types of rolling mills, Thread rolling, roll passes, Rolling defects and remedies. **Extrusion and Drawing -** Type of extrusion- Hot and Cold, Direct and indirect. Pipe drawing, tube drawing, wire drawing.
Unit-2 POWDER METALLURGY 12 hour
Introduction, principle, scope and names of processes. Production of metal powders, compaction, sintering and sizing. Self lubricated bearings. Advantages of the process and its limitations. (Elementary concept only).
Unit-3 MODERN MACHINING PROCESS 10 hours
Ultrasonic Machining (USM), Electro Chemical Machining (ECM), Electro Chemical Grinding (ECG), Electrical Discharging Machining(EDM), Laser Beam Machining (LBM), Electron Beam Machining (EBM), Plasma Arc Machining (PAM)

Suggested Reading:

Text Book (s)

1. Amitabh Ghosh and Ashok kumar Malik, ‘Manufacturing science’, Edition: 2nd Edition, 2010, Publisher: East West Press, ISBN: 9788176710633, 8176710636
2. **Dr.P.C.Sharma, ‘Production technology’, (Manufacturing Processes).**

Reference Book (s)

1. Serope Kalpakjian and Steven R.Schmid,' Manufacturing Engineering and Technology;4th Edition, 2001;Publisher: PEARSON,'ISBN: 9788177581706, 8177581708

Name of The Course	**MACHINE DRAWING**				
Course Code	**DPME2005**				
Prerequisite	**DPME1005**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	4	0	2

Course Objectives:

1. Provide the fundamental concepts of machine drawing elaborating on how to concretize the idea of new structure such as a machine element.
2. Help the student in the visualization of assembly and sub assembly of various machine elements.

Course Outcomes

CO1	**Draw the isometric view of a given three dimensional object/part**
CO2	**Draw the orthogonal projection of a solid body**
CO3	**Practice different kinds of materials and Mechanical components conventionally.**
CO4	**Identify the elements of a detailed drawing.**
CO5	**Produce the assembly drawing using part drawings.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 GENERAL CONCEPT OF MACHINE DRAWING **06 hour**
(a) Views and sections (Full and half), dimensioning Technique -Unidirectional and aligned practice conventions as per latest code of practice for general engineering drawing. (b) General concept of IS working drawing symbols for (i) Welding & Rivetting (ii) Serews & Screw threads (iii) Surface Finish Marks (iv) Limits, Fits & Tolerances
Unit-2 FAMILIARIZATION WITH AUTO CAD COMMOANDS **09 hour**
CAD, Different type of CAD software available, Advantages of using CAD, AUTOCAD graphical user interface? Setting up drawing environment: Setting units, drawing limits, Snap, Opening and Saving a drawing, Setting drafting properties, Different co-ordinate system used. Commands and their aliases, Different methods to start a command Selecting object, removing object from selection set, Editing with grips, Editing object properties. Use of draw commands - Line, Arc, Circle, Polygon, Polygon, Polyline, rectangle, Ellipse, construction line, Spline Use of modify commands - erase offset, Move, Copy, Mirror, Fillet, Chamfer, Array, Scale, Stretch, rotate, Explode, Lengthen Creating 2D objects using Draw and Modify commands, Use of Hatch commands. Controlling the drawings display; Zoom, PAN, view ports, Aerial view. Drawing with precision: Adjusting snap and Grid alignment. Use of Tools Menu bar for calculating distance, angle, area, ID points, Mass using inquiry command, Quick select. Adding text to drawing, creating dimension Use of UCS, Alignment of UCS, Move UCS, Orthographic UCS Creating 3 D objects using region, boundary, 3D Polyline, Extrude, revolve feature. Use of solid 3D edit features, Shell, Imprint, Separate, Section, Boolean functions like Union, Subtract and Intersect, Extrude faces, Move faces, Delete face, Offset faces, Copy faces and colour faces commands. To show the section - Use of slice, Section commands Rendering and imaging, Produce hard copies.
Unit-3 Assembly Drawing **21 hours**
Sectioned View of (i) Knuckle joint- Part drawing, Solid Modelling, Assembly and Sectioning. **(ii) Protective type flange coupling- Part drawing, Solid Modelling, Assembly and Sectioning.** **(iii) Bench vice - Part drawing, Solid Modelling, Assembly and Sectioning.** **Assembly Drawing of (i) Knuckle joint- Part drawing, Solid Modeling, Assembly and Sectioning.** **(ii) Protective type flange coupling- Part drawing, Solid Modeling, Assembly and Sectioning.** **(iii) Bench vice - Part drawing, Solid Modeling, Assembly and Sectioning.** **Assembly Drawing from detail and vice versa**
Unit-4 Assembly Drawing from detail and vice versa **09 hours**
(i) Tail stock of Lathe machine **(ii) Screw jack** **(iii) Drilling Jig** **B). Assembly and Disassembly Drawings** **Plummer block, Footstep bearings, Couplings etc., Rivetted & Welded Joints, Screw and form of screw thread** **Spur gear profile drawing and free hand sketching** **Spur gear profile drawing from given data.**
Unit-5 Free hand sketching **6 hours**
(i) Pipe fittings-Such as-Elbows-Reducers, T-Cross and Bibcock. **(ii) I. C. engine piston, Simple bearing, Cottor and Knuckle joint, pulleys and flywheel-Sectioned views.** **(iii)Cutting tools of Lathe machine, shaper and common milling cutters.**

(iv) Gear puller and C-clamp **(v) Sketching of ortho graphics views from isometric views be practiced.**

Suggested Reading:

Text Book (s)

1. Bhatt N. D., "Engineering Drawing", Charotar publishing House, 1998

Reference Book (s)

1. French and Vierk, "Fundamentals of Engineering Drawing", McGraw Hill, 2002.

Name of The Course	**APPLIED MECHANICS LAB**				
Course Code	**DPME2006**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives:

1. Perform and solve problems concerning simple application of moments and forces.
2. Grasp the idea of the mechanical advantage, velocity ratio and efficiency of Simple machine.

Course Outcomes

CO1	**Perform and solve problems concerning simple application of moments and forces.**
CO2	**Grasp the idea of the mechanical advantage, velocity ratio and efficiency of Simple machine.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

1. To verify the law of Polygon of forces.
2. To verify the law of parallelogram and triangle of forces.
3. To verify the law of principle of moments.
4. To find the coefficient of friction between wood, steel, copper and glass.
5. To find the coefficient of friction on inclined surface
6. To find the reaction at supports of a simply supported beam carrying point loads only.
7. To find the forces in the jib & tie of a jib crane.
8. To find the mechanical advantage, velocity ratio and efficiency of Simple wheel & axle.
9. To find the mechanical advantage, velocity ratio and efficiency of Simple Screw jack.
10. To find the mechanical advantage, velocity ratio and efficiency of Simple Worm & worm wheel.
11. To find out center of gravity of regular lamina.
12. To find out center of gravity of irregular lamina.

Name of The Course	**THERMAL ENGINEERING LAB**				
Course Code	**DPME2007**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives:

1. Define the fundamentals of laws of thermodynamics and its applications.
2. Calculate heat and work interactions for various system.

Course Outcomes

CO1	**Define the fundamentals of laws of thermodynamics and its applications.**
CO2	**Calculate heat and work interactions for various system**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

1. Determination of temperature by: - I. Thermo couple ii. Pyrometer
2. Study of constructional details and specification of high pressure boiler and sketch
3. Demonstration of mounting and accessories on a boiler for study and sketch (field visit).
4. Performance testing of steam boiler.
5. Study of steam turbines through models and visits.
6. Determination of dryness fraction of wet steam sample
7. To study various types of compressors with the help of their models.

Name of The Course	**MANUFACTURING PROCESS LAB**				
Course Code	**DPME2026**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	4	2

Course Objectives:

1. Operate the working principle of various machines used in manufacturing
2. Grasp the appropriate production process and machines

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Course Outcomes:

CO1	**Perform and solve problems concerning simple application of moments and forces.**
CO2	**Grasp the idea of the mechanical advantage, velocity ratio and efficiency of Simple machine.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

1. PATTERN MAKING: **(a) Making Patterns (Any two Experiments).** **(i) Solid one piece pattern. (ii) Split two piece patterns. (iii) Split three piece patterns.** **(iv) Gated pattern. (v) Four Piece pattern. (vi) Sweep pattern. (vii) Skeleton pattern. (viii) Segmental pattern.**
(b) MAKING CORE BOXES (Any two Experiments). **(i) Straight Core Box. (ii) Bent Core Box. (iii) Unbalanced Cores.**
(a) Sand Testing (Any two Experiments). **(i) Grading (Grain Size).** **(ii) Determination of Moisture content (iii) Determination of Clay content.** **(iv) Determination of Permeability for gases.** **(b) Preparation of : (i) Green Sand Composition.** **(ii) Dry Sand Composition. (iii) Loam Sand Composition. (iv) Oil Sand For Cores.**
MOULDING: (All Experiments). **(a) Making at least 8 sands moulds of different forms with different types of pattern using.** **(i) Floor Moulding. (ii) Two Box Moulding.**

(iii)Three Box (or more) Moulding. **(b) At least one of the following:** **(i) Making and setting of cores of different types. (ii) Making one shell mould apparatus.**
CASE STUDY OF: (All Experiments). **At least 2 sand casting products from sand preparation, pattern layout to final finished casting** **by shell moulding, centrifugal casting, investment casting and continuous casting.**
ADVANCE WELDING SHOP: (All Experiments). **Study of various Gas cutting and welding equipments:-** **Welding transformer, Generator/rectifier, Gas cylinder, Gas cutting machines, Cutting torches etc., various electrodes and filler metals and fluxes.**
Practice of welding and cutting of different metals by making suitable jobs by different methods:- **1. Arc Welding practice of mild steel (M.S.) and Spot welding on stainless steel jobs.** **2. Tig Welding practice of Non-Ferrous metals, like Copper, Brass and Aluminum.** **3. Practice of Gas cutting manually.** **4. Practice of Gas cutting by cutting machine.** **5. Practice of Arc cutting.**

Name of The Course	**MECHANICS OF SOLIDS**				
Course Code	**DPME2008**				
Prerequisite	**DPME2001**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	2	0	4

Course Objectives:

1. To provide the basic concepts and principles of strength of materials.
2. To give an ability to calculate stresses and deformations of objects under external loading.

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Course Outcomes:

CO1	**Analyze and design structural members subjected to tension, compression, torsion, bending and combined stresses using the fundamental concepts of stress, strain and elastic behavior of materials.**
CO2	**Utilize appropriate materials in design considering engineering properties, sustainability, cost and weight.**
CO3	**Determine the deflections and rotation produced by the three fundamental types of load: axial, tensional and flexural.**
CO4	**Develop an understanding of the concepts of stress and strain and their use in the analysis and design of machine members and structures.**
CO5	**Develop an understanding of material behavior under a condition of pure torsion (twisting moment) on circular shafts.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 INTRODUCTION TO STRESS AND STRAIN **10 hour**
Introduction of Mechanical properties of materials, Definition of stress and strain, axial loading, different types of stresses and strains, tensile and compressive stress and strain, elastic limit, Hooke's law, stress-strain curve for ductile and brittle material, salient features of stress-strain curve. Young's modules of elasticity, Factor of safety, Stress and strain in straight, stepped bars and taper bar of circular cross section, determination of stress and elongation of a bolt in a bolted joint when subjected to direct external load only. Temperature stresses,Stress and strain on composite section under axial loading, stress and strain due to temperature variations in homogeneous and composite bars and metallic

tires, Shear load, shear stress and strain, modulus of rigidity, lateral strain, Poisson's ratio, volumetric strain, bulk modulus relation between modulus of elasticity, modulus of rigidity and bulk modulus.
Unit-2 PRINCIPAL STRESSES AND STRAIN, STRAIN ENERGY **08 hour**
Compound stress and strains: Introduction, normal stress and strain, shear stress and strain, stresses on inclined sections, strain energy, impact loads and stresses, state of plane stress, principal stress and strain, maximum shear stress, Mohr's stress circle, three dimensional state of stress & strain, equilibrium equations, generalized Hook's law, theories of failure. Thermal Stresses.Meaning of strain energy and resilience, Derivation of formula for resilience of a uniform bar in tension, Proof resilience, modulus of resilience, suddenly applied load, Impact or shock load. Strain energy in a material subjected to uniaxial tension and uniform shear stress. General expression for total strain energy of simple beam subjected to simple bending.: Pure Bending
Unit-3 SHEAR FORCE AND BENDING MOMENT **10 hours**
Types of beam,Types of load and support ,Shear force and bending moment for concentrated and uniformly distributed loads on simply supported beams, cantilever and overhanging beam. Shear force and bending moment diagrams. Relationship between shear force and bending moment, Point of contra flexure, calculations for finding the position of contra flexure, Condition for maximum bending Moment
Unit-4 THIN AND THICK CYLINDRICAL AND SPHERICAL SHELLS **08 hours**
Thin cylinders & spheres: Introduction, difference between thin walled and thick walled pressure vessels, Thin walled spheres and cylinders, hoop and axial stresses and strain, volumetric strain.Thick cylinders:Radial, axial and circumferential stresses in thick cylinders subjected to internal or external pressures, compound cylinders, stresses in rotating shaft and cylinders, stresses due to interference fits.
Unit-5 SLOPES AND DEFLECTIONS OF BEAMS, TORSION **10 hours**
Definition of slope and deflection, sign convention, Circular bending, Calculation of maximum slope and deflection for the following standard cases by double integration or moment area method: (1) Cantilever having point load at the free end. Cantilever having point load at any point of the span, Cantilever with uniformly distributed load over the entire span Cantilever having U.D.L. over part of the span from free end Cantilever having U.D.L. over a part of span from fixed end (2) Simply supported beam with point load at centre of the span. Simply supported beam with U.D. load over entire span. NOTE: All examples will be for constant moment of inertia without derivation of formula.Strength of solid and hollow circular shafts, Derivation of torsion equation, Polar modulus of section, Advantages of hollow shafts over solid shaft, Comparison of weights of solid and hollow shafts for same strength, Horse power transmitted. Calculation of shaft diameter for a given horse power.

Suggested Reading:

Text Book (s)

1. Rajput R. K., Strength of Materials, S.Chand & Co. Ltd., Delhi.
2. **Kapoor J.K., Strength of Materials, Asian Publication, Muzaffarnagar.**

Reference Book (s)

1. Ramamarutham S., Strength of Materials, Dhanpat Rai & Sons, Delhi..
2. Strength of Materials by Timoshenko and Yσungs, East West Press.

Name of The Course	**CONCEPT OF HEAT TRANSFER**
Course Code	**DPME2009**
Prerequisite	**DPME2002**
Co-requisite	
Anti-requisite	

	L	T	P	C
	3	2	0	4

Course Objectives:

1. To prepare students to know the basic knowledge of different types of heat exchanger.
2. Apply the concept of heat transfer to find heat flow in different metals.

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Course Outcomes:

CO1	**Draw the isometric view of a given three dimensional object/part**
CO2	**Draw the orthogonal projection of a solid body**
CO3	**Practice different kinds of materials and Mechanical components conventionally.**
CO4	**Identify the elements of a detailed drawing.**
CO5	**Produce the assembly drawing using part drawings.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1Introduction: **06 hour**
Modes and mechanisms of heat transfer - Basic laws of heat transfer -General discussion about applications of heat transfer. Conduction Heat Transfer: Fourier rate equation - General heat conduction equation in Cartesian coordinates.
Unit-2 One Dimensional Steady State Conduction Heat Transfer **10 hour**
Homogeneous slabs, overall heat transfer coefficient electrical analogy - Critical radius of insulation
One Dimensional Steady State Conduction Heat Transfer , Extended surface (fins) Heat Transfer - Long Fin, Fin with insulated tip and Short Fin.
Unit-3 One Dimensional Transient Conduction Heat Transfer **10 hours**
Systems with negligible internal resistance - Significance of Biot and Fourier Numbers . Heat Transfer with Phase Change: Boiling: - Pool boiling - Regimes, Critical Heat flux and Film boiling. Condensation: Film wise and drop wise condensation.
Unit-4 Heat Exchangers **07 hours**
Classification of heat exchangers – parallel and counter flow and cross flow heat exchanger overall heat transfer Coefficient and fouling factor - Concepts of LMTD and NTU methods - Problems using LMTD and NTU methods.
Unit-5 Radiation Heat Transfer **07 hours**
Emission characteristics and laws of black-body radiation - Irradiation - total and monochromatic quantities- laws of Planck, Wien, Kirchhoff, Lambert, Stefan and Boltzmann- heat exchange between two black bodies - concepts of shape factor - Emissivity - heat exchange between grey bodies - radiation shields

Suggested Reading:

Text Book (s)

1. Heat and Mass Transfer by R. K. Rajput/ S. CHAND PUBLICATION
2. A test book for Heat and mass transfer by Pk Nag
3. Heat and Mass Transfer by R.S. Khurmi

Reference Book (s)

1. Fundamentals of Heat and Mass Transfer by Frank P. Incropera.
2. Heat & Mass Transfer: A Practical Approach by Yunus Cengel , Afshin Ghajar

Name of The Course	**HYDRAULICS AND HYDRAULIC MACHINES**				
Course Code	**DPME2025**				
Prerequisite	**DPME2001**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

1. To prepare students to know the basic knowledge of different types of hydraulic machine.
2. Apply the concept of fluid mechanics to find fluid flow in different channel.

Course Outcomes:

CO1	**Identify understanding of fluid mechanics fundamentals, including concepts of mass and momentum conservation**
CO2	**Apply the Bernoulli equation to solve problems in fluid mechanics.**
CO3	**Discuss of laminar and turbulent boundary layer fundamentals**
CO4	**Correlate the recent developments in fluid mechanics, with application to aerospace systems.**
CO5	**Apply the concepts developed for fluid flow analysis to issues in aerospace design**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Properties of fluid **06 hour**
Fluid : Real fluid, ideal fluid., Fluid Mechanics, Hydraulics, Hydrostatics, Hydro kinematics, Mass density, specific weight, specific gravity, cohesion, adhesion, viscosity, surface tension, capillarity, vapour pressure and compressibility. Hydrostatic Pressure: Pressure, intensity of pressure, pressure head, Pascal's law and its applications.
Unit- 2 Measurement of Pressure **08 hour**
Atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure. Use of simple manometer, differential manometer and mechanical gauges Measurement of pressure by manometers and pressure gauges. Fundamental of Fluid Flow, Types of Flow, Steady and unsteady flow, Laminar and turbulent flow Uniform and non-uniform flow. Discharge and continuity equation (flow equation)
Unit-3 Bernoulli's Theorem **07 hours**
Types of hydraulic energy, Potential energy, Kinetic energy, Pressure energy Bernoulli's theorem; statement and description (without proof of theorems) Venturimeter (horizontal and inclined) Orifice: Definition of Orifice, and types of Orifices, Hydraulic Coefficients.
Unit-4 Flow through Pipes and Flow Measurement **10 hours**
Definition, laminar and turbulent flow explained through Reynold's Experiment. Reynolds Number, critical velocity and velocity distribution. Head Losses in pipe lines due to friction, sudden expansion and sudden contraction entrance, exit, Hydraulic gradient line and total energy line.Measurement of velocity by Pitot tube , Measurement of Discharge by a Notch Difference between notches and orifices. Dimension less numbers types (definition only)
Unit-5 Pumps and Turbines **07 hours**
Reciprocating pumps (parts, working, discharge, work done, %slip only), Centrifugal pumps (parts, working), Reciprocating v/s Centrifugal

pumps, Turbine (layout, efficiency, classification), Construction & working of (Pelton turbine).

Suggested Reading:

Text Book (s)

1. Fluid Mechanics & Hydraulic Machines, Laxmi Publication (P) Ltd., New Delhi
2. Vijay Gupta & Gupta S.K., Fluid Mechanics, New Age International Publishers, New Delhi.

Reference Book (s)

1. Garde R.J., Fluid Mechanics, New Age International Publishers, New Delhi
2. Modi P.N., Fluid Mechanics, New Age International Publishers, New Delhi.

Name of The Course	**INSPECTION & QUALITY CONTROL**				
Course Code	**DPME2012**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

1. To reduce the reduction of defect goods or unsatisfying services.
2. To ensure that the product and services fit for purpose and suitable for the intended purpose.

Course Outcomes:

CO1	**Express the concepts of quality control, improvement and management**
CO2	**Apply the concept of design for quality.**
CO3	**Employ the concepts of reliability.**
CO4	**Generalize and carry out reliability data analysis**
CO5	**Assess various reliability prediction and evolution methods.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Inspection **08 hour**
Introduction, units of measurement, standards for measurement and interchangeability International, national and company standard, line and wavelength standards Planning of inspection: what to inspect? When to inspect? Who should inspect? Where to inspect? Types of inspection: remedial, preventive and operative inspection, incoming, in-process and final inspection. Study of factors influencing the quality of manufacture
Unit- 2 Measurement and gauging **14 hour**
Basic principles used in measurement and gauging, mechanical, optical, electrical and electronic. Study of various measuring instruments like: calipers, micrometers, dial indicators, surface plate, straight edge, try square, protectors, sine bar, clinometer, comparators – mechanical, electrical and pneumatic. Slip gauges, tool room microscope, profile projector. Limit gauges: plug, ring, snap, taper, thread, height, depth, form, feeler, wire and their applications for linear, angular, surface, thread and gear measurements, gauge tolerances
Unit-3 Statistical Quality Control **10 hours**
Basic statistical concepts, empirical distribution and histograms, frequency, mean, mode, standard deviation, normal distribution, binomial and Poisson, Simple- examples. Introduction to control charts, namely X, R, P and C charts and their applications. Sampling plans, selection of sample size, method of taking samples, frequency of samples. Inspection plan format and test reports

Unit-4 Modern Quality Concepts 06 hours
Concept of total quality management (TQM) National and International Codes. ISO-9000, concept and its evolution QC tools Introduction to Kaizen, 5S
Unit-5 Instrumentation 06 hours
Measurement of mechanical quantities such as displacement, vibration, frequency, pressure temperature by electro mechanical transducers of resistance, capacitance & inductance type.

Suggested Reading:

Text Book (s)

1. Statistical Quality Control by M.Mahajan: Dhanpat Rai and Sons, Delhi
2. Engineering Metrology by RK Jain

Reference Book (s)

1. French and Vierk, “Fundamentals of Engineering Drawing”, McGraw Hill, 2002.

Name of The Course	**MECHANICS OF SOLID LAB**				
Course Code	**DPME2013**				
Prerequisite	**DPME2001**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives:

1. Ability to conduct standard tension tests of steel and other metals.
2. Ability to conduct compression tests of concrete, cast iron and steel.

Course Outcomes:

CO1	**Ability to conduct standard tension tests of steel and other metals.**
CO2	**Ability to conduct compression tests of concrete, cast iron and steel.**
CO3	**Ability to conduct tests with materials subjected to torsion.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

1. To find the shear force at a given section of simply supported beam for different loading.
2. To find the value of 'E' for a steel beam by method of deflection for different loads.
3. To determine the Max-Fibre stress in X-section of simply supported beam with concentrated loads and to find the neutral axis of the section.
4. To determine the ultimate tensile strength, its modulus of Elasticity, Stress at yield point, % Elongation and contraction in x-sectional area of a specimen by U.T.M. through necking phenomenon.
5. To determine the ultimate crushing strength of materials like steel and copper and compare their strength.
6. To determine Rock Well Hardness No. Brinell Hardness No. of a sample.
7. To estimate the Shock Resistance of different qualities of materials by Izod's test and charpy test.
8. To determine the bending moment at a given section of a simply supported beam for different loading.
9. To determine the various parameters of Helical coil spring.
10. To determine the angle of twist for a given torque by Torsion apparatus and to plot a graph between torque and angle of twist.

Suggested Reading:

Name of The Course	**CONCEPT OF HEAT TRANSFER LAB**

Course Code	**DPME2014**				
Prerequisite	**DPME2002**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives:

1. Analyze the heat flow in different types of materials like steel, copper, silver, etc.
2. Understanding to solve the problems related to heat transfer in conduction, convection and radiation

Course Outcomes:

CO1	**Analyze the heat flow in different types of materials like steel, copper, silver, etc.**
CO2	**Understanding to solve the problems related to heat transfer in conduction, convection and radiation.**
CO3	**Compare the rate of flow of heat and thermal conductivity of materials like copper and steel.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

1. Study of Heat Transfer through Composite Wall.
2. Study of Thermal Conductivity of Insulating Powder.
3. Study of Concentric Tube Heat Exchanger (Plain Tube Type).
4. Experimental Study of Thermal Conductivity of Metal Rod
5. Experimental Study of Heat Transfer From A Pin-Fin Apparatus
6. Study of Emissivity Measurement Apparatus
7. Study of Stefan Boltzmann Apparatus

Suggested Reading:

Name of The Course	**Hydraulics and Hydraulics Machine Lab**				
Course Code	**DPME2028**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives:

1. Perform standard measurement techniques of fluid mechanics and their applications.
2. Operate different hydraulic machines and measure different parameters.

Course Outcomes:

CO1	**Grasp compare the results of analytical models introduced in lecture to the actual behavior of real fluid flows.**
CO2	**Perform standard measurement techniques of fluid mechanics and their applications.**
CO3	**Operate different hydraulic machines and measure different parameters.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

To verify Bernoulli's Theorem.

To find out venturimeter coefficient
To determine Coef. of velocity (Cv), Coef. of discharge (Cd) Coef. of contraction (Cc) and verify the relation between them
To perform Reynold's Experiment.
To determine Darcy's coefficient of friction for flow through pipes.
To verify loss of head due to: (a) Sudden enlargement (b) Sudden Contraction.
To determine velocity of flow of an open channel by using a current meter.
To determine coefficient of discharge of a rectangular notch/triangular notch.
Study of the following:(i) Reciprocating Pumps or Centrifugal Pumps. (ii) Impulse turbine or Reaction turbine (iii)Pressure Gauge/water meter/mechanical flow meter.

Name of The Course	**INSPECTION AND QUALITY LAB**				
Course Code	**DPME2017**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives:

1. Perform dial indicator for measuring taper.Operate different hydraulic machines and measure different parameters.
2. Apply the concept of design for quality.

Course Outcomes:

CO1	**Perform dial indicator for measuring taper.**
CO2	**Displays & Plot frequency distribution for 50 turned components.**
CO3	**Apply the concept of design for quality.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

Use of dial indicator for measuring taper.
Use of combination set, bevel protector and sine bar for measuring taper.
Measurement of thread characteristic using vernier and gauges.
Use of slip gauge in measurement of centre distance between two pins.
Use of tool maker's microscope and comparator.
Plot frequency distribution for 50 turned components.
With the help of given data, plot X, R, P and C charts

Name of The Course	**COMPUTER AIDED DESIGN LAB**				
Course Code	**DPME2016**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	4	2

Course Objectives:

1. Perform the different techniques of graphical representation for simple parts and assemblies apply the concept of design for quality.
2. Manipulate drawings through editing and plotting techniques

Course Outcomes:

CO1	**Perform the different techniques of graphical representation for simple parts and assemblies**
CO2	**Displays basic concepts of the AutoCAD software**

CO3	Manipulate drawings through editing and plotting techniques

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

Setting up of drawing environment by setting drawing limits, drawing units, naming the drawing, naming layers, setting line types for different layers using various type of lines in engineering drawing, saving the file with drawing extension
Layout drawing of a building using different layer and line colors indicating all Building details. Name the details using text commands, Make a Title Block
Make an Isometric dimensioned drawing of Connecting Rod using isometric grid and snap
Draw quarter sectional isometric view of a cotter joint
Draw different types of bolts and nuts with internal and external threading in Acme and Square threading standards. Save the bolts and nuts as blocks suitable for insertion
Draw 3D models by extruding simple 2D objects, dimension and name the objects
Draw a spiral by extruding a circle
To Draw Orthographic Projection Drawings (Front, Top, Side) of boiler safety valve giving name the various components of the valve.

Name of The Course	THEORY OF MACHINE				
Course Code	DPME3001				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	T	P	C
		3	2	0	4

Course Objectives:

1. Understand the fundamentals of the theory of kinematics and dynamics of machines.
2. To Use computer software packages in simple design of machines.

Course Outcomes:

CO1	Identify with common mechanisms used in machines and everyday life.
CO2	Calculate mobility (number of degrees-of-freedom) and enumerate rigid links and types of joints within mechanisms.
CO3	Analyse ability to conduct a complete (translational and rotational) mechanism position, velocity and acceleration analysis
CO4	Compare between various cam mechanism classification and cam motion profiles, and familiarity with introductory cam design considerations.
CO5	Compare between various gear mechanism classification and gear train analysis, and familiarity with gear standardization and specification in design.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Introduction 08 hour
Statics and dynamics, links, classification of links, kinematic pairs classification, degrees of freedom, constrained motion-types, kinematic chains, mechanisms, inversions of quadratic chain, single slider crank chain and double slider crank chain. Straight line motion mechanisms: classification of straight line motion mechanisms, peaucellier's, grass hopper and Pantograph mechanisms.
Unit- Velocity and Acceleration Mechanism 12 hour

Velocity and acceleration in Mechanisms: Motion of a link in machine, velocity of a point on a link – Instantaneous center – types of instantaneous centers – kennedy theorem – velocity measurement by Instantaneous center method, Relative velocity method. Acceleration of a point on a link - acceleration in slider crank mechanism, Coriolis component of acceleration. Steering gear mechanism: Davis and Ackerman steering gear, Single and Double Hook Joint analysis.
Unit-3 Cams **10 hours**
Definitions, Types of cams and followers, types of follower motion, generation of cam profiles for uniform velocity, uniform acceleration and simple harmonic motion. Maximum velocity and maximum acceleration, analysis of roller follower and circular cam with straight flanks.
Unit-4 Gears **10 hours**
Friction wheels and toothed gears- types-law of gearing, condition of constant velocity ratio for transmission of motion- cycloidal and involute teeth profiles, velocity of sliding-interference - condition for minimum number of teeth to avoid interference- expressions for arc of contact and path of contact.
Unit-5 Vibrations **04 hours**
Concept of vibrations and its types – longitudinal, transverse and tensional vibrations (simple numerical), Damping of vibrations.

Suggested Reading:

Text Book (s)

1. Theory of Machines by D.R. Malhotra; Satya Prakashan, New Delhi.
2. Theory of Machines by V.P Singh; Dhanpat Rai and Sons, New Delhi

Reference Book (s)

1. Theory of Machines by Jagdish Lal; Metropolitan Publishers, New Delhi.
2. Theory of Machines by R.C. Jindal; North Publications

Name of The Course	**MACHINE DESIGN**				
Course Code	**DPME3002**				
Prerequisite	**DPME2004**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	2	0	4

Course Objectives:

1. To prepare students for design various machine components.
2. Analysis the various mechanical properties of materials.

Course Outcomes:

CO1	**Analyze the stress and strain on mechanical components and identify and quantify failure modes for mechanical parts.**
CO2	**Describe variety of mechanical components available and emphasize the need to continue learning.**
CO3	**Express the basic machine elements used in machine design; design machine elements to withstand the loads and deformations for a given application, while considering additional specifications.**
CO4	**Appraise a design problem successfully, taking decisions when there is not a unique answer.**
CO5	**Apply mechanical engineering design theory to identify and quantify machine elements in the design of commonly used mechanical systems.**

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Exam (MTE)**	**End Term Exam (ETE)**	**Total Marks**
20	30	50	100

Course Content:

Unit-1 Introduction to Design **08 hour**
1.1 Basic requirements for machine elements design **1.2 General design process** **1.3 Mechanical properties** **1.4 General design considerations like fatigue, creep, fabrication methods, economic considerations, material selection, ergonomic etc.** **1.5 Designing for strength**
Unit- Riveted And Welded Joints **07 hour**
2.1Types of riveted joints **2.2 Possible failure of riveted joints** **2.3 Design of lap and butt type riveted joints (simple cases)** **2.4 Strength and efficiency of riveted joints** **2.5 Common types of welded joints** **2.6 Transverse fillet and parallel fillet welded joint**
Unit-3 Screwed Joints **08 hours**
3.1 Introduction to screw and various definitions of screw threads **3.2 Advantages and disadvantages of screwed joints over riveted and welded joints** **3.3 Common types of screw fastening; through bolt, tap bolt, stud, cap screw, machine screw and set screw.** **3.4 Designation of screw threads** **3.5 Stresses in screw fastenings** **3.6 Design of bolts for cylinder cover**
Unit-4 Keys And Couplings **08 hours**
Keys And Couplings : **4.1 Definition of term Key; its various types** **4.2 Splines** **4.3 Forces acting on sunk keys** **4.4 Shaft couplings and its various types** **4.5 Design of flange coupling** **Shafts:** **5.1 Various types of shafts** **5.2 Stresses in shafts** **5.3 Design of shaft (solid and hollow) subjected to torque and Bending moment**
Unit-5 Design Of Cotter and Knuckle Joint **08 hours**
Design Of Cotter Joint : **6.1 Design of cotter** **6.2 Design of socket** **6.3 Design of spigot** **Design Of Knuckle Joint :** **7.1 Design of rod** **7.2 Design of pin**

Suggested Reading:

Text Book (s)

1. R.S.khurmi, Machine design, S.Chand, New Delhi
2. V. Bhandari, Machine Design, Tata Mcg Hill, New Delhi

Reference Book (s)

1. Mechanical Engineering Design" by Joseph Edward Shigley

Name of The Course	**MACHINE TOOL TECHNOLOGY AND MAINTAINENCE**				
Course Code	**DPME3003**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	0

Course Objectives:

1. To revise the fundamentals of Manufacturing Process I and hence educate the students about the scope of the subject.
2. To emphasize upon the prominent theories, concepts and constructional features of machines related to them.

Course Outcomes:

CO1	**Discuss basic principles and working of machine tools**
CO2	**Discuss detail knowledge of lathe machine**

CO3	Discuss detail knowledge of shaping planning and slotting machine.
CO4	Discuss detail knowledge of drilling and boring machine
CO5	Discuss detail knowledge of milling and grinding machine

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Basic features of Machine tools **06 hour**
Various types of machining operations and machine tools. Common features of all basic machine tools, work holding and tool holding devices, Drive systems, sources of power, Bed, body or frame. Mechainaical drive system for providing reciprocating, oscillating and rotational movement. Systems of stepped and stepless, friction and positive drives.
Unit-2 Center Lathe **10 hour**
The centre lathe and its principle of working. Types of lathes, Lathe specification and size, Features of lathe bed. Head stock and tail stock. Feed mechanism and change-gears, carriage saddle, Cross slide, Compound rest, Tools post, Apron mechanism, lathe accessories, Chucks, Face plate, Angle plate, Driving plate, Lathe dogs, mandrils, Steady rest, Lathe attachements. Lathe operations-plane and step turning, Taper turning, Screw cutting, Drilling, Boring, reaming,Knurling, Parting off, Under cutting, Relieving. **Types of lathe tools and their uses.** **Brief description of semi automatic and automatic lathes such as capstan and turret lathes, their advantages and disadvantages over centre lathe, types of job done on them. General and periodic maintance of a centre lathe.**
Unit-3 Shaping Planning and Slotting Machine **04 hours**
Working principles of planer, shaper and slotter. Differences and similarities among them, quick return mechanism applied to the machines. Types of work done on them, types of tools used, their geometry . General and periodic maintenance of a shaper.
Unit-4 Drilling and Boring Machine, Milling and Grinding Machine **10 hours**
Types of tools used in drilling and boring. Classification of drilling and boring machines, principle of working and constructional details of simple and radial drilling M/C and general and periodic maintenance. Operations like facing, counter boring, tapering.Types of milling machines, constructional features of horizontal milling M/C. general maintenance of the machine, types of milling cutters, milling operations like plane milling, space milling, angular milling form milling, straddle milling, gang milling, Negative rack milling. Common abrasive grinding wheel materials, Bonds, Grain or grits of abrasive, Grain structure and shapes of common wheels, various speeds and feeds, Use of coolants, Methods of grinding. Types of grinding machines, precision finishing operations like honing.
Unit-5 Cooling Process and Plant Maintenance **10 hours**
Action of cutting fluids. Requirement of good cutting fluids, their selection for different materials and operations. Maintenance: maintenance definition, scope of maintenance, maintenance strategies, economics and performance measures, objective of maintenance, concepts of general approach to eliminate Losses, classification of maintenance-corrective, scheduled, preventive, predictive and productive maintenance. common techniques to monitor the conditions of systems-vibration based, radiographic, thermographic, ferro graphic,

computer based diagnosis etc, forms of wear, wear on guide surfaces, breakdown and remedies of machine tools, repair cycle, installation and maintenance of machine tools, PERT in maintenance.

Suggested Reading:

Text Book (s)

1. Machine tool technology by Anup Goel technical publication

Reference Book (s)

1. Manufacturing Process Vol 2 by P N RAO

Name of The Course	**Theory of Machine Lab**				
Course Code	**DPME3004**				
Prerequisite	**DPME2008**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	0

Course Outcomes:

CO1	**Grasp the working of inversions of four bar/single and double slider mechanism**
CO2	**Grasp the working of different types of gear and gear trains.**
CO3	**Displays principles of gyroscope and governors.**

Continuous Assessment Pattern

To study various types of Kinematic links, pairs, chains and Mechanisms.
To study inversions of 4 Bar Mechanisms, Single and double slider crank mechanisms.
To find coefficient of friction between belt and pulley.
To study various type of cam and follower arrangements.
To study various types of gears – Helical, cross helical worm, bevel gear.
To study various types of gear trains – simple, compound, reverted, epicyclic and differential.
To perform experiment on Watt and Porter Governors to prepare performance
characteristic Curves, and to find stability & sensitivity.
To study gyroscopic effects through model

Text Book (s)

3. Theory of Machines by D.R. Malhotra; Satya Prakashan, New Delhi.
4. Theory of Machines by V.P Singh; Dhanpat Rai and Sons, New Delhi

Reference Book (s)

3. Theory of Machines by Jagdish Lal; Metropolitan Publishers, New Delhi.

Name of The Course	**Project**				
Course Code	**DPME9999**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	0	10

Course Objectives:

1. Perform the different techniques of graphical representation for simple parts and assemblies apply the concept of design for quality.
2. Manipulate drawings through editing and plotting techniques

Course Outcomes:

CO1	**Create a own data or implementation on previous data project.**
CO2	**Create model to exhibit project**
CO3	**Develop understanding of subject based knowledge given in the classroom in the context of its application at work places.**
CO4	**Develop firsthand experience and confidence amongst the students to enable them to use and apply polytechnic/institute based knowledge**

	and skills to solve practical problems related to the world of work.
CO5	Develop abilities like interpersonal skills, communication skills, positive attitudes and values etc.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

Projects connected with repair and maintenance of machines.
Estimating and costing projects.
Design of jigs / fixtures.
Projects related to quality control.
Projects relating to installation, calibration and testing of machines.
Projects related to wastage reduction.
Project, related to fabrication.
Project work related to increasing productivity.

ELECTIVE COURSE

Name of The Course	REFRIGERATION & AIRCONDITIONING				
Course Code	DPME3005				
Prerequisite	DPME2009				
Co-requisite	DPME2002				
Anti-requisite					
		L	T	P	C
		3	0	0	3

Course Objectives:

1. Apply concepts of refrigeration system to analyze refrigerators.
2. Understanding of various types of refrigerants and their uses.
3. Apply concepts of pshychrometry to analyze various types of air-conditioners.

Course Outcomes:

CO1	Choose the method of refrigeration for particular purpose
CO2	Differentiate between VCR and VAR
CO3	Determine the refrigerant for required refrigeration system
CO4	Evaluate the quality of air inside given space
CO5	Inspect the elements of window and split air conditioning system

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Fundamentals of Refrigeration 06 hour
Introduction to refrigeration, and air conditioning, meaning of refrigerating effect, units of refrigeration, COP, methods of refrigeration.

Unit- 2 Vapour Compression System **10 hour**	
Introduction, principle working of vapour compression system, T- S and p– H charts, dry, wet and superheated compression. Effect of sub cooling, super heating, mass flow rate, entropy, enthalpy, work done, Refrigerating effect and COP.	
Unit-3 Refrigerants **06 hours**	
Functions, classification of refrigerants, Nomenclature, Properties of ideal refrigerant.	
Unit-4 Vapour Absorption System **08 hours**	
Introduction, principle and working of simple absorption system. Advantages and disadvantages of vapors absorption refrigeration system over vapors compression system.	
Unit-5 Psychometric and Air-Conditioner **15 hours**	
Definition, importance, specific humidity, relative humidity, degree of saturation, DBT, WBT, DPT, sensible heat, latent heat, Total enthalpy of air. Psychometric chart and various processes of psychometric. Study of window air-conditioning, split type air conditioning, concept of central air-conditioning	

Suggested Reading:

Text Book (s)

1. Refrigeration & Air conditioning –C.P. Arora, TMH, New Delhi.
2. Refrigeration & Air conditioning –R.S.Khurmi, S.Chand, New Delhi.

Reference Book (s)

1. Refrigeration & Air conditioning –W.F. Stocker and J.W. Jones, TMH, New Delhi.
2. Refrigeration & Air conditioning- P.L.Ballaney, Khanna Publishers, New Delhi

Name of The Course	**Robotics**				
Course Code	**DPME3006**				
Prerequisite	**DPME2001**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

1. Be familiar with the history, concept development and key components of robotics technologies.
2. Be familiar with various robot sensors and their perception principles that enable a robot to analyze their environment, reason and take appropriate actions toward the given goal.

Course Outcomes:

CO1	**Importance of robotics in today and future goods production**
CO2	**Discuss Robot configuration and subsystems**
CO3	**Discuss Principles of robot programming and handle with typical robot**
CO4	**Discuss Working of mobile robots**
CO5	**Discuss detail knowledge of application of robots**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit- Introduction **10 hour**

Definition, Classification of Robots - Geometric classification and Control classification, Laws of Robotics, Robot Components, Coordinate Systems, Power Source. Robot anatomy, configuration of robots, joint notation schemes, work volume, manipulator kinematics, position representation, forward and reverse transformations, homogeneous transformations in robot kinematics, D-H notations, kinematics equations, introduction to robot arm dynamics.
Unit-2 ROBOT DRIVES AND POWER TRANSMISSION SYSTEMS 10 hour
Robot drive mechanisms: Hydraulic / Electric / Pneumatics, servo & stepper motor drives, Mechanical transmission method: Gear transmission, Belt drives, Rollers, chains, Links, Linearto-Rotary motion conversion, Rotary-to-Linear motion conversion, Rack and Pinion drives, Lead screws, Ball Bearings.
Unit-3 ROBOT END EFFECTORS 06 hours
Classification of End effectors – active and passive grippers, Tools as end effectors, Drive system for grippers. Mechanical, vacuum and magnetic grippers. Gripper force analysis and gripper design
Unit-4 ROBOT SIMULATION 05 hours
Methods of robot programming, Simulation concept, Off-line programming, advantages of offline programming.
Unit-5 ROBOT APPLICATIONS 10 hours
Robot applications in manufacturing-Material transfer and machine loading/unloading, Processing operations like Welding & painting, Assembly operations, Inspection automation, Limitation of usage of robots in processing operation. Robot cell design and control, Robot cell layouts-Multiple robots & Machine interference.

Suggested Reading:

Text Book (s)

1. Robotic: Control, Sensing, Vision and Intelligence, by Fu, McGraw Hill.

Reference Book (s)

1. Robotics for Engineers, by Y. Koren, McGraw Hill

Name of The Course	**Power Plant Engineering**				
Course Code	**DPME3007**				
Prerequisite	**DPME2009**				
Co-requisite	**DPME3005**				
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

1. Describe source of energy and types of power plant.
2. Analyze different types of steam cycles of steam power plant and estimate efficiency.

Course Outcomes:

CO1	Identify power plant components and basic terms related with power plant system.
CO2	Describe elements and functions of steam, hydro, nuclear, diesel and solar power plants.
CO3	Determine power generation by using Rankine cycle.
CO4	Calculate performance of power plants based on load variations.
CO5	Discuss Non conventional power generation plants

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Introduction to power plant **08 hour**
Power scenario in India, Types of power plants – Hydro, Nuclear, Thermal, Future trends in power sector. Analysis of steam cycles- Carnot, Rankine, Reheat cycle, Regenerative cycle, Methods of reheating, Advantages and disadvantages of reheat cycle,Sources of waste heat **Heat recovery forms & methods – Sensible and latent Heat recovery.**
Unit-2 Steam power plant **10 hour**
Layout of steam power plant, general features of selection of site **High pressure boilers – Construction and working of Sub-critical and Super-critical boilers.Coal and ash elevator, Coal crushing, Pulverized fuel handling system, Ball mill, Pulverized fuel and their advantages, Multi handling system- equipments for in plant handling of coal such as belt conveyor, screw conveyor, bucket retort stoker, Pulverized fuel burner, Hydraulic and pneumatic ash handling, Electrostatic precipitator.**
Unit-3 Nuclear power plant **08 hours**
Fusion and fission reaction, general criteria for selection of site. **Elements of nuclear power station, layout, types of nuclear reactors.** **Nuclear fuels, coolant & moderators.** **Working of PWR, BWR, CANDU, BREEDER type reactor.** **Safety precautions and waste disposals**
Unit-4 Gas turbine power plant **08 hours**
General Layout, selection of site, Gas turbine power plants in India. components of gas turbine plants, gas turbine Fuels. Comparison of Gas turbine plant with diesel and Steam power plant. Environmental impact of gas turbine power plant. Prediction of load, selection of types of generation, number of generating units. Load duration curves, cost analysis, elements, controlling the cost of power plant (simple numerical) **Major electrical equipments in power station- generator, step-up transformer, switch gear, electrical motors**
Unit-5 Non conventional power generation plants **08 hours**
Geothermal power plant- types, economical justification, Tidal power plant- factors affecting suitability of site, working of different tidal power plants, advantages and disadvantages, Wind power plant- different types, advantages and Disadvantages. Solar power plant Magneto Hydro dynamics power plant Small hydro power plant.

Suggested Reading:

Text Book (s)

1. Power Plant Engineering. by Nag, P.K., Tata-McGraw Hill. Higher Education, 3rd edition, 2008.
2. Power plant engineering. By R.K.RAJPUT Laxmi publication

Reference Book (s)

Powerplant Technology, by EL-Wakil, M.M., McGraw Hill, 1st Edition, 1984

Name of The Course	**Automobile Engineering**				
Course Code	**DPAE3001**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

1. The anatomy of the automobile in general.
2. Suspension, frame, springs and other connections

Course Outcomes:

CO1	**Identify the different parts of the automobile**
CO2	**Explain the working of various parts like engine, transmission, clutch,**

	brakes
CO3	Describe how the steering and the suspension systems operate
CO4	Understand the environmental implications of automobile emissions
CO5	Develop a strong base for understanding future developments in the automobile industry

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 High speed diesel engine **08 hour**
Theory of diesel engine operation. Difference between petrol & diesel engine. Advantages and disadvantages. **Fuel filters-primary and secondary; Fuel injection pumps- plunger and barrel type, distributor type; priming of fuel feed pumps, Fuel injectors and solid injection, Common rail direct Injection(CRDI). Type of nozzles, Governing and type of governors.**
Unit-2 Combustion **10 hour**
Phenomenon of combustion in C.I engines and S.I engines, phases of combustion and after burning. Methods producing turbulence. Various types of combustion chambers for petrol and diesel engines. Detonation and knocking, octane and cetane number, swirl and squish.Working principle of Hybrid car, fuel cell car/dual fuel operated engines
Unit-3 Different Types of Engine **08 hours**
Super charged engines. Location of super charger, Power absorbed by super charger,Turbo charged engines,Wankel engine Gas turbines and jet propulsion, Alternate fuels operated engines like L.P.G, C.N.G ,Hydrogen operated
Unit-4 Engine Pollutants and its control **08 hours**
Sources of engine pollutants of S.I and C.I engine. Effect of pollutants on human and environment. Methods of Control – Crank case ventilation, fuel tank ventilation, carburetion and recirculation. Redesigning of various engine system, V.V.R. Exhaust gas recirculation systems. Catalytic converters. Close loop feedback, electronic integrated engine management system. **Emission rules and regulations. Bharat – I, II, III,IV**
Unit-5 Auto Electrical and Electronics System **06 hours**
Constructional details of lead acid cell battery. Maintenance of **batteries, checking of batteries for voltage and specific gravity** **Concept of Dynamo** **Alternator - Construction and working,** **Starter motor** **Charging of battery**

Suggested Reading:

Text Book (s)

1. Automobile Engineering by Dr. Kirpal Singh; Standard Publishers Distributors
2. Automobile Engineering by R.B. Gupta; Satya Parkash, New Delhi

Reference Book (s)

1. I.C. Engines by M.L. Mathur and Sharma; DhanpatRai and Sons, Delhi

Name of The Course	**REFRIGERATION & AIRCONDITIONING LAB**				
Course Code	**DPME3008**				
Prerequisite	**DPME2009**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Outcomes:

CO1	Measure the COP of refrigeration systems
CO2	Handle the charging of refrigerator and air-conditioner

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

Identify various parts of a refrigerator
Identify various parts of a window air conditioner.
To find COP of Refrigeration system.
To study charging of a refrigerator.
To study charging of a window type air conditioner.
Study of cut section of single cylinder compressor
Study of an ice plant, cold storage plant.
Study of a central air conditioning plant.

Name of The Course	ROBOTICS LAB				
Course Code	DPME3009				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	T	P	C
		0	0	2	1

Course Outcomes:

CO1	Describe in detail how industrial robot systems are used, structured and operate,
CO2	Describe in detail the structure and operation of robotic tooling, including actuators, mechanics and sensors,

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

ASSIGNMENT ON INTRODUCTION TO ROBOT CONFIGURATION
DEMONSTRATION OF ROBOT WITH 2 DOF, 3 DOF, 4 DOF etc.
TWO ASSIGNMENTS ON PROGRAMMING THE ROBOT FOR APPLICATIONS
TWO ASSIGNMENTS ON PROGRAMMING THE ROBOT FOR APPLICATIONS IN VAL II
TWO PROGRAMMING EXERCISES FOR ROBOTS
TWO CASE STUDIES OF APPLICATIONS IN INDUSTRY
EXERCISE ON ROBOTIC SIMULATION SOFTWARE

Name of The Course	POWER PLANT ENGINEERING LAB				
Course Code	DPME3010				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	T	P	C
		0	0	2	1

Course Outcomes:

CO1	Sketch schematic diagram of coal thermal power plant.

CO2	Measure efficiencies of condenser, cooling tower and compressors.
CO3	Identify difference between working of impulse and reaction turbine.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

To study low pressure boilers and their accessories and mountings.
To study high pressure boilers and their accessories and mountings.
To study the working of impulse and reaction steam turbines.
To prepare heat balance sheet for given boiler.
To find power output & efficiency of a steam turbine.
To find the condenser efficiencies.
To study cooling tower and find its efficiency.
To find calorific value of a sample of fuel using Bomb calorimeter.
Calibration of Thermometers and pressure gauges.
To study and find volumetric efficiency of a reciprocating air compressor.

Name of The Course	AUTOMOBILE ENGINEERING LAB				
Course Code	DPME3010				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	T	P	C
		0	0	2	1

Course Outcomes:

CO1	Demonstrate the vehicle construction, chassis, lubrication system and cooling system in automobile.
CO2	Appraise the recent trends in alternate fuels and automobile safety system.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

Servicing and overhauling of petrol engine
Servicing and overhauling of diesel engine.
Dismantling, inspection and assembling of fuel injection pump
Dismantling, inspection and assembling of fuel injector.
Testing of fuel injection pump and fuel injector.
Gasoline engine Emission test using exhaust gas analyser.
Diesel engine Emission test using smokemeter.
Basic electrical checks:- Battery connections, electrical bulbs and units, circuit protection devices and wiring connections.
Testing of battery:- Specific gravity test, high rate discharge test, open circuit voltage test; charging of battery.
Testing of starter motor, alternator and dynamo.

GALGOTIAS UNIVERSITY

(Established under Galgotias University Uttar Pradesh Act No. 14 of 2011)

Program: Diploma in Automobile Engineering

Scheme: 2020-2021

Vision:

To be a cradle for inventions and innovations that provides transformative education to create leaders and innovators, and generating new knowledge for society and industry

Mission:

- To prepare efficient technical graduates with high level of knowledge and technological innovation.
- To provide necessary support to the aspirants in their goal oriented academic pursuits through value aided curricular and co-curricular activities.
- To achieve the international standards of quality assurance in accordance with the needs in public and private sectors
- To provide the students with academic environment of excellence, leadership, ethical guidelines and lifelong learning needed for a long productive career.

Program Educational Objectives:

The Diploma in Automobile Engineering Undergraduate Program at Galgotias University has the following Program Educational Objectives (PEOs):

1. Impart knowledge of Mathematics, Applied sciences and Engineering.
2. Ability to work in teams on multi-disciplinary projects in industry.
3. Practice in a broad range of industries for Automobile engineering
4. Participate as leaders in their fields of expertise and in activities that support service and economic development nationally and throughout the world.

Program Specific Objectives:

Automobile Engineering Diploma Students will able to:

PSO1- Ability to solve contemporary issues related to Automobile, design, and Industrial automation through internship integrated program curriculum.

PSO2- Conceptualize; make/improve physical products, process and system using Automobile and industrial engineering

Program Outcomes:

The Diploma holder of Automobile Engineering will be able to:

Program Outcome	Diploma in Automobile Engineering students will be able to:
PO1	**Basic knowledge: An ability to apply knowledge of basic mathematics, science and engineering to solve the engineering problems.**

PO2	Discipline knowledge: An ability to apply discipline - specific knowledge to solve core and/or applied engineering problems.
PO3	Experiments and practice: An ability to plan and perform experiments and practices and to use the results to solve engineering problems.
PO4	Engineering tools: Apply appropriate technologies and tools with an understanding of the limitations.
PO5	The engineer and society: Demonstrate knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.
PO6	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO7	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO8	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO9	**Communication: An ability to communicate effectively.**
PO10	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the context of technological changes.

Curriculum

Semester 1									
Sl. No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	PHYE1001	APPLIED PHYSICS-I	3	2	0	4	20	50	100
2	MATH1002	APPLIED MATHEMATICS-I	4	0	0	4	20	50	100
3	SLPC1003	PROFESSIONAL COMUNICATION-I	3	0	0	3	20	50	100
4	DPME1005	ENGINEERING GRAPHICS	0	6	0	3	20	50	100
5	DPCS1001	INTERNET OF THING	2	0	0	2	20	50	100
6	PHYE1006	APPLIED PHYSICS-I LAB	0	0	2	1	50	-	50
7	SLPC1007	PROFESSIONAL COMUNICATION-I LAB	0	0	4	2	50	-	50
8	DPCS1008	COMPUTER FUNDAMENTALS LAB	0	0	2	1	50	-	50
9	SPYO1001	SPORTS AND YOGA	0	0	2	0	50	-	50
10	DPME1009	WORKSHOP PRACTICE	0	0	6	3			
11		Total Credits	10	8	20	23			

Semester II									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	PHYE-1010	APPLIED PHYSICS-II	3	2	0	4	20	50	100
2	MATD1011	APPLIED MATHEMATICS-II	3	2	0	4	20	50	100
3	SLPC1012	PROFESSIONAL COMUNICATION-II	3	0	0	3	20	50	100
4	DPME1013	ELEMENTRY WORKSHOP TECHNOLOGY	2	0	0	2	20	50	100
5	CHEM1014	BASIC CHEMISTRY	3	2	0	4	20	50	100
6	DPME-1006	ELEMENTS OF MECHANICAL ENGINEERING	3	0	0	3	20	50	100
7	PHYE1015	APPLIED PHYSICS-II LAB	0	0	2	1	50	-	50
8	SLPC1016	PROFESSIONAL COMUNICATION-II LAB	0	0	2	1	50	-	50
9	DPCS1009	ARTIFICIAL INTELLIGENCY	0	0	2	1	50	-	50
10	CHEM1017	BASIC CHEMISTRY LAB	0	0	2	1	50	-	50
		Total	17	6	8	24			

Semester III									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	MATD-2001	APPLIED MATHEMATICS-III	3	2	0	4	20	50	100
2	DPME-2001	APPLIED MECHANICS	3	0	0	3	20	50	100
3	DPME-2002	THERMAL ENGINEERING	3	0	0	3	20	50	100
4	DPEE-2010	BASICS OF ELECTRICAL & ELECTRONIC ENGG.	3	0	0	3	20	50	100
5	DPME-2003	MANUFACTURING PROCESS	3	0	0	3	20	50	100
6	DPME-2005	MACHINE DRAWING	0	4	0	2	20	50	100

7	DPME-2006	APPLIED MECHNICS LAB	0	0	2	1	50	-	50
8	DPME-2007	THERMAL ENGINEERING LAB	0	0	2	1	50	-	50
9	DPME-2026	MANUFACTURING PROCESS LAB	0	0	4	2	50	-	50
10	DPEE-2011	BASICS OF ELECTRICAL & ELECTRONIC ENGG. LAB	0	0	2	1	50	-	50
		Total	15	2	14	23			
Semester IV									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	DPME-2008	MECHANICS OF SOLID	3	2	0	4	20	50	100
2	DPME-2009	CONCEPT OF HEAT TRANSFER	3	2	0	4	20	50	100
3	DPME-2025	HYDRAULICS AND HYDRAULIC MACHINES	3	0	0	3	20	50	100
4	DPAE-2001	AUTO ENGINE	3	0	0	3	20	50	100
5	EEDM-3002	ENVIRONMENT EDUCATION & DISASTER MANAGEMENT	2	0	0	2	50	-	50
6	DPME-2028	MECHANICS OF SOLID LAB	0	0	2	1	50	-	50
7	DPME-2014	CONCEPT OF HEAT TRANSFER LAB	0	0	2	1	50	-	50
8	DPME-2027	HYDRAULICS AND HYDRAULIC MACHINES LAB	0	0	2	1	50	-	50
9	DPAE-2002	AUTO ENGINE LAB	0	0	2	1	50	-	50
10	DPAE-2003	Overhaulling lab	0	0	4	2	50	-	50
11	DPME-9001	DISRUPTIVE TECHNOLOGY	0	0	2	1	50	-	50
		Total	14	4	14	23			
Semester V									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	DPME-3001	THEORY OF MACHINE	3	2	0	4	20	50	100
2	DPAE-3003	CHASSIS, BODY AND TRANSMISSION	3	0	0	3	20	50	100
3	DPME-3002	MACHINE DESIGN	3	2	0	4	20	50	100
4	IMED-3001	INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT	3	0	0	3	20	50	100
5	DPAE-3007/DPAE-3008	Elective –I	2	0	0	2	20	50	100
6	DPAE-3004	GARAGE EQUIPMENT	3	0	0	3	20	50	100
7	DPAE-3005	CHASSIS, BODY AND TRANSMISSION LAB	0	0	2	1	50	-	50
8	DPME-3004	THEORY OF MACHINE LAB	0	0	2	1	50	-	50
9	DPAE-3006	AUTOMOBILE WORKSHOP	0	0	4	2	50	-	50

10	PDSS-3008	PERSONALITY DEVELOPMENT & SOFT SKILLS	0	0	4	2	50	-	50
		Total	18	4	10	25			
Semester VI									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	DPME-9998	FIELD VISIT AND PRESENTATION OR MINOR PROJECT	0	0	0	2	50	-	50
2	DPME-9999	MAJOR PROJECT	0	0	0	10	50	-	50
		Total	0	0	0	12			

List of Electives

Elective-1

Sl No	Course Code	Name of the Electives					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	DPAE3 007	MOTOR VEHICLE ACT AND TRANSPORT MANAGEMENT	3	0	0	3			
2	DPAE3 008	AUTO ELECTRICAL AND ELECTRONIC SYSTEM	3	0	0	3			
		Total				6			

Detailed Syllabus

Name of The Course	**Engineering Graphics**
Course Code	**DPME1005**
Prerequisite	**None**
Co-requisite	
Anti-requisite	

	L	T	P	C
	0	6	0	3

Course Objectives

1. To develop the concept and applicability of engineering graphics to the industry. To develop the ideas, vision and its practical reality through engineering graphics.To follow basic drawing standards and conventions.
2. To develop skills in three-dimensional visualization of engineering component.

Course Outcomes

CO1	**Use the techniques and able to interpret the drawing in Engineering field.**
CO2	**Interpret engineering drawings using fundamental technical mathematics.**
CO3	**Construct basic and intermediate geometry.**
CO4	**To improve their visualization skills so that they can apply these skills in developing new products**
CO5	**Create and modify two-dimensional orthographic drawings using AutoCAD software, complete with construction lines and dimensions.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: Introduction 06 hours
Graphics: An Overview, its need and objectives. Introduction to Computer Aided Drafting- Introduction to AutoCAD; Initial setup commands, Utility commands, drawing aids, entity draw commands, display commands and edit commands
Unit II:Lettering, Numerals and dimensioning 6 Hours
Drawing Instruments and its uses. Lettering. Drawing scale, various types of lines and their uses. Dimensioning; Basic types of dimensioning- linear, angular and radial dimensioning. Dimensioning technique as per SP-46. Title block. Conventional Presentation.
Unit III: Geometrical Construction and Engineering Curves 9 Hours
To draw an ellipse by, Directrix and focus method , Arcs of circle method, Concentric circles method. To draw a parabola by: Directrix and focus method, Rectangle method, To draw a hyperbola by: Directrix and focus method , passing through given points with reference to asymptotes , Transverse Axis and focus method.
Unit IV: Principles of Projection 6 Hours
(a) Orthographic, Pictorial and perspective. Concept of horizontal and vertical planes. Difference between I and III angle projections. (b) Projections of points, lines and planes. Orthographic Projections of Simple Geometrical Solids. Orthographic views of simple composite solids from their isometric views. Exercises on missing surfaces and views
Unit V:Isometric Projections 9 Hours
Overview of Formal Languages : Representation of regular languages and grammars, finite state Machines

Suggested Reading

1. Bhatt N. D., "Engineering Drawing", Charotar publishing House, 1998

Reference Book (s)

2. French and Vierk, "Fundamentals of Engineering Drawing", McGraw Hill, 2002.

3. John K.C., "Engineering Graphics for Degree", PHI Learning Private Limited, New Delhi, 2010.

Name of The Course	Workshop Practice				
Course Code	**DPME1009**				
Prerequisite	**None**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	6	3

Course Outcomes

CO1	**Operate the working principle of various machines used in manufacturing**
CO2	**Grasp the appropriate production process and machines**
CO3	**Perform ,Explain and Identify the basic welding concepts**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

Unit I: GENERAL INTRODUCTION:
(a) Scope of subject "Workshop" in engineering. **(b) Different shop activities and broad division of the shops on the basis of nature of work done such as** **(i) Carpentry Shop** **(ii) Painting, Polishing & Plumbing Shop** **(iii) Sheet Metal & Soldering Shop** **(iv) Fitting Shop** **(v) Welding Shop (Elet ARC/ Brazing)** **(vi) Machine Shop**
Unit II: Carpentryshop
Fundamental of wood working operations: **Marking & Measuring.** **Holding & Supporting.** **Cutting & Sawing.** **Drilling & Boring.** **Turning/ Smoothing** **Jointing.**
Unit III: Painting, Polishing & Plumbing shop
Painting & Polishing **Its need, Introduction to methods of paintings (Classification only); Mannual, Machine (spray) and dip painting at room temperature, operations involved-discription of steps only eg. surface preparation method for old and new surface in timber and iron structure-sanding, derusting, deqreasing, filling of pore and dents, paint application- manual, machine (spray and dip painting drying of paint air drying and oven drying under coat and filler material (red oxide, putty, yellow clay), surface preparation materials (sand and emery papers); tools and equipments used (Name,size specification for indification). Brushes-Round and flat wire brush, scraper, trowel , spraygun, compressor. Defects likely to occur in painting and their remedies Safety of Personnel, Equipment & Tools to be observed.** **Exp No-1 Introduction & demonstration of tools used in Painting & Polishing shop** **Exp No-2 (Job No- PPS1) Painting on the wooden & metal surface** **Exp No-3 (Job No- PPS2) Polishing on the plastic & metal sheet** **(ii) Plumbing** **Introduction, Study Of Plumbing Tools, Pipe Fittings, Types Of Pipe Joints, Pipe Threading** **Exp No-1 Introduction & demonstration of tools used in Plumbing shop** **Exp No-2 (Job No- PS1) Threading on G.I. pipe by die** **Exp No-3 (Job No- PS2) Internal tapping by tap set**

Unit IV: Sheet Metal shop
Sheet Metal Tools and Operation: (1) Operations involved (Names and concept only) Laying out, marking and measuring,cutting, Shearing and blanking, Straightening bending and seaming, Punching and piercing , burring and stamping, (2) Sheet metal joints - Lap, seam, Locked seam, cup or circuler, Flange, angular and cap. (3) Tools and equipments used (Name, size, specification for identification only). (4) Marking Tools- Scriber, Divider and Trammel, Protractor, Trysquare, Dot punch, Steel Rule, Steel tape, Sheet metal gauge. (5) Cutting and shearing Tools-hand Shear and lever, Snips, Chisels. (6) Straightening tool-Straight edge. (7) Striking Tools-Mallet, Hammer. (8) Holding Tools-Vice, Plier, C or G clamps, Tongs. (9) Supporting Tools-Stakes and Anvil. (10) Bending Tools-Crimpers, Form dies, Roundnose plier, Rails. (11) Punching-Piercing and Drifting tools. (12) Burring Tools-Files. (13) Common defects likely to occur during and after operation-Their identification and remedy. Defects due to wrong operation or wrong tool. (14) Safety of Personnel, Equipment & Tools to be observed. Exp No-1 Introduction & demonstration of tools used in Sheetmetal shop Exp No-2 (Job No- SMS1) Making a rectangular tray Exp No-3 (Job No- SMS2) Making a hollow cylinder Exp No-4 (Job No- SMS3) Making a hollow square Exp No-5 (Job No- SMS4) Making a funnel (ii)-Soldering
Unit V:Fitting shop
1- Introduction to fitting shop tools, common materials used in fitting shop, Identification of materials 2- Description and demonstration of various types of work benches, holding devices and files. Precautions while filing. 3- Description and demonstration of simple operation of hack-sawing, demonstration and description of various types of blades and their specifications, uses and method of fitting the blade. 4- Care and maintenance of measuring tools like calipers, steel rule, try square, vernier calipers, micrometer, height gauge, combination set. Handling of measuring instruments, checking of zero error, finding of least count (all gauges including dial gauge). Exp No-1 Introduction & demonstration of tools used in Fitting shop Exp No-2 (Job No- FS1)Filing, Hacksawing, Drilling & Tapping on the workpiece Exp No-3 (Job No- FS2)Making a male & female workpiece
Unit VI: Welding shop
(i)Elet ARC Welding 1- (a) Introduction to welding and its importance in engineering practice; types of welding; common materials that can be welded, introduction to welding equipment e.g. a.c. welding set, d.c. rectifier, electrode holder, electrodes and their specifications, welding screens and other welding related equipment, accessories and gloves. (b) Safety precautions during welding (c) Hazards of welding and its remedies 2- Electric arc welding, (a.c. and d.c.) precautions while using electric arc welding, Practice in setting current and voltage for striking proper arc. Earthing of welding machine. 3- Various types of joints and end preparation. Exp No-1 Introduction & demonstration of tools used in Welding shop Exp No-2 (Job No- WS1) Making a T joint Exp No-3 (Job No- WS2) Making a single V butt joint Exp No-4 (Job No- WS3) Making a over lap joint (ii) Brazing/Gas welding Mild steel & steel sheet,brass sheet. (1) Its concept, comparison with welding as joining method and classification, Brazing (2) Brazing operation- edge preparation of

joints,Pickling and degreasing, Fluxing, Tinning and brazing.   **(3) Materials Used-Common fluxes, brazing rod, and their specifications and discription (For Identification Only), brazing**   **(4) Common defects likely to occurs during and after brazing.**   **(5) Safety of Personnel, Equipment & Tools to be observed.**   **Exp No-1 Introduction & demonstration of tools used in Brazing shop**   **Exp No-2 (Job No- BS1) Making a T joint**   **Exp No-3 (Job No- BS2) Making a single V butt joint**   **Exp No-4 (Job No- BS3) Making a over lap joint**
Unit VII: Machine shop
Introduction to machine tools viz lathe, drilling machine, shaper and planer simple line and block diagram of components and their functions.   **Safety of Personnel, Equipment, Tools & to be observed.**   **Exp No-1 Introduction & demonstration of tools used in machine shop**   **Exp No-2 (Job No- MS1) Facing**   **Exp No-3 (Job No- MS2) Turning, Stap Turning, Chamfering**   **Exp No-3 (Job No- MS3) Grooving, Knurling**

Suggested Reading:

1. Amitabh Ghosh and Ashok kumar Malik, 'Manufacturing science', Edition: 2nd Edition, 2010, Publisher: East West Press, ISBN: 9788176710633, 8176710636
2. Dr.P.C.Sharma, 'Production technology', (Manufacturing Processes).

Reference Book (s)

Serope Kalpakjian and Steven R.Schmid,' Manufacturing Engineering and Technology;4th Edition, 2001;Publisher: PEARSON,'ISBN: 9788177581706

Name of The Course	ELEMENTS OF MECHANICAL ENGINEERING
Course Code	**DPME1006**

Prerequisite	**None**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**

Course Objectives

3. Develop an ability to apply knowledge of mathematics, science, and engineering
4. To develop an ability to design a system, component, or process to meet desired needs within realistic constraints

Course Outcomes

CO1	**Identify various Energy sources, Fuel & combustion and lubrication systems**
CO2	**Define the basic concepts of units and dimensions, systems and its boundaries, properties, state, process, cycle, etc.- required as foundation for development of principles and laws of thermodynamics**
CO3	**Discuss application and usage of various engineering mechanical components.**
CO4	**Describe different lubrication system for lubricating the components of machine**
CO5	**Recognize Basic idea of Transmission of Motion by various drives.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Thermal Engineering: Sources of Energy   **6 hour**
Definition, Concept of thermodynamic system and surroundings, Closed system, Open system, Isolated system, Thermodynamics definition of work. Zeroth low of thermodynamics Basic ideas, conventional and nonconventional forms

Thermal, Hydel, Tidal, wind, Solar, Biomass and Nuclear and their uses.
Unit- 2 Thermal Engineering : Fuel and Combustion **10 hour**
Introduction to common fuels - solid, liquid and gases and their composition. Combustion of fuels- their higher and lower calorific values. Combustion equations for carbon, sulphur, hydrogen and their simple compounds
Unit-3 Machine Components **20 hours**
(i) Pins, Cotter and Knuckle Joints. **(ii) Keys, Key ways and spline on the shaft.** **(iii)Shafts, Collars, Cranks,** **(iv) Bearings-Plane, Bushed, Split-step, ball, Roller bearing, Journal bearing, Foot step bearing, thrust bearing, collar bearing and Special type bearings and their applications.** **(v) Gears: Different types of gears, gear trains and their use for transmission of motion. Determination of velocity ratio for spur gear trains; spur gear, single and double helical gears, Bevel gears, worms, Rack and Pinion. Simple and compound and epicyclic gear trains and their use. Definition of pitch and pitch circle & module.** **(vi) Springs: Compression, Tension, Helical springs , Torsion springs, Leaf and Laminated springs. Their use and material.** **(vii) Basic idea of Transmission of Motion By Belts, Ropes & Pulleys, Chain & Sprockets. Classification and uses of ropes in transmission operation, Chains and their classifications, their application in power transmission, their comparison with other drive systems**
Unit-4 Lubrication **4 hours**
Different lubrication system for lubricating the components of machines. Principle of working of wet sump and dry sump system of lubrication.

Suggested Reading

Text Book (s)

2. Elementary of Mechanical Engineering by Katsons Publications.

Reference Book (s)

1. Basics of Mechanical Engineering by Katsons publications .

Name of The Course	ELEMENTARY WORKSHOP TECHNOLOGY				
Course Code	**DPME1013**				
Prerequisite	**None**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	6	0	3

Course Objectives

1. To develop general machining skills in the students.

2. Develop a skill in dignity of labor, precision, safety at work place, team working and development of right attitude.

Course Outcomes

CO1	**Recognize different shops of central workshop on the basis of nature of work done**
CO2	**Analyze the operations involved in casting process**
CO3	**Determine the use of various machine tools**
CO4	**Apply the various welding processes**
CO5	**Differentiate between soldering, brazing and welding**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 General Introduction **5 hour**
Scope of subject "Workshop Technology" in engineering. Different shop activities and broad division of the shops on the basis of nature of work done - (i) Wooden Fabrication (Carpentry) (ii) Metal Fabrication (shaping and Forming, Smithy, Sheet metal and Joining-welding, Riveting, Fitting and Plumbing.(c) Organization and layout of workshop.(d) General safety precaution in workshop
Unit-2 Casting **12 hour**
Basic steps in making a casting, Pattern Materials, Patterns allowances, colour coding of pattern, Types of pattern, Pattern making tools. Mould materials, Types of sand, Moulding processes - Sand moulding, Pit moulding, machine moulding. Shell moulding. Cores and core classification, Testing of sand. Types of furnaces - Cupola furnace, Crucible furnace, Electric arc furnace, Cleaning of casting — Fettling, Shot blasting, Cutting & trimming, Casting defects Shrinkage, Hot tear, blow holes, misrun and cold shut, scabs, fins, rat tail. Special casting processes - die casting, centrifugal casting, Investment casting. Elements of gating system.
Unit-3Basic Machining Processes **10 hours**
Lathe Introduction, Types of lathes — light duty, Medium duty and heavy duty geared lathe, CNC lathe, Specifications, Basic parts and their functions. Operations and tools — Turning, parting off, Knurling, facing, boring, drilling, threading, step turning, taper turning, Drilling Introduction, Classification, Types of operations, Specifications of drilling machine, Types of drills and reamers, Basic parts and their functions. introduction, Classification, Principle of operation, up and down milling. Types of milling cutters, Basic parts and functions of column and knee type milling machine.
Unit-4 Welding **10 hours**
Introduction, Classification, Safety precautions, Gas welding techniques, Types of welding flames, Arc welding – principle, equipments, applications. Shielded metal arc welding, Submerged arc welding, TIG/MIG Welding, Electro slag welding, plasma arc welding, Resistance welding – spot welding, Seam welding, Projection welding, welding defects.
Unit-5 Soldering and Brazing **8 hours**
Its concept, comparison with welding as joining method and classification, electric soldering and forge soldering. Soldering operation- edge preparation of joints, Pickling and degreasing, Fluxing, Tinning and Soldering. Materials Used-Common fluxes, soft and hard solder, solder wire (Plain and Resin core) and sticks, spelters and their specifications and description (For Identification Only), forge soldering bits. Electric soldering iron. Common defects likely to occurs during and after soldering. Safety of Personnel, Equipment & Tools to be observed.

Suggested Reading

Text Book (s)

2. S.K. Hajara Chaudhary - "Workshop Technology" - Media Promotors and Publishers,New Delhi

Reference Book (s)

3. B.S. Raghuwanshi - "Workshop Technology" - Dhanpat Rai and sons, New Delhi
4. H.S.Bawa - "Workshop Technology" -Tata McGraw Hill Publishers, New Delhi.

Name of The Course	APPLIED MECHANICS				
Course Code	**DPME2001**				
Prerequisite	**PHYE1001**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

3. To prepare students about to solve the mechanics problems.
4. Student able o analysis the performace of a mechanical machine.

Course Outcomes

CO1	**Describe basic knowledge of Engineering Mechanics where in Laws of Physics are applied to Solve Engineering problems.**
CO2	**Analyse force system and apply them to practical engineering system design and development.**
CO3	**Examine a mechanical system and derive all forces, couples and moment about it.**
CO4	**Calculate different parameters for a machine like mechanical advantage, velocity ratio and Machine law.**
CO5	**Recognize Concept of moment of inertia and its applications.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Introduction **2 hour**
Mechanics and its utility. Concept of scalar and vector quantities. Effect of a force. Tension & compression. Rigid body. Principle of physical independence of force. Principle of transmissibility of a force.
Unit-2 System of Forces, General Condition of Equilibrium 06 hour
Concept of coplanar and non-coplanar forces including parallel forces. Concurrent and non-concurrent forces. Resultant force. Equilibrium of forces. Law of parallelogram of forces. Law of triangle of forces and its converse. Law of polygon of forces. Solution of simple engineering problems by analytical and graphical methods such as simple wall crane, jib crane and other structures. Determination of resultant of any number of forces in one plane acting upon a particle, conditions of equilibrium of coplanar concurrent force system.General condition of equilibrium of a rigid body under the action of coplanar forces, statement of force law of equilibrium, moment law of equilibrium, application of above on body.
Unit-3 Moment & couple **06 hours**
Concept of Varignon's theorem. Generalized theorem of moments. Application to simple problems on levers-Bell crank lever, compound lever, steel yard, beams and wheels, lever safety valve, wireless mast, moment of a couple; Properties of a couple ; Simple applied problems such as pulley and shaft.
Unit-4 Friction **06 hours**
Definition of a machine. Mechanical advantage, velocity ratio, input, output, mechanical efficiency and relation between them for ideal and actual machines. Law of a machine Lifting machines such as levers, single pulley, three system of pulleys. Weston differential pulley, simple wheel and axle, differential wheel and axle. Simple screw jack, differential screw jack, simple worm and worm wheel..
Unit-5 Machines **06 hours**
Its concept, comparison with welding as joining method and classification, electric soldering and forge soldering. Soldering operation- edge preparation of joints, Pickling and degreasing, Fluxing, Tinning and Soldering. Materials Used-Common fluxes, soft and hard solder, solder wire (Plain and Resin core) and sticks, spelters and their specifications and description (For Identification Only), forge soldering bits. Electric soldering iron.

Common defects likely to occurs during and after soldering. Safety of Personnel, Equipment & Tools to be observed.
Unit-6 Centre of Gravity **06 hours**
Concept, definition of centroid of plain figures and center of gravity of symmetrical solid bodies. Determination of centroid of plain and composite lamina using moment method only, Centroid of bodies with removed portion. Determination of center of 'gravity' of solid bodies - cone, cylinder, hemisphare and sphere, composite bodies and bodies with portion removed.
Unit-7 Moment of Inertia **06 hours**
Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common geometrical section : rectangle, triangle, circle (without derivations). Second moment of area for L, T, I and channel section, section of modulus

Suggested Reading:

Text Book (s)

4. A Textbook of Engineering Mechanics by D.S. Kumar
5. **A Textbook of Engineering Mechanics, written by Dr. R. K. Bansal.**
6. **Engineering Mechanics, written by R. K. Rajput.**

Reference Book (s)

3. Beer – Johnson Engineering Mechanics Tata McGraw Hill, Delhi
4. Basu Engineering Mechanics Tata McGraw Hill, Delhi

Name of The Course	**THERMAL ENGINEERING**				
Course Code	**DPME2002**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

3. To This course aims to provide a good platform to mechanical engineering students to understand, model and appreciate concept of dynamics involved in thermal energy transformation.
4. To prepare them to carry out experimental investigation and analysis at later stages of graduation

Course Outcomes

CO1	**Define the fundamentals of laws of thermodynamics and its applications.**
CO2	**Calculate heat and work interactions for various system.**
CO3	**Use & Practice two property rule and hence thermodynamic tables, thermodynamic diagrams and concept of equation of state, also their simple application.**
CO4	**Evaluate change in entropy to determine reversibility and irreversibility.**
CO5	**Calculate efficiencies of Heat engine, Heat pump, Refrigerator and Vapour power cycle.**

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Exam (MTE)**	**End Term Exam (ETE)**	**Total Marks**
20	30	50	100

Course Content:

Unit-1 FUNDAMENTAL OF THERMODYNAMICS **12 hour**
Definition, concept of thermodynamic system and surroundings. Closed system, open system, isolated system, and thermodynamics definition of work. Zeroth law of thermodynamics. First law of thermodynamics for cyclic and non-cyclic processes. Idea of internal energy and enthalpy. Thermodynamic processes - constant volume, constant pressure, constant temperature (Isothermal) processes, adiabatic process,

polytrophic process, their representation on P-V diagram and calculation of work done.
Unit-2 SECOND LAW OF THERMODYNAMICS **08 hour**
Definition, concept of thermodynamic system and surroundings. Closed system, open system, isolated system, and thermodynamics definition of work. Zeroth law of thermodynamics. First law of thermodynamics for cyclic and non-cyclic processes. Idea of internal energy and enthalpy. Thermodynamic processes - constant volume, constant pressure, constant temperature (Isothermal) processes, adiabatic process, polytrophic process, their representation on P-V diagram and calculation of work done.
Unit-3 ENTROPY **06 hours**
Physical concept and significance, reversibility and efficiency, Irreversibility and entropy. Expression for change of entropy in various thermodynamic processes. Simple numerical problems concerning the above.
Unit-4 GAS POWER CYCLES **08 hours**
Air Standard cycles: Carnot, Otto, Diesel, Dual and Stirling cycles, P-V and T-S diagrams, description, efficiencies and mean effective pressures, Comparison of Otto, Diesel and dual cycles.
Unit-5 PROPERTIES OF STEAM **10 hours**
Idea of steam generation beginning from heating of water at 0°C to its complete formation into saturated steam. Pressure temperature curve for steam. Idea of dry saturated steam, wet steam and its dryness fraction, super-heated steam and its degree of super heat. Enthalpy, entropy, specific volume and saturation pressure and temperature of steam. Use of steam table and mollier chart. Simple numerical problems.

Suggested Reading:

Text Book (s)

4. "Thermal Engineering: Engineering Thermodynamics and Energy Conversion Techniques" by P L Ballaney
5. **Thermodynamics and Thermal Engineering" by J Selwin Rajadurai**
6. **Thermal Engineering" by R K Rajput**

Reference Book (s)

3. Nag, P.K., Engineering Thermodynamics, 3rd ed., Tata McGraw-Hill, 2005
4. Cengal, Y.A and Boles, M.A, Thermodynamics: An Engineering Approach, 5th ed., McGraw-Hill, 2006.

Name of The Course	**MANUFACTURING PROCESS**				
Course Code	**DPME2003**				
Prerequisite	**DPME1013**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

3. An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities
4. An ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes

Course Outcomes

CO1	**Identify and know basic press operations and tools.**
CO2	**Identify basic manufacturing processes like forging, rolling and extrusion, for required component**
CO3	**Discus process parameters for different operations**
CO4	**Classify the products simply in terms of their basic shape**
CO5	**Describe the difference between the hot and cold working of metals and give the advantages of each process**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 METAL FORMING PROCESSES 18 hour
Press Working - Types of presses, type of dies, selection of press die, die material. Press Operations-Shearing, piercing, trimming, punching, notching, shaving, gearing, embossing, stamping **Forging -** Open die forging, closed die forging, Press forging, upset forging, swaging, up setters, roll forging, Cold and hot forging.**Rolling -** Elementary theory of rolling, Types of rolling mills, Thread rolling, roll passes, Rolling defects and remedies. **Extrusion and Drawing -** Type of extrusion- Hot and Cold, Direct and indirect. Pipe drawing, tube drawing, wire drawing.
Unit-2 POWDER METALLURGY 12 hour
Introduction, principle, scope and names of processes. Production of metal powders, compaction, sintering and sizing. Self lubricated bearings. Advantages of the process and its limitations. (Elementary concept only).
Unit-3 MODERN MACHINING PROCESS 10 hours
Ultrasonic Machining (USM), Electro Chemical Machining (ECM), Electro Chemical Grinding (ECG), Electrical Discharging Machining(EDM), Laser Beam Machining (LBM), Electron Beam Machining (EBM), Plasma Arc Machining (PAM)

Suggested Reading:

Text Book (s)

3. Amitabh Ghosh and Ashok kumar Malik, ‘Manufacturing science’, Edition: 2nd Edition, 2010, Publisher: East West Press, ISBN: 9788176710633, 8176710636
4. **Dr.P.C.Sharma, ‘Production technology’, (Manufacturing Processes).**

Reference Book (s)

2. Serope Kalpakjian and Steven R.Schmid,' Manufacturing Engineering and Technology;4th Edition, 2001;Publisher: PEARSON,'ISBN: 9788177581706, 8177581708

Name of The Course	MACHINE DRAWING			
Course Code	DPME2005			
Prerequisite	DPME1005			
Co-requisite				
Anti-requisite				
	L	T	P	C
	0	4	0	2

Course Objectives:

3. Provide the fundamental concepts of machine drawing elaborating on how to concretize the idea of new structure such as a machine element.
4. Help the student in the visualization of assembly and sub assembly of various machine elements.

Course Outcomes

CO1	**Draw the isometric view of a given three dimensional object/part**
CO2	**Draw the orthogonal projection of a solid body**
CO3	**Practice different kinds of materials and Mechanical components conventionally.**
CO4	**Identify the elements of a detailed drawing.**
CO5	**Produce the assembly drawing using part drawings.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 GENERAL CONCEPT OF MACHINE DRAWING **06 hour**	
(a) Views and sections (Full and half), dimensioning Technique -Unidirectional and aligned practice conventions as per latest code of practice for general engineering drawing. (b) General concept of IS working drawing symbols for (i) Welding & Rivetting (ii) Serews & Screw threads (iii) Surface Finish Marks (iv) Limits, Fits & Tolerances	
Unit-2 FAMILIARIZATION WITH AUTO CAD COMMOANDS **09 hour**	
CAD, Different type of CAD software available, Advantages of using CAD, AUTOCAD graphical user interface? Setting up drawing environment: Setting units, drawing limits, Snap, Opening and Saving a drawing, Setting drafting properties, Different co-ordinate system used. Commands and their aliases, Different methods to start a command Selecting object, removing object from selection set, Editing with grips, Editing object properties. Use of draw commands - Line, Arc, Circle, Polygon, Polygon, Polyline, rectangle, Ellipse, construction line, Spline Use of modify commands - erase offset, Move, Copy, Mirror, Fillet, Chamfer, Array, Scale, Stretch, rotate, Explode, Lengthen Creating 2D objects using Draw and Modify commands, Use of Hatch commands. Controlling the drawings display; Zoom, PAN, view ports, Aerial view. Drawing with precision: Adjusting snap and Grid alignment. Use of Tools Menu bar for calculating distance, angle, area, ID points, Mass using inquiry command, Quick select. Adding text to drawing, creating dimension Use of UCS, Alignment of UCS, Move UCS, Orthographic UCS Creating 3 D objects using region, boundary, 3D Polyline, Extrude, revolve feature. Use of solid 3D edit features, Shell, Imprint, Separate, Section, Boolean functions like Union, Subtract and Intersect, Extrude faces, Move faces, Delete face, Offset faces, Copy faces and colour faces commands. To show the section - Use of slice, Section commands Rendering and imaging, Produce hard copies.	
Unit-3 Assembly Drawing **21 hours**	
Sectioned View of (i) Knuckle joint- Part drawing, Solid Modelling, Assembly and Sectioning. **(ii) Protective type flange coupling- Part drawing, Solid Modelling, Assembly and Sectioning.** **(iii) Bench vice - Part drawing, Solid Modelling, Assembly and Sectioning.** **Assembly Drawing of (i) Knuckle joint- Part drawing, Solid Modeling, Assembly and Sectioning.** **(ii) Protective type flange coupling- Part drawing, Solid Modeling, Assembly and Sectioning.** **(iii) Bench vice - Part drawing, Solid Modeling, Assembly and Sectioning.** **Assembly Drawing from detail and vice versa**	
Unit-4 Assembly Drawing from detail and vice versa **09 hours**	
(i) Tail stock of Lathe machine **(ii) Screw jack** **(iii) Drilling Jig** **B). Assembly and Disassembly Drawings** **Plummer block, Footstep bearings, Couplings etc., Rivetted & Welded Joints, Screw and form of screw thread** **Spur gear profile drawing and free hand sketching** **Spur gear profile drawing from given data.**	
Unit-5 Free hand sketching **6 hours**	
(i) Pipe fittings-Such as-Elbows-Reducers, T-Cross and Bibcock. **(ii) I. C. engine piston, Simple bearing, Cottor and Knuckle joint, pulleys and flywheel-Sectioned views.**	

(iii)Cutting tools of Lathe machine, shaper and common milling cutters. **(iv) Gear puller and C-clamp** **(v) Sketching of ortho graphics views from isometric views be practiced.**

Suggested Reading:

Text Book (s)

2. Bhatt N. D., "Engineering Drawing", Charotar publishing House, 1998

Reference Book (s)

2. French and Vierk, "Fundamentals of Engineering Drawing", McGraw Hill, 2002.

Name of The Course	**APPLIED MECHANICS LAB**				
Course Code	**DPME2006**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives:

3. Perform and solve problems concerning simple application of moments and forces.
4. Grasp the idea of the mechanical advantage, velocity ratio and efficiency of Simple machine.

Course Outcomes

CO1	**Perform and solve problems concerning simple application of moments and forces.**
CO2	**Grasp the idea of the mechanical advantage, velocity ratio and efficiency of Simple machine.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

13. To verify the law of Polygon of forces.
14. To verify the law of parallelogram and triangle of forces.
15. To verify the law of principle of moments.
16. To find the coefficient of friction between wood, steel, copper and glass.
17. To find the coefficient of friction on inclined surface
18. To find the reaction at supports of a simply supported beam carrying point loads only.
19. To find the forces in the jib & tie of a jib crane.
20. To find the mechanical advantage, velocity ratio and efficiency of Simple wheel & axle.
21. To find the mechanical advantage, velocity ratio and efficiency of Simple Screw jack.
22. To find the mechanical advantage, velocity ratio and efficiency of Simple Worm & worm wheel.
23. To find out center of gravity of regular lamina.
24. To find out center of gravity of irregular lamina.

Name of The Course	**THERMAL ENGINEERING LAB**				
Course Code	**DPME2007**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives:

3. Define the fundamentals of laws of thermodynamics and its applications.
4. Calculate heat and work interactions for various system.

Course Outcomes

CO1	**Define the fundamentals of laws of thermodynamics and its applications.**
CO2	**Calculate heat and work interactions for various system**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

8. Determination of temperature by: - I. Thermo couple ii. Pyrometer
9. Study of constructional details and specification of high pressure boiler and sketch
10. Demonstration of mounting and accessories on a boiler for study and sketch (field visit).
11. Performance testing of steam boiler.
12. Study of steam turbines through models and visits.
13. Determination of dryness fraction of wet steam sample
14. To study various types of compressors with the help of their models.

Name of The Course	**MANUFACTURING PROCESS LAB**				
Course Code	**DPME2026**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	4	2

Course Objectives:

3. Operate the working principle of various machines used in manufacturing
4. Grasp the appropriate production process and machines

.

Course Outcomes:

CO1	**Perform and solve problems concerning simple application of moments and forces.**
CO2	**Grasp the idea of the mechanical advantage, velocity ratio and efficiency of Simple machine.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

1. PATTERN MAKING: **(a) Making Patterns (Any two Experiments).** **(i) Solid one piece pattern. (ii) Split two piece patterns. (iii) Split three piece patterns.** **(iv) Gated pattern. (v) Four Piece pattern. (vi) Sweep pattern. (vii) Skeleton pattern. (viii) Segmental pattern.**
(b) MAKING CORE BOXES (Any two Experiments). **(i) Straight Core Box. (ii) Bent Core Box. (iii) Unbalanced Cores.**
(a) Sand Testing (Any two Experiments). **(i) Grading (Grain Size).** **(ii) Determination of Moisture content (iii) Determination of Clay content.** **(iv) Determination of Permeability for gases.** **(b) Preparation of : (i) Green Sand Composition.** **(ii) Dry Sand Composition. (iii) Loam Sand Composition. (iv) Oil Sand For Cores.**

MOUDLING: (All Experiments). **(a) Making at least 8 sands moulds of different forms with different types of pattern using.** **(i) Floor Moulding. (ii) Two Box Moulding. (iii)Three Box (or more) Moulding.** **(b) At least one of the following:** **(i) Making and setting of cores of different types. (ii) Making one shell mould apparatus.**
CASE STUDY OF: (All Experiments). **At least 2 sand casting products from sand preparation, pattern layout to final finished casting** **by shell moulding, centrifugal casting, investment casting and continuous casting.**
ADVANCE WELDING SHOP: (All Experiments). **Study of various Gas cutting and welding equipments:-** **Welding transformer, Generator/rectifier, Gas cylinder, Gas cutting machines, Cutting torches etc., various electrodes and filler metals and fluxes.**
Practice of welding and cutting of different metals by making suitable jobs by different methods:- **1. Arc Welding practice of mild steel (M.S.) and Spot welding on stainless steel jobs.** **2. Tig Welding practice of Non-Ferrous metals, like Copper, Brass and Aluminum.** **3. Practice of Gas cutting manually.** **4. Practice of Gas cutting by cutting machine.** **5. Practice of Arc cutting.**

Name of The Course	**MECHANICS OF SOLIDS**				
Course Code	**DPME2008**				
Prerequisite	**DPME2001**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	2	0	4

Course Objectives:

3. To provide the basic concepts and principles of strength of materials.
4. To give an ability to calculate stresses and deformations of objects under external loading.

.

Course Outcomes:

CO1	**Analyze and design structural members subjected to tension, compression, torsion, bending and combined stresses using the fundamental concepts of stress, strain and elastic behavior of materials.**
CO2	**Utilize appropriate materials in design considering engineering properties, sustainability, cost and weight.**
CO3	**Determine the deflections and rotation produced by the three fundamental types of load: axial, tensional and flexural.**
CO4	**Develop an understanding of the concepts of stress and strain and their use in the analysis and design of machine members and structures.**
CO5	**Develop an understanding of material behavior under a condition of pure torsion (twisting moment) on circular shafts.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 INTRODUCTION TO STRESS AND STRAIN **10 hour**
Introduction of Mechanical properties of materials, Definition of stress and strain, axial loading, different types of stresses and strains, tensile and compressive stress and strain, elastic limit, Hooke's law, stress-strain curve for ductile and brittle material, salient features of stress-strain curve. Young's modules of elasticity, Factor of safety, Stress and strain in straight, stepped bars and taper bar of circular cross section,

determination of stress and elongation of a bolt in a bolted joint when subjected to direct external load only. Temperature stresses,Stress and strain on composite section under axial loading, stress and strain due to temperature variations in homogeneous and composite bars and metallic tires, Shear load, shear stress and strain, modulus of rigidity, lateral strain, Poisson's ratio, volumetric strain, bulk modulus relation between modulus of elasticity, modulus of rigidity and bulk modulus.
Unit-2 PRINCIPAL STRESSES AND STRAIN, STRAIN ENERGY **08 hour**
Compound stress and strains: Introduction, normal stress and strain, shear stress and strain, stresses on inclined sections, strain energy, impact loads and stresses, state of plane stress, principal stress and strain, maximum shear stress, Mohr's stress circle, three dimensional state of stress & strain, equilibrium equations, generalized Hook's law, theories of failure. Thermal Stresses.Meaning of strain energy and resilience, Derivation of formula for resilience of a uniform bar in tension, Proof resilience, modulus of resilience, suddenly applied load, Impact or shock load. Strain energy in a material subjected to uniaxial tension and uniform shear stress. General expression for total strain energy of simple beam subjected to simple bending.: Pure Bending
Unit-3 SHEAR FORCE AND BENDING MOMENT **10 hours**
Types of beam,Types of load and support ,Shear force and bending moment for concentrated and uniformly distributed loads on simply supported beams, cantilever and overhanging beam. Shear force and bending moment diagrams. Relationship between shear force and bending moment, Point of contra flexure, calculations for finding the position of contra flexure, Condition for maximum bending Moment
Unit-4 THIN AND THICK CYLINDRICAL AND SPHERICAL SHELLS **08 hours**
Thin cylinders & spheres: Introduction, difference between thin walled and thick walled pressure vessels, Thin walled spheres and cylinders, hoop and axial stresses and strain, volumetric strain.Thick cylinders:Radial, axial and circumferential stresses in thick cylinders subjected to internal or external pressures, compound cylinders, stresses in rotating shaft and cylinders, stresses due to interference fits.
Unit-5 SLOPES AND DEFLECTIONS OF BEAMS, TORSION **10 hours**
Definition of slope and deflection, sign convention, Circular bending, Calculation of maximum slope and deflection for the following standard cases by double integration or moment area method: (1) Cantilever having point load at the free end. Cantilever having point load at any point of the span, Cantilever with uniformly distributed load over the entire span Cantilever having U.D.L. over part of the span from free end Cantilever having U.D.L. over a part of span from fixed end (2) Simply supported beam with point load at centre of the span. Simply supported beam with U.D. load over entire span. NOTE: All examples will be for constant moment of inertia without derivation of formula.Strength of solid and hollow circular shafts, Derivation of torsion equation, Polar modulus of section, Advantages of hollow shafts over solid shaft, Comparison of weights of solid and hollow shafts for same strength, Horse power transmitted. Calculation of shaft diameter for a given horse power.

Suggested Reading:

Text Book (s)

3. Rajput R. K., Strength of Materials, S.Chand & Co. Ltd., Delhi.
4. **Kapoor J.K., Strength of Materials, Asian Publication, Muzaffarnagar.**

Reference Book (s)

3. Ramamarutham S., Strength of Materials, Dhanpat Rai & Sons, Delhi..
4. Strength of Materials by Timoshenko and Yσungs, East West Press.

Name of The Course	**CONCEPT OF HEAT TRANSFER**				
Course Code	**DPME2009**				
Prerequisite	**DPME2002**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	2	0	4

Course Objectives:

3. To prepare students to know the basic knowledge of different types of heat exchanger.
4. Apply the concept of heat transfer to find heat flow in different metals.

.

Course Outcomes:

CO1	**Draw the isometric view of a given three dimensional object/part**
CO2	**Draw the orthogonal projection of a solid body**
CO3	**Practice different kinds of materials and Mechanical components conventionally.**
CO4	**Identify the elements of a detailed drawing.**
CO5	**Produce the assembly drawing using part drawings.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1Introduction: **06 hour**
Modes and mechanisms of heat transfer - Basic laws of heat transfer -General discussion about applications of heat transfer. Conduction Heat Transfer: Fourier rate equation - General heat conduction equation in Cartesian coordinates.
Unit-2 One Dimensional Steady State Conduction Heat Transfer **10 hour**
Homogeneous slabs, overall heat transfer coefficient electrical analogy - Critical radius of insulation One Dimensional Steady State Conduction Heat Transfer , Extended surface (fins) Heat Transfer - Long Fin, Fin with insulated tip and Short Fin.
Unit-3 One Dimensional Transient Conduction Heat Transfer **10 hours**
Systems with negligible internal resistance - Significance of Biot and Fourier Numbers . Heat Transfer with Phase Change: Boiling: - Pool boiling - Regimes, Critical Heat flux and Film boiling. Condensation: Film wise and drop wise condensation.
Unit-4 Heat Exchangers **07 hours**
Classification of heat exchangers – parallel and counter flow and cross flow heat exchanger overall heat transfer Coefficient and fouling factor - Concepts of LMTD and NTU methods - Problems using LMTD and NTU methods.
Unit-5 Radiation Heat Transfer **07 hours**
Emission characteristics and laws of black-body radiation - Irradiation - total and monochromatic quantities- laws of Planck, Wien, Kirchhoff, Lambert, Stefan and Boltzmann- heat exchange between two black bodies - concepts of shape factor - Emissivity - heat exchange between grey bodies - radiation shields

Suggested Reading:

Text Book (s)

4. Heat and Mass Transfer by R. K. Rajput/ S. CHAND PUBLICATION
5. A test book for Heat and mass transfer by Pk Nag
6. Heat and Mass Transfer by R.S. Khurmi

Reference Book (s)

3. Fundamentals of Heat and Mass Transfer by Frank P. Incropera.
4. Heat & Mass Transfer: A Practical Approach by Yunus Cengel , Afshin Ghajar

Name of The Course	**HYDRAULICS AND HYDRAULIC MACHINES**				
Course Code	**DPME2025**				
Prerequisite	**DPME2001**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

3. To prepare students to know the basic knowledge of different types of hydraulic machine.
4. Apply the concept of fluid mechanics to find fluid flow in different channel.

Course Outcomes:

CO1	**Identify understanding of fluid mechanics fundamentals, including concepts of mass and momentum conservation**
CO2	**Apply the Bernoulli equation to solve problems in fluid mechanics.**
CO3	**Discuss of laminar and turbulent boundary layer fundamentals**
CO4	**Correlate the recent developments in fluid mechanics, with application to aerospace systems.**
CO5	**Apply the concepts developed for fluid flow analysis to issues in aerospace design**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Properties of fluid **06 hour**
Fluid : Real fluid, ideal fluid., Fluid Mechanics, Hydraulics, Hydrostatics, Hydro kinematics, Mass density, specific weight, specific gravity, cohesion, adhesion, viscosity, surface tension, capillarity, vapour pressure and compressibility. Hydrostatic Pressure: Pressure, intensity of pressure, pressure head, Pascal's law and its applications.
Unit- 2 Measurement of Pressure **08 hour**
Atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure. Use of simple manometer, differential manometer and mechanical gauges Measurement of pressure by manometers and pressure gauges. Fundamental of Fluid Flow, Types of Flow, Steady and unsteady flow, Laminar and turbulent flow Uniform and non-uniform flow. Discharge and continuity equation (flow equation)
Unit-3 Bernoulli's Theorem **07 hours**
Types of hydraulic energy, Potential energy, Kinetic energy, Pressure energy Bernoulli's theorem; statement and description (without proof of theorems) Venturimeter (horizontal and inclined) Orifice: Definition of Orifice, and types of Orifices, Hydraulic Coefficients.
Unit-4 Flow through Pipes and Flow Measurement **10 hours**
Definition, laminar and turbulent flow explained through Reynold's Experiment. Reynolds Number, critical velocity and velocity distribution. Head Losses in pipe lines due to friction, sudden expansion and sudden contraction entrance, exit, Hydraulic gradient line and total energy line.Measurement of velocity by Pitot tube , Measurement of Discharge by a Notch Difference between notches and orifices. Dimension less numbers types (definition only)
Unit-5 Pumps and Turbines **07 hours**

Reciprocating pumps (parts, working, discharge, work done, %slip only), Centrifugal pumps (parts, working), Reciprocating v/s Centrifugal pumps, Turbine (layout, efficiency, classification), Construction & working of (Pelton turbine).

Suggested Reading:

Text Book (s)

3. Fluid Mechanics & Hydraulic Machines, Laxmi Publication (P) Ltd., New Delhi
4. Vijay Gupta & Gupta S.K., Fluid Mechanics, New Age International Publishers, New Delhi.

Reference Book (s)

3. Garde R.J., Fluid Mechanics, New Age International Publishers, New Delhi
4. Modi P.N., Fluid Mechanics, New Age International Publishers, New Delhi.

Name of The Course	**Auto Engine**				
Course Code	**DPAE2001**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

3. To identify the functioning of the engine and its accessories.
4. The student will be made to learn the location and importance of each part..

Course Outcomes:

CO1	**Describe basic working of 2 stroke and 4 stroke engine. (K2)**
CO2	**Categorize different types of engines. (K4)**
CO3	**Demonstrate petrol engine and its operational system. (K3)**
CO4	**Illustrate diesel engines and it's working.(K3)**
CO5	**Discuss Engine pollutants and its control. (K2)**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Introduction to combustion engine: 06 hour
Engine as a power source Concept of internal combustion engine. Engine dimensions: Bore, stroke, dead centres, compression ratio, swept volume, clearance volume, engine capacity, engine torque engine power at the crank shaft. Classification of engines as per stroke, cycle, fuel, ignition, cooling number and arrangement of cylinders, reciprocating and rotary. Concept of 2 stroke and 4 stroke engines and their comparison. Working principles of petrol and diesel engines.
Unit- 2 Constructional details 10 hour
Constructional details of cylinder block, cylinder head, cylinder liner piston, piston rings, gudgeon pin, connecting rod, crankshaft, camshaft, valve mechanisms, flywheel and damper
Unit-3 Fuel System 10 hours
Fuel system in spark ignition engine: Fuel feed system, fuel pumps-its types, fuel tank, fuel lines, fuel filters, concept of carburetion. Working and construction of a simple carburetor. Advantages of using fuel injection system in spark ignition engines.
Unit-4 Diesel Engine AND Combustion 07 hours
Theory of diesel engine operation. Difference between petrol& diesel engine. Fuel injection pumps- plunger and barrel type,Advantages and disadvantages. Phenomenon of combustion in C.I engines and S.I engines, phases of combustion and after burning. Methods producing turbulence.

Detonation and knocking, octane and cetane number, swirl and squish.
Unit-5 Engine Pollutants and its control 07 hours
Sources of engine pollutants of S.I and C.I engine. Effect of pollutants on human and environment. Methods of Control – Crank case ventilation, fuel tank ventilation, carburetion and recirculation. Redesigning of various engine system, V.V.R. Exhaust gas recirculation systems. Catalytic converters. Close loop feedback, electronic integrated engine management system. Emission rules and regulations. Bharat – I, II, III,IV

Suggested Reading:

Text Book (s)

3. utomobile Engineering by Dr. Kirpal Singh; Standard Publishers Distributors
4. Automobile Engineering by R.B. Gupta; Satya Parkash, New Delhi

Reference Book (s)

2. I.C. Engines by M.L. Mathur and Sharma; Dhanpat Rai and Sons, Delhi

Name of The Course	**MECHANICS OF SOLID LAB**				
Course Code	**DPME2013**				
Prerequisite	**DPME2001**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives:

3. Ability to conduct standard tension tests of steel and other metals.
4. Ability to conduct compression tests of concrete, cast iron and steel.

Course Outcomes:

CO1	**Ability to conduct standard tension tests of steel and other metals.**
CO2	**Ability to conduct compression tests of concrete, cast iron and steel.**
CO3	**Ability to conduct tests with materials subjected to torsion.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

11. To find the shear force at a given section of simply supported beam for different loading.
12. To find the value of 'E' for a steel beam by method of deflection for different loads.
13. To determine the Max-Fibre stress in X-section of simply supported beam with concentrated loads and to find the neutral axis of the section.
14. To determine the ultimate tensile strength, its modulus of Elasticity, Stress at yield point, % Elongation and contraction in x-sectional area of a specimen by U.T.M. through necking phenomenon.
15. To determine the ultimate crushing strength of materials like steel and copper and compare their strength.
16. To determine Rock Well Hardness No. Brinell Hardness No. of a sample.
17. To estimate the Shock Resistance of different qualities of materials by Izod's test and charpy test.
18. To determine the bending moment at a given section of a simply supported beam for different loading.
19. To determine the various parameters of Helical coil spring.
20. To determine the angle of twist for a given torque by Torsion apparatus and to plot a graph between torque and angle of twist.

Suggested Reading:

Name of The Course	**CONCEPT OF HEAT TRANSFER LAB**

Course Code	**DPME2014**				
Prerequisite	**DPME2002**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives:

3. Analyze the heat flow in different types of materials like steel, copper, silver, etc.
4. Understanding to solve the problems related to heat transfer in conduction, convection and radiation

Course Outcomes:

CO1	**Analyze the heat flow in different types of materials like steel, copper, silver, etc.**
CO2	**Understanding to solve the problems related to heat transfer in conduction, convection and radiation.**
CO3	**Compare the rate of flow of heat and thermal conductivity of materials like copper and steel.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

8. Study of Heat Transfer through Composite Wall.
9. Study of Thermal Conductivity of Insulating Powder.
10. Study of Concentric Tube Heat Exchanger (Plain Tube Type).
11. Experimental Study of Thermal Conductivity of Metal Rod
12. Experimental Study of Heat Transfer From A Pin-Fin Apparatus
13. Study of Emissivity Measurement Apparatus
14. Study of Stefan Boltzmann Apparatus

Suggested Reading:

Name of The Course	**Hydraulics and Hydraulics Machine Lab**				
Course Code	**DPME2028**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives:

3. Perform standard measurement techniques of fluid mechanics and their applications.
4. Operate different hydraulic machines and measure different parameters.

Course Outcomes:

CO1	**Grasp compare the results of analytical models introduced in lecture to the actual behavior of real fluid flows.**
CO2	**Perform standard measurement techniques of fluid mechanics and their applications.**
CO3	**Operate different hydraulic machines and measure different parameters.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

To verify Bernoulli's Theorem.

To find out venturimeter coefficient
To determine Coef. of velocity (Cv), Coef. of discharge (Cd) Coef. of contraction (Cc) and verify the relation between them
To perform Reynold's Experiment.
To determine Darcy's coefficient of friction for flow through pipes.
To verify loss of head due to: (a) Sudden enlargement (b) Sudden Contraction.
To determine velocity of flow of an open channel by using a current meter.
To determine coefficient of discharge of a rectangular notch/triangular notch.
Study of the following:(i) Reciprocating Pumps or Centrifugal Pumps. (ii) Impulse turbine or Reaction turbine (iii)Pressure Gauge/water meter/mechanical flow meter.

Name of The Course	**Overhaulling LAB**				
Course Code	**DPAE2003**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

3. .

Course Outcomes:

CO1	**Practice on overhaulling of Petrol Engine**
CO2	**Practice on overhaulling of Diesel Engine**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

Diagnosing the engine for overhauling.
Removal of engine from vehicle.
Dismantling of engine.
Overhauling of petrol engine
Overhauling of diesel engine.
Replacing of piston and piston rings – removal and refitting.
Overhauling of gear box.
Overhauling of wheels and axles.
Overhauling of brakes.
Overhauling of clutch.

Suggested Reading:

Text Book (s)

5. AUTOMOILE ENGINEERING BY KRIPAL SINGH
6. I.C. Engines by M.L. Mathur and Sharma; Dhanpat Rai and Sons, Delhi

Name of The Course	**Auto Engine LAB**				
Course Code	**DPME2003**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	4	2

Course Objectives:

3. Perform the different techniques of simple parts and assemblies apply the concept of design for quality.
4. Manipulate knowledge of subsystems of an engine.

Course Outcomes:

CO1	Grasp the knowledge of fundamentals & working of Petrol Engines. (S2)
CO2	Differentiate components of SI & CI engines. (S1)
CO3	Grasp the knowledge of subsystems of an engine. (S2)

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

Study of fuel systems in petrol engines.
Study of fuel injector systems in Diesel Engines.
Study of F.I.P (Fuel Injection Pump).
Study of Engine tune up.
Study of turbocharger.
Study of cooling system.
Study of engine block.

Suggested Reading:

Text Book (s)

7. AUTOMOILE ENGINEERING BY KRIPAL SINGH
8. I.C. Engines by M.L. Mathur and Sharma; Dhanpat Rai and Sons, Delhi

Name of The Course	THEORY OF MACHINE				
Course Code	DPME3001				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	T	P	C
		3	2	0	4

Course Objectives:

3. Understand the fundamentals of the theory of kinematics and dynamics of machines.
4. To Use computer software packages in simple design of machines.

Course Outcomes:

CO1	Identify with common mechanisms used in machines and everyday life.
CO2	Calculate mobility (number of degrees-of-freedom) and enumerate rigid links and types of joints within mechanisms.
CO3	Analyse ability to conduct a complete (translational and rotational) mechanism position, velocity and acceleration analysis
CO4	Compare between various cam mechanism classification and cam motion profiles, and familiarity with introductory cam design considerations.
CO5	Compare between various gear mechanism classification and gear train analysis, and familiarity with gear standardization and specification in design.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Introduction 08 hour
Statics and dynamics, links, classification of links, kinematic pairs classification, degrees of freedom, constrained motion-types, kinematic chains, mechanisms, inversions of quadratic chain, single slider crank chain and double slider crank chain. Straight line motion mechanisms: classification of straight line motion mechanisms, peaucellier's, grass hopper and Pantograph mechanisms.
Unit- Velocity and Acceleration Mechanism 12 hour
Velocity and acceleration in Mechanisms: Motion of a link in machine, velocity of a point

on a link – Instantaneous center – types of instantaneous centers – kennedy theorem – velocity measurement by Instantaneous center method, Relative velocity method. Acceleration of a point on a link - acceleration in slider crank mechanism, Coriolis component of acceleration. Steering gear mechanism: Davis and Ackerman steering gear, Single and Double Hook Joint analysis.
Unit-3 Cams **10 hours**
Definitions, Types of cams and followers, types of follower motion, generation of cam profiles for uniform velocity, uniform acceleration and simple harmonic motion. Maximum velocity and maximum acceleration, analysis of roller follower and circular cam with straight flanks.
Unit-4 Gears **10 hours**
Friction wheels and toothed gears- types-law of gearing, condition of constant velocity ratio for transmission of motion- cycloidal and involute teeth profiles, velocity of sliding-interference - condition for minimum number of teeth to avoid interference- expressions for arc of contact and path of contact.
Unit-5 Vibrations **04 hours**
Concept of vibrations and its types – longitudinal, transverse and tensional vibrations (simple numerical), Damping of vibrations.

Suggested Reading:

Text Book (s)

9. Theory of Machines by D.R. Malhotra; Satya Prakashan, New Delhi.
10. Theory of Machines by V.P Singh; Dhanpat Rai and Sons, New Delhi

Reference Book (s)

4. Theory of Machines by Jagdish Lal; Metropolitan Publishers, New Delhi.
5. Theory of Machines by R.C. Jindal; North Publications

Name of The Course	**MACHINE DESIGN**				
Course Code	**DPME3002**				
Prerequisite	**DPME2004**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	2	0	4

Course Objectives:

3. To prepare students for design various machine components.
4. Analysis the various mechanical properties of materials.

Course Outcomes:

CO1	**Analyze the stress and strain on mechanical components and identify and quantify failure modes for mechanical parts.**
CO2	**Describe variety of mechanical components available and emphasize the need to continue learning.**
CO3	**Express the basic machine elements used in machine design; design machine elements to withstand the loads and deformations for a given application, while considering additional specifications.**
CO4	**Appraise a design problem successfully, taking decisions when there is not a unique answer.**
CO5	**Apply mechanical engineering design theory to identify and quantify machine elements in the design of commonly used mechanical systems.**

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Exam (MTE)**	**End Term Exam (ETE)**	**Total Marks**
20	30	50	100

Course Content:

Unit-1 Introduction to Design **08 hour**

1.1 Basic requirements for machine elements design **1.2 General design process** **1.3 Mechanical properties** **1.4 General design considerations like fatigue, creep, fabrication methods, economic considerations, material selection, ergonomic etc.** **1.5 Designing for strength**
Unit- Riveted And Welded Joints **07 hour**
2.1Types of riveted joints **2.2 Possible failure of riveted joints** **2.3 Design of lap and butt type riveted joints (simple cases)** **2.4 Strength and efficiency of riveted joints** **2.5 Common types of welded joints** **2.6 Transverse fillet and parallel fillet welded joint**
Unit-3 Screwed Joints **08 hours**
3.1 Introduction to screw and various definitions of screw threads **3.2 Advantages and disadvantages of screwed joints over riveted and welded joints** **3.3 Common types of screw fastening; through bolt, tap bolt, stud, cap screw, machine screw and set screw.** **3.4 Designation of screw threads** **3.5 Stresses in screw fastenings** **3.6 Design of bolts for cylinder cover**
Unit-4 Keys And Couplings **08 hours**
Keys And Couplings : **4.1 Definition of term Key; its various types** **4.2 Splines** **4.3 Forces acting on sunk keys** **4.4 Shaft couplings and its various types** **4.5 Design of flange coupling** **Shafts:** **5.1 Various types of shafts** **5.2 Stresses in shafts** **5.3 Design of shaft (solid and hollow) subjected to torque and Bending moment**
Unit-5 Design Of Cotter and Knuckle Joint **08 hours**
Design Of Cotter Joint : **6.1 Design of cotter** **6.2 Design of socket** **6.3 Design of spigot** **Design Of Knuckle Joint :** **7.1 Design of rod** **7.2 Design of pin**

Suggested Reading:

Text Book (s)

3. R.S.khurmi, Machine design, S.Chand, New Delhi
4. V. Bhandari, Machine Design, Tata Mcg Hill, New Delhi

Reference Book (s)

2. Mechanical Engineering Design" by Joseph Edward Shigley

Name of The Course	**Chassis, Body and Transmission**				
Course Code	**DPAE3003**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	0

Course Objectives:

3. The anatomy of the chassis in general.
4. The location and importance of each part..

Course Outcomes:

CO1	Identify the different types of Chassis frame and Requirement of chassis.
CO2	Explain the working of various parts like clutch, front, steering system.
CO3	Understand the Transmission system.
CO4	Develop a strong base for understanding future developments in the automobile industry.
CO5	Understand the Steering system

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term	Total Marks

		Exam (ETE)	
20	30	50	100

Course Content:

Unit-1 Chassis and Body	**08 hour**
Classification of vehicles, types of chassis, layout of conventional type of chassis, function and arrangement of major assemblies. Alternating arrangement used such as engine position, drive types, their merits and demerits., types of frame and body streamlining, cross members, brackets, materials of frame and body upholstery..	
Unit-2 Clutch	**10 hour**
Necessity, function and requirements of clutch, types of clutch - single plate clutch, multi plate clutch, hydraulic power assisted and wet and dry plate clutch, clutch plate and lining material Constructional details and working of centrifugal, semi centrifugal clutch, fluid coupling.	
Unit-3 Transmission	**10 hours**
Necessity, function and types of manual transmission- Sliding, constant mesh and synchromesh. Over drive, over running clutch, description and operation of transfer gear box. Common faults and remedies Types of automatic transmission and their main components Epicyclic gear box – construction, working and determination of speed ratio Torque converter – construction, principle of working. Continuously transmission, Automated Manual Transmission	
Unit-4 Final Drive And front axle	**08 hours**
Propeller shaft – function, construction details. Universal joints - functions and types. Types of final drive – hotchkiss drive, torque tube drive. Differential – principle, functions and its working. Rear axles – semi floating, , three quarter floating. Fully floating . Common faults and remedies Types – Stub double drop, fully dropped, load distribution, effect of braking on axle shape, steering head, Elliot and reverse elliot, steering knuckle.Common abrasive grinding wheel materials, Bonds, Grain or grits of abrasive, Grain structure and shapes of common wheels, various speeds and feeds, Use of coolants, Methods of grinding. Types of grinding machines, precision finishing operations like honing.	
Unit-5 Steering	**10 hours**
Steering mechanism, function, Davis and Ackerman's Principle of steering. Working and constructional details of steering gear, steering linkages, sector arm, center arm, drag link and tie rod steering stops. Front wheel geometry-castor, camber, steering axis inclination, toe in and toe out. Cornering force, cornering power and self-righting torque. Over steering and under steering. Power steering – necessity, types, Construction features and working of hydraulic and electronic power steering systems, Common steering systems troubles and remedies	

Suggested Reading:

Text Book (s)

1. Chassis, Body and Transmission-I by G.S.Aulakh, Eagle Prakashan, Jalandhar

Reference Book (s)

2. Chassis, Body and Transmission by Ishan Publications, Jalandhar

Name of The Course	**CHASSIS, BODY AND TRANSMISSION LAB**				
Course Code	**DPAE3005**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives:

1. The anatomy of the chassis in general.
2. The location and importance of each part..

Course Outcomes:

CO1	Differentiate various types of chassis.
CO2	Handle working of different components like clutch, gearbox.
CO3	Grasp the knowledge of Servicing and overhauling of gear box and propeller shaft

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	0	50	100

Course Content

Study and sketches of Heavy and Light vehicle chassis.
Identify and servicing of single plate and multi plate clutch.
Study and sketch of centrifugal clutch.
Servicing and overhauling of constant mesh and synchromesh gear box
Servicing of universal joints, slip joint and propeller shaft
Servicing of differential, adjustment of crown and pinion backlash.
Checking and adjustment of steering geometry, camber, caster, Toe-in, Toe-out, kingpin inclination.
Study of live axles.

Suggested Reading:

Text Book (s)

1. Chassis, Body and Transmission-I by G.S.Aulakh, Eagle Prakashan, Jalandhar

Reference Book (s)

1. Chassis, Body and Transmission by Ishan Publications, Jalandhar

Name of The Course	**Project**
Course Code	**DPME9999**
Prerequisite	
Co-requisite	
Anti-requisite	

	L	T	P	C
	0	0	0	10

Course Objectives:

3. Perform the different techniques of graphical representation for simple parts and assemblies apply the concept for different project.
4. Manipulate drawings through editing and plotting techniques

Course Outcomes:

CO1	**Create a own data or implementation on previous data project.**
CO2	**Create model to exhibit project**
CO3	**Develop understanding of subject based knowledge given in the classroom in the context of its application at work places.**
CO4	**Develop firsthand experience and confidence amongst the students to enable them to use and apply polytechnic/institute based knowledge and skills to solve practical problems related to the world of work.**
CO5	**Develop abilities like interpersonal skills, communication skills, positive attitudes and values etc.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

Projects connected with repair and maintenance of machines.
Estimating and costing projects.
Design of jigs / fixtures.
Projects related to quality control.

Projects relating to installation, calibration and testing of machines.
Projects related to wastage reduction.
Project, related to fabrication.
Project work related to increasing productivity.

ELECTIVE COURSE

Name of The Course	**MOTOR VEHICLE ACT AND TRANSPORT MANAGEMENT**				
Course Code	**DPME3007**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

4. To prepare students about to find the vehicle operating cost.
5. To prepare students about to find the vehicle operating cost.
6. To prepare students to motor vehicle act in India.

Course Outcomes:

CO1	**Analze to reduce Vehicle Operating Costs.**
CO2	**Analysis of vehicle accident.**
CO3	**Discuss vehicle claim procedure from insurance company and about Motor Vehicle Act.**
CO4	**Analyze Motor Vehicle Act features and appropriate practices covering Motor Vehicle Act.**
CO5	**Understant about to transport management systems and techniques would also be an asset to him.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Garage location, layout and types, and change work procedure 06 hour
Location of garage/selection of site of garage **• Layout of garage** **• Types of garage** **• Estimation of repair** **• Job control system** **• Work – order or job card** **• Testing and test reports** **• Costing and billing**
Unit- 2 Garage stores 08 hour
•Definition **• Purpose of store keeping** **• Function of store keeping** **• Location of store** **• Layout of store** **• Advantage of good store – keeping and recording** **• Procurement of store.**
Unit-3 Insurance of vehicle 08 hours
Meaning and necessity of vehicle insurance **• Types of vehicle insurance** **• Duties of driver in case of accident and injury to a person** **• Procedure to get accidental claim and compensation**
Unit-4 Driving And Highway Code 08 hours
• Principle of driving **• Driving procedure** **• Driving precautions** **• Driving in abnormal conditions, like hilly area, night, fog, heavy traffic and rain** **• Emergency Driving situations** **• Driving License - purpose, importance and requirements**

• Different types of driving license • Procedure to get driving license • Highway code – types with sketches with colour code
Unit-5 Motor Vehicle Act **10 hours**
• Definitions • Salient features of motor vehicle act • Licensing of drivers and conductors of motor vehicles • Registration of old and new vehicles • Transfer of vehicle – local and state to state • Traffic offences, penalties procedure • Fitness of vehicle – meaning and purpose, provision in the act • Vehicle permit – different types • Imposition of penalties of violation of rules • Different documents required for registration of vehicle, for driving license, and for transfer of vehicle.

Suggested Reading:

Text Book (s)

3. Transport in Modern India by KP Bhatnagar, SatishBahadur, DN Aggarwal and SC Gupta.

Reference Book (s)

3. Motor Vehicle Act of India

Name of The Course	**Auto Electrical and Electronic System**				
Course Code	**DPME3008**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

3. To identify the functioning of the battery and its accessories.
4. The student will be made to learn the location and importance of each part for electrical.

Course Outcomes:

CO1	Describe and apply knowledge of electrical system in two wheeler. (K2)
CO2	Describe and apply knowledge of electrical system in Four wheeler. (K2)
CO3	Demonstrate petrol engine and its wireing system. (K3)
CO4	Illustrate diesel engines and electrical system.(K3)
CO5	Illustrate electrical system in engine.(K3)

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit- Introduction **4 hour**
Various Electrical and Electronics components/systems in Automobile, Functions and uses, earth return system, types of earthing, 6V, 12V system.
Unit-2 Batteries 10 hour
Lead Acid Batteries - Construction, working, elements, types, materials used, electrolyte and its strength, effect of added plate area and temperature, rating, capacity, efficiency, temperature characteristics, terminal voltages, charging and discharging **Battery Testing - Electrolyte testing by hydrometer, voltage test, high discharge and cadmium test (voltage)** **Alkaline Batteries: Construction, working, merits and demerits of Ni-Fe, Ni- Cd, Ag-Zn cells, maintenance free batteries Lithium ion battery - Construction and working Fuel cells - Principles of working and uses of fuel cell**
Unit-3 Fuel System **10 hours**
Fuel system in spark ignition engine: Fuel feed system, fuel pumps-its types, fuel tank, fuel lines, fuel filters, concept of carburetion.

Working and construction of a simple carburetor. Advantages of using fuel injection system in spark ignition engines.
Unit-4 Charging System 10 hours
Circuits, function and various components, dynamo and alternator, types, construction, working, advantages and disadvantages of dynamo and alternators, drives, cut out relay Necessity of regulation, construction and working of regulators for dynamos and alternators Starting
Unit-5 System 06 hours
Starting requirements of I.C engines, principle, types and construction of starter motor, starter switches, starter drives their types and working. **Various lighting circuits, head lamp, type and constructional details, sealed beam, double filaments, asymmetric and dual units, vertical and side control of lamps, fog light, side light, brake light, instrument light, indicator lights, reversing light, lamp mounting, working indicators LED lighting Wiring - HT and LT, their specifications, cable colour codes, wiring Harness, Cable connections, Wiring diagrams of cars and two wheeler, Fuses, faults and rectification**

Suggested Reading:

Text Book (s)

2. Young. A. P & Griffiths. L, Automobile Electrical and Electronic Equipments, English Languages Book Society & New Press, 1990.

Reference Book (s)

1. Vinal. G.W., Storage Batteries, John Wiley & Sons Inc., New York, 1985

GALGOTIAS UNIVERSITY

(Established under Galgotias University Uttar Pradesh Act No. 14 of 2011)

Program: Diploma Computer Science & Engineering

Scheme: 2020-2021

Curriculum

Semester 1									
Sl. No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	PHYE-1001	APPLIED PHYSICS-I	3	2	0	4	20	50	100
2	MATD-1002	APPLIED MATHEMATICS-I	4	0	0	4	20	50	100
3	PCDE-1003	PROFESSIONAL COMMUNICATION-I	2	0	0	2	20	50	100
4	DPCS-1004	COMPUTER FUNDAMENTALS	3	0	0	3	20	50	100
5	CHEM-1005	BASIC CHEMISTRY	4	0	0	4	20	50	100
6	PHYE-1006	APPLIED PHYSICS-I LAB	0	0	2	1	50	-	50
7	PCDE-1007	PROFESSIONAL COMMUNICATION-I LAB	0	0	2	1	50	-	50
8	DPCS-1008	COMPUTER FUNDAMENTALS LAB	0	0	2	1	50	-	50
9	CHEM-1009	BASIC CHEMISTRY LAB	0	0	2	1	50	-	50
10	SPYO1001	SPORTS AND YOGA	0	0	2	1	50	-	50
		TOTAL	16	2	10	22			
Semester II									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	PHYE-1010	APPLIED PHYSICS-II	3	2	0	4	20	50	100
2	MATD-1011	APPLIED MATHEMATICS-II	3	2	0	4	20	50	100
3	PCDE-1012	PROFESSIONAL COMMUNICATION-II	3	0	0	3	20	50	100
4	DPCO-1013	FUNDAMENTAL OF ELECTRONICS DEVICE	3	0	0	3	20	50	100
5	DPCS-1014	OPERATING SYSTEM	3	0	0	3	20	50	100
6	PHYE-1015	APPLIED PHYSICS-II LAB	0	0	2	1	50		100
7	PCDE-1016	PROFESSIONAL COMMUNICATION-II LAB	0	0	2	1	50		100
8	DPME-1017	WORKSHOP PRACTICE	0	0	6	3	50		100
9	DPCO-1018	FUNDAMENTAL OF ELECTRONICS DEVICE LAB	0	0	2	1	50		100
10	DPCS-1019	OPERATING SYSTEM LAB	0	0	2	1	50		100
		TOTAL	15	4	14	24			
Semester III									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE

1	DPCS-2001	COMPUTER PROGRAMMING & PROBLEM SOLVING	3	0	0	3	20	50	100
2	DPCS-2002	COMPUTER HARDWARE AND MAINTENANCE	3	0	0	3	20	50	100
3	DPCS-2007	DATA COMMUNICATION AND COMPUTER NETWORKS	3	0	0	3	20	50	100
4	MATD-2001	APPLIED MATHEMATICS-III	3	2	0	4	20	50	100
5	DPCO2003	PRINCIPLES OF DIGITAL ELECTRONICS	3	0	0	3	20	50	100
6	DPCS-2004	COMPUTER PROGRAMMING & PROBLEM SOLVING LAB	0	0	4	2	50		100
7	DPCS-2005	COMPUTER HARDWARE AND MAINTENANCE LAB	0	0	2	1	50		100
8	DPCS-2011	DATA COMMUNICATION AND COMPUTER NETWORKS LAB	0	0	2	1	50		100
9	DPCO2007	PRINCIPLES OF DIGITAL ELECTRONICS LAB	0	0	2	1	50		100
10	DPCS2017	DIGITAL MARKETING & E-COMMERCE	3	0	0	3	20	50	100
		TOTAL	18	2	10	24			

Semester IV

Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	DPCS-2009	DATA STRUCTURES USING C	3	0	0	3	20	50	100
2	DPCS-2008	RELATIONAL DATABASE MANAGEMENT SYSTEMS	3	0	0	3	20	50	100
3	DPCS-2003	SOFTWARE ENGINEERING	3	0	0	3	20	50	100
4	DPCS-2018	JAVA PROGRAMMING	3	0	0	3	20	50	100
5	DPCO-2010	MICROPROCESSOR & ITS APPLICATION	3	0	0	3	20	50	100
6	DPCS-2014	DATA STRUCTURES USING C LAB	0	0	2	1	50	-	50
7	DPCS-2012	RELATIONAL DATABASE MANAGEMENT SYSTEMS LAB	0	0	2	1	50	-	50
8	DPCS-2006	SOFTWARE ENGINEERING LAB	0	0	2	1	50	-	50
9	DPCO-2013	MICROPROCESSOR & ITS APPLICATION LAB	0	0	2	1	50	-	50
10	DPCS-2019	JAVA PROGRAMMING LAB	0	0	2	1	50	-	50
11	DPCS9001	DISRUPTIVE TECHNOLOGY LAB	0	0	2	1	50	-	50
12	EEDM-3002	ENVIRONMENT EDUCATION & DISASTER MANAGEMENT	3	0	0	2	20	50	100

		TOTAL	18	0	12	23			
Semester V									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	DPCS-3002	COMPUTER GRAPHICS	3	0	0	3	20	50	100
2	DPCS-3003	INTERNET & WEB TECHNOLOGY	3	0	0	3	20	50	100
3	IMED3001	INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT	3	0	0	3	20	50	100
4	DPCS-3004	1.1) PYTHON & DATA SCIENCE (ELECTIVE-I)	3	0	0	3	20	50	100
5	DPCS-3011	PYTHON & DATA SCIENCE LAB (ELECTIVE-I)	0	0	2	1	50	-	50
6	DPCS-3005	2.1) MOBILE COMPUTING (ELECTIVE-II)	3	0	0	3	20	50	100
7	DPCS-3012	2.1) MOBILE COMPUTING LAB (ELECTIVE-II)	0	0	2	1	50	-	50
8	DPCS-3008	COMPUTER GRAPHICS LAB	0	0	2	1	50	-	50
9	DPCS-3009	INTERNET &WEB TECHNOLOGY LAB	0	0	2	1	50	-	50
10	PDSS3008	PERSONALITY DEVELOPMENT & SOFT SKILLS	0	0	4	2	50	-	50
		TOTAL	18	0	10	21			
Semester VI									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	DPPE-9998	FIELD VISIT AND PRESENTATION OR MINOR PROJECT	0	0	0	2	50	-	50
2	DPPE-9999	MAJOR PROJECT	0	0	0	12	50	-	50
		TOTAL	0	0	0	14			
		GRAND TOTAL				128			

List of Electives

Basket-1

Sl No	Course Code	Name of the Electives					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	DPCS-3004	1.1) PYTHON & DATA SCIENCE (ELECTIVE-I)	3	2	0	3	20	50	100
2	DPCS-3011	1.2) PYTHON & DATA SCIENCE (ELECTIVE-I) LAB	0	0	2	1	50	-	50
3	DPCS-3006	1.3) CLOUD COMPUTING (ELECTIVE-II)	3	0	0	3	20	50	100
4	DPCS-3013	1.4) CLOUD COMPUTING LAB(ELECTIVE-II)	0	0	2	1	50	-	50

Basket-2

		Name of the Elective		Assessment Pattern

Sl No	Course Code		L	T	P	C	IA	MTE	ETE
1	DPCS-3005	2.1) MOBILE COMPUTING (ELECTIVE-III)	3	2	0	3	20	50	100
2	DPCS-3012	2.1) MOBILE COMPUTING LAB (ELECTIVE-III)	0	0	2	1	50	-	50
3	DPCS-3024	2.3) AI & ML (ELECTIVE-IV)	3	2	0	3	20	50	100
4	DPCS-3025	2.4) AI & ML (ELECTIVE-IV)	0	0	2	1	50	-	50

Detailed Syllabus

Name of The Course	Computer Fundamentals				
Course Code	DPCS1004				
Prerequisite	Aware about computer physics and maths				
Corequisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objectives:

1. To create awareness and emphasize the need for the roll of computer in Engineering and to give a general understanding on working of computer.

Course Outcomes

CO1	Discuss about the basic input and output devices of computer. (K2)
CO2	Understand the role of CPU and basic principles of Windows operating system.(K2)
CO3	Applying MS office tools for different applications (K5)
CO4	Utilize the Internet and surf Worldwide Web (K3)
CO5	Discuss the application of Computer in various Domains. (K3)

Text Book (s): 1. Fundamentals of Computers" by Rajaraman V and Adabala N

2. "Computer Fundamentals" by P K Sinha.

Reference Book (s):

1. "Computer Fundamentals" by Goel
2. "Fundamentals of Computers" by Reema Thareja
3. "Fundamentals of Computers" by E Balagurusamy

.

Unit-1 Introduction and parts of computer. 8 hours
Introduction Components of PC, The system Unit, Front part of system Unit Back part of system Unit, CPU, Memory of computer, Monitor, Mouse, Key board, Disk, Printer, Scanner, Modem, Video, Sound cards, Speakers.
Unit-2 Introduction To Windows 3 hours
Working with window, Desktop, Components of window, Menu bar option, starting window, Getting familiar with desktop, moving from one window to another, Reverting windows to its previous size Opening taskbar buttons into a windows creating shortcut of program, Quitting windows.
Unit-3 GUI Based Editing, Spreadsheets, Tables & Presentation 5 hours
Application Using MSOffice2010, Menus, Opening of menus, Toolbars: standard toolbars, formatting tool-bars & closing of menus Quitting Document, Editing & designing your document, Spreadsheets, Working & Manipulating data with Excel, Changing the layout, Working with simple graphs & Presentation, Working with Power Point and Presentation.
Unit-4 Introduction to Internet 3 hours
What is Internet, Equipment Required for Internet connection, Sending & receiving Emails, Browsing the WWW, Creating own Email Account Internet chatting.
Unit-5 Application of Computer System in various Domains 3 hours
Computer application in Offices, book's publication, data analysis, accounting, investment, inventory control, graphics, data base management, Instrumentation, Airline and railway ticket reservation, robotics, artificial intelligence, military, banks, design and research work, real-time, point of sale terminals, financial transaction terminals.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	Computer Fundamentals LAB
Course Code	DPCS1008
Prerequisite	DPCS1004
Co requisite	
Ant requisite	

	L	T	P	C
	0	0	2	1

Course Objectives: 1. Discuss about the basic input and output devices of computer and understand the basic knowledge of computer system and components of computer.In this students learn the need of different memory system in computer .Understand basic principles of Windows operating system. Access the Internet domain and also aware about the working of basic tools of MS-office-like MS-word, power-point,MS-excel and MS-Access.After this course students learn to working on MS-office and its differetn tools and also understand the working of MS-Word, MS-EXCEL, and MS-Power Point.

Course Outcomes

CO1	Create database, slides and text by using ms office. S5
CO2	Write mail and apply other application on internet. S4
CO3	To create awareness and emphasize the need for the role of computer in Engineering.
CO4	To give a general understanding on working of computer.
CO5	Apply computer application in different domains.

Text Book (s): 1Fundamentals of Computers” by Rajaraman V and Adabala N
2. Computer Fundamentals” by P K Sinha. ISBN-13: 978-8176567527 BPB Publications.
Reference Book (s):1FUNDAMENTALS OF COMPUTERS” by E Balagurusamy
2.” Fundamentals of Computers” by Reema Thareja

List of Experiments
Use of MS-Paint and its drawing tools.
Making a student resume by using MS-Word 2007 including: Font formatting, using bullets, page formatting and shortcuts for MS-Word.
Using MS-Internet Explorer for connecting to the internet. On line web tutorial, links, hyperlinks, responding to email link.
Searching the internet using MS-Internet Explorer, using web crawler searching, using yahoo and commonly used search engines.
Using address book by creating new contact, creating new group, addressing message and finding email addresses.
Using email reading file attachment, actions on mail like forwarding, deleting, receiving & replying.
Creating and sending mails, attaching files, receiving mails, subscribing to newsgroup.
Making students mark sheet by using MS-Excel 2007
Chatting on internet, chat environment , using chat toolbar
Create slides using MS Power point.
Develop an application using mail merge for envelopes.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	OPERATING SYSTEM			
Course Code	DPPE2003			
Prerequisite	DPCS1004			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives: 1. This course introduces the basic facilities provided in modern operating systems
2. The course discusses concurrency: how to manage multiple tasks that execute at the same time and share resources. Topics in this section include processes and threads, context switching, synchronization, scheduling, and deadlock.
3. the course addresses the problem of memory management; it will cover topics such as linking, dynamic memory allocation, dynamic address translation, virtual memory, and demand paging.
4. The course concerns file systems, including topics such as storage devices, disk management and scheduling, directories, protection, and crash recovery.

Course Outcomes

CO1	Understand the function and classification of operating system. K2
CO2	Analyze the structure and organization of the file system, Evaluate the process synchronization and scheduling. K4
CO3	Differentiate the different approaches to memory management and concept of paging and segmentation.K4
CO4	Develop a description for occurrence and avoidance of deadlock. K6
CO5	Analyze deadlock condition and apply algorithm for prevention and detection of deadlock.

Text Book (s): 1. Abraham Silberschatz, "Operating System Concepts"
2. Tannenbaum" Operating System Design and Implementation "

Reference Book (s):1. Die Annleblanc and Issac Yates, Linux – Install and Configuration Black Book, IDG Books India Private Ltd., Delhi.
2. Richard Peterson, Linux – The Complete Reference, Tata McGraw Hill, New Delhi

Unit-1 Introduction 8 hours
Operating system and functions, evolution of operating system, Classification of operating system-Batch ,Time sharing, Real Time system, Multiprocessing system, Multi programming System, Multi tasking system, Network system, Distributed system, Operating system structure- layered structure.
Unit-2 File system 9 hours
File concepts, Access methods, Directory system, introduction to file system protection and security.
Unit-3 CPU& Disk scheduling 8 hours
Scheduling concepts, Scheduling algorithm, Multiprocessor scheduling, FCFS scheduling, Shortest seek time first.
Unit-4 Memory Management 8 hours
Swapping, multiple partitions, Paging, Segmentation, Demand paging, Page replacement, Virtual memory concepts.
Unit-5 Deadlock 8 hours
Introduction to deadlock, Necessary condition for deadlock, Method for handling deadlock, Brief overview of deadlock prevention, Deadlock avoidance (Banker's algorithm), Deadlock detection and recovery.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	OPERATING SYSTEM LAB				
Course Code	DPCS1019				
Prerequisite	DPCS1008				
Corequisite					
Antirequisite					
		L	T	P	C
		0	0	2	1

Course Objectives: 1This course introduces students to basic structure of operating systems, Kernel, user interface, I/O device management, device drivers, process environment, concurrent processes and synchronization, inter-process communication, process scheduling, memory management, deadlock management and resolution, and file system structures.

Course Outcomes

CO1	Creating and manipulating user account and practice on Linux Command and practice on V I(Visual Interface) command and analyze the structure and organization of the file system into operating system. S5
CO2	Create the programs In Linux using Shell and set up Windows operating system and Installing and configuring different driver and software. S5

Text Book (s): 1. Silberschatz, Galvin, Gagne"Operating System Principles,Wiley India Pvt Ltd,ISBN: 9788126509621,
2. Richard Peterson, Linux – The Complete Reference, Tata McGraw Hill, New Delhi
Reference Book (s):1. Neetu Singh,Operating System,Global Academic Publishers & Distributors,ISBN-13: 978-9381695715

2. Die Annleblanc and Issac Yates, Linux – Install and Configuration Black Book, IDG Books India Private Ltd., Delhi.

Ex.1
Creating and managing user accounts.
Ex.2
Practice on Linux commands, Practice on VI (Visual Interface) commands.
Ex.3
Write and execute at least 10 programmers in Linux using shells such as- i. Factorial of numbers ii. Prime numbers iii. Fibonacci series iv. Sum & Reverse of numbers v. Largest of three numbers, etc.
Ex.4
Installing and configuring windows.
Ex.5
Create file and folder.
Ex.6
Searching a file.
Ex.7
Installation of device drivers.
Ex.8
Creating user accounts.
Ex.9
Customizing desktop.
Ex.10
Setting monitor resolution.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	COMPUTER PROGRAMMING AND PROBLEM SOLVING				
Course Code	DPCS2001				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		3	2	0	4

Course Objectives: 1. This course is designed to provide a comprehensive study of the C programming language. It stresses the strengths of C, which provide students with the means of writing efficient, maintainable, and portable code.

2. To learn and acquire art of computer programming.

Course Outcomes

CO1	Apply the basic concepts of algorithm and different programming techniques. (K3)
CO2	Develop, compile and debug programs using different data types involving decision structures and loops in C language. (K4)
CO3	Develop programs using array and strings concepts. (K4)
CO4	Apply the dynamics of memory by the use of pointers and functions. (K3)
CO5	Develop program using functions, structure and Union. (K4)

Text Book (s): 1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.

2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill.

Reference Book (s):1. Practical C programming, 3rd Edition (A Nushel Handbook) O' Really

2. Programming and Problem solving through 'C' by (ELSEVIER).

Unit-1 Algorithm & Programming Environment 8 hours
Algorithm for problem solving: An Introduction – Properties of algorithm – Classification –Algorithm logic – Flowchart. Programming environment: High level programming language – low level programming language – middle level programming language – Assembler – Compiler – Interpreter. How to install C compiler and IDE tool to run C programming Code
Unit-2 Programming Basics 8 hours
Introduction to ' C' programming : fundamentals ,structure of a 'C' program,

Constants, Variables – Data Types – Expressions using operators in 'C' – Managing Input and Output operations – Decision Making and Branching – Looping statements – solving simple scientific and statistical problems. Making a program using loops and conditional statements
Unit-3 Arrays and Strings 8 hours
Arrays: Initialization – Declaration – One dimensional and two dimensional arrays. String-: String operations – String Arrays. Simple programs: sorting- searching – matrix operations.
Unit-4 Functions and Pointers 10 hours
Function: definition of function – Declaration of function – Pass by value – Pass by reference – Recursion – Pointers: Definition – Initialization – Pointers arithmetic – Pointers and arrays- Example Problems. Making programs that create a function including some methods (Swap, power, string operations, etc.).
Unit-5 Structures And Unions 8 hours
Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure - Union - Programs using structures and Unions – Storage classes, Pre-processor directives. Making programs that create a structure/Union of a students/employee.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	COMPUTER PROGRAMMING AND PROBLEM SOLVING LAB				
Course Code	DPCS2004				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		2	0	2	1

Course Objectives: This course is designed to provide a comprehensive study of the C programming language. It stresses the strengths of C, which provide students with the means of writing efficient, maintainable, and portable code.

Course Outcomes

CO1	Apply array, string, structures, unions and recursion and write simple program. (S4)
CO2	Apply concept of call by value and call by reference for writing program in C.
CO3	Practice the programming using pointer and recursive function.

Text Book (s): 1. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill.

Reference Book (s):1. Programming and Problem solving through 'C' by (ELSEVIER)
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.

Ex.1
Problem formulation, Problem Solving and Flowcharts.
Ex.2
C Programming using Simple statements and expressions.
Ex.3
Scientific problem solving using decision making and looping.
Ex.4
Simple programming for one dimensional and two dimensional arrays.
Ex.5
Solving problems using String functions.
Ex.6
Programs with user defined functions – Includes Parameter Passing.
Exp.7
Write a Program using Pointer.
Exp.8
Write a Program using Recursive Function.
Exp.9
Write a Program using structures.
Exp.10
Write a Program using Union.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	Computer Hardware & Maintenance				
Course Code	DPCS2002				
Prerequisite	Fundamentals of Computer System				
Corequisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objectives: 1. Computer hardware involves all physical components of computer those integrate to each other and make a system and maintenance means care of all parts.

2. Students learn the working and function of all hard devices and apply for troubleshooting and maintenance. Student also learns network device and applying for making LAN.

Course Outcomes:

CO1	Understand the different peripheral and Network devices.
CO2	Understand the basics components on motherboard and peripherals devices.
CO3	Analyze the working, function of Keyboard and Mouse.
CO4	Illustrate the working, function and troubleshooting of external memory devices.
CO5	Analyzing working, function and troubleshooting of printer, scanner and storage devices.

Text Book (s): 1. K.L.James "Computer Hardware and Maintenance" PHI

Reference Book (s):

1 Dan Gookin"Troubleshooting and Maintaining Your PC All-in-one "John Wiley and Sons Ltd, ISBN13 9780470396650

2. William G. Wong"PC Hardware Maintenance, Repair & Upgrading for A+ Certification "engage Learning, Inc, ISBN10 0766832732

Unit-1 Introduction to peripheral and Network devices **8 hours**
Component and peripheral devices (connected with computer). Power Supply: Operating characteristics in CPU, Network Devices: Hub, Switch, Router, Bridge, Gateway, Ethernet Card.
Unit-2 Mother Board **8 hours**
Mother Board features and Architecture, Mother board components, BUS Architecture and its types, CMOS- Battery, Connections on the Mother Board, Keeping CPU cool, Motherboard trouble shooting.
Unit-3 Key Board and Mouse **8 hours**
Key Board: Switches, Keyboard organization, Key board type, trouble shooting. Mouse: Mouse type, Connecting Mouse, Trouble shooting.
Unit-4 HDD/CD **8 hours**
HDD: Magnetic recording, Data Encoding Method, HDD feature, HDD trouble shooting. Compact Disc Drive: CD-R, CD-W, CD-RW, DVD-R, DVD-RW, Working and Maintenance.
Unit-5 Printers and Scanner **8 hours**
Printers: Image formation method, Printing mechanism, types of printer, working and Trouble shooting of printer. Scanner: Flat Bed, External Devices- Pen Drive, Flash Drive, External Hard Disk.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	COMPUTER HARDWARE AND MAINTENANCE LAB				
Course Code	DPCS2005				
Prerequisite	DPCS1004				
Corequisite					
Antirequisite					
		L	T	P	C

	0	0	2	1

Course Objectives: 1. This course is designed to enable the students get a detailed knowledge of all the hardware components that assembled a computer and to understand the different interfaces required for connecting these hardware devices and also understand and applying the basics of troubleshooting of computer as well as printer ans scanner..

Course Outcomes

CO1	Understand basics components on motherboard and peripherals devices. S3
CO2	Analysis the internal peripheral devices of CPU and assembling PC .S4
CO3	Understand the computer related problems. S3

Text Book (s): 1. K.L.James – Computer Hardware and maintenance - PHI

Reference Book (s):1. Computer Hardware And Maintenance, by S S Velankar Mrs Y C Kulkarni, ISBN-13: 978-9383750528

2. Stephen Root – Computer Hardware and Maintenance –Elsevier..

EXP. 1
1. Study of devices on motherboard. 1.1 Study of Key board & Keyboard decoder 1.2 Study of Video Adopter & display controlle 1.3 Study of Floppy Drive, CD Drive and Hard 1.4 Study of Multifunction Input/output contro 1.5 Assembling of PC and Installation of Opera
EXP.2
Troubleshooting & repair of following equipment 2.1 Dot Matrix Printer, Laser, Inkjet Printer. 2.2 CPU 2.3 Disk Drive 2.4 Problems related to monitor
EXP.3
Study and Trouble Shooting of 3.1 Network 3.2 Power Supplies

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50		50	100

Name of The Course	DATA COMMUNICATION AND COMPUTER NETWORKS				
Course Code	DPCS2007				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objectives:

1. Familiarize the student with basic taxonomy and terminology of the computer networking area.
2. Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.
3. Apply fundamentals of networking to detect and correct error in transmission.
4. Familiarize the student with routing and addressing also applying suitable protocol in networks.

Course Outcomes

CO1	Discuss the concept of data communication and networking criteria with reference to OSI model. K2
CO2	Generalize the need of Multiplexing, Switching and Modulation, discuss about transmission media. K3
CO3	Demonstrate function of Data link layer, identify and correcting error using appropriate algorithm. K3
CO4	Illustrate Routing Technique, algorithm, protocols and addressing by Transport layer K3
CO5	Discuss function of Transport, session and application layer with protocol and algorithm. K2

Text Book (s): 1. B. A. Forouzan - Data Communication and Networking (3 Ed.) -TMH.
2. A. S. Tanebaum - Computer Networks (4 Ed.) – Pearson Education/ PHI.

Reference Book (s):1. W. Stallings - Data and Computer Communication (5 Ed.) -Pearson Education/ PHI.
2. James F. Kurose, Keith W. Ross "Computer Networking: A Top-Down Approach, 6th Edition"- Pearson Education, ISBN: 9780132856201

Unit-1 Overview of Data Communication and Networking 10 hours
Introduction; Data Communication; Components, data representation (ASCII, ISO, etc.). Direction of Data Flow(Simples, Half duplex, Full duplex), Parallel and Serial Transmission. Network; Distributed processing, Network criteria, Physical structure (Types of connection, Topology), Categories of network (LAN, MAN, WAN; Reference models; OSI reference model TCP/IP reference model, their architecture and comparative layered study.
Unit-2 Physical Layer 6 hours
Overview of data (Analog and Digital), Signal (Analog and Digital), Modulation (AM,FM) Transmission (Analog and Digital) and Transmission media (Guided and Non-guided); Multiplexing: TDM, FDM, WDM; Switching; Circuit switching, Packet switching and Message switching.
Unit-3 Data Link Layer 8 hours
Types of errors, Framing (Character and bit stuffing), Error detection and Correction methods; Flow control; Protocols Stop and wait ARQ, Go-Back, NARQ, Selective repeat ARQ, HDLC. Medium Access Sub Layer :Point to point protocol, LCP, NCP, FDDI, Token bus, Token ring; Multiple access protocols, CSMA,CSMA/CD, FDMA, TDMA, CDMA; Ethernet.
Unit-4 Network layer 8 hours
Addressing : Internet address, classful address, Sub netting; Routing : Techniques, Static vs. dynamic routing, Routing table for classful address; Routing algorithms: Shortest path algorithm, Flooding, Distance vector routing, Link state routing; Protocols ARP,RARP, IP, ICMP, IPV6; Unicast and multicast routing protocols.
Unit-5 Transport, Session and Application layer 10 hours
Process to process delivery; UDP, TCP; Congestion control algorithm; Leaky bucket algorithm, Token bucket algorithm, Choke packets. Functioning of session and application layers; protocols: DNS;SMTP;SNMP;FTP; HTTP & WWW; Security: Cryptography, authentication, encryption and decryption; Security protocols in internet Firewalls.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	Data Communication and Computer Networks Lab				
Course Code	DPCS2011				
Prerequisite	DPCS2005				
Corequisite	DPCS2009				
Antirequisite					
		L	T	P	C
		0	0	2	1

Course Objectives: 1. Analyze the communication tools and appropriate architecture, topology for networking structure.
2. To Apply networking concept in Establishment of a LAN.

Course Outcomes

CO1	Discuss data communication concept and computer networking tools. S3
CO2	Analysis of various network components and designing issues of LANs. S4
CO3	Perform proxy server and network drivers installation and also handle troubleshooting of network related problem. S3

Text Book (s): 1. B. A. Forouzan - Data Communication and Networking (3 Ed.) - TMH.ISBN-13: 978-1259064753
2. A. S. Tanebaum - Computer Networks (4 Ed.) – Pearson Education/ PHI.ISBN-13: 978-9332518742

3. W. Stallings - Data and Computer Communication (5 Ed.) -Pearson Education/ PHI.
Reference Book (s):1. Kurose James F.- Computer Networking: A Top-Down Approach, Pearson Education, ISBN-13: 978-9332585492
2. Peterson - Computer Networks - A System Approach, Elsevier; Fifth edition, ISBN-13: 978-9380501932
3. Todd Lammle - CCNA Routing and Switching Complete Study Guide,Wiley; Second edition, ISBN-13: 978-8126564460

Experient-1
Identification of various networks components, Connection, BNC, RJ-45, I/O box,Cables, Co-axial, twisted pair, UTP, NIC (Network Interface Card),Switch, Hub.
Experient-2
Sketch wiring diagram of network cabling considering a computer lab of 20 systems.
Experient-3
Interfacing with the network card (Ethernet)
Experient-4
Preparing of network cables.
Experient-5
Establishment of a LAN.
Experient-6
Use of protocols in establishing LAN.
Experient-7
Trouble shooting of networks.
Experient-8
Installation of network device drivers.
Experient-9
Installation of networks (Peer Networking client server Interconnection).
Experient-10
Use/installation of proxy server.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	DIGITAL MARKETING AND E-COMMERCE
Course Code	DPCS2021

Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objectives: 1. Digital marketing is the promotion of products or brands via one or more forms of electronic media.
2. This course introduces the concepts, vocabulary, and procedures associated with E-Commerce and the Internet.
Course Outcomes

CO1	Understand basic Concept of digital marketing.
CO2	Apply the SEO and prepare report.
CO3	Identify the use of all the most popular social media platforms to grow business.
CO4	Illustrate the major categories and trends of e-commerce applications.
CO5	Examine the essential processes of an e-commerce system.

Text Book (s): 1 Dynamic Digital Marketing, Dawn McGrue Wiley publication.
Electronic Commerce- Technologies & Application - Bhaskar
Bharat - TMH
Reference Book (s): 1. E-Commerce :Strategy Technologies and Applications - TataMcGraw Hill

Unit-1 Introduction to Digital Marketing: 8 hours
Introduction to digital marketing, How is it different from traditional marketing? Discussion on new trends and current scenario of the world? How can digital marketing be a tool of success for companies? Categorization of digital marketing for the business
Unit-2 Search Engine Optimization (SEO) 8 hours
SEO (Search engine Optimization, what is On page optimization, Off page optimization, how to prepare a reports like- Keywords, titles, meta tag
Unit-3 Social Media Optimization (SMO) 8 hours
SMO (Social Media Optimization) like Facebook, Twitter, LinkedIn, Tumblur,

Pinterest and more social media services optimization.
Unit 4 ELECTRONIC COMMERCE 8 hours
Overview, Definitions, Advantages and Disadvantages of Ecommerce, threats of E-commerce, Managerial Prospective, Rules and Regulations For controlling E-commerce, Cyber Laws.
Unit-5 BUSINESS MODELS & STRATEGY OF E-COMMERCE 8 hours
Model based on transaction, Type, Model Based on TransactionParty -B2B, B2C,C2b, C2c, E-Governance. Overview, Strategic, Methods for developing E-commerce

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	**DATA STRUCTURE USING C**				
Course Code	**DPCS2009**				
Prerequisite					
Corequisite					
Antirequisite					
		L	**T**	**P**	**C**
		3	**2**	**0**	**4**

Course Objectives:

1. To teach efficient storage mechanisms of data for an easy access.

2. To design and implementation of various basic and advanced data structures.

3. To introduce various techniques for representation of the data in the real world.

4. To develop application using different types of data structures.

Course Outcomes

CO1	**Generalize the Big (O) notation and role of algorithm complexity in computing as applied to specified problem definition. (K5)**
CO2	**Develop different kinds of stacks & queues and their applications and implementations in problem solving. (K4).**
CO3	**Use different kinds of linked lists and their applications in problem solving. (K4)**
CO4	**Generalize tree concept and Apply traversing mechanism on various tree structure. (K3).**
CO5	**Analyze Graph: representation and algorithms, Breadth-first search (BFS), Depth-first search (DFS). (K4).**

Text Book (s): 1. Ellis Horowitz, SatrajSahni and Susan Anderson-Freed, Fundamentals of Data Structures in C, W. H.Freeman and Company.

2. Seymour Lipschutz, Data Structures, Schaum's Outlines Series, Tata McGraw-Hill.

Reference Book (s):1Data Structure using 'c' Tanenbaum PHI

2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.

Unit-1 Introduction to data structure & Basic Concepts 8 hours

Data Representation, Abstract data Types, Data Structure and Structured Types, Difference between Abstract Data Types, Data Types and Data Structures. Data Types, Linear data type, Non- Linear data type, Primitive data type, Non primitive data type. Basic concepts and notation & Mathematical background and representation of array
Unit-2 Stacks and Queues 10 hours
Representation of stacks & queues using linked , sequential and their applications. Making a program that implement Stack and Queue.
Unit-3 Lists 8 hours
List representation techniques, Multilinked structures, Dynamic storage allocation techniques.
Unit-4 Tree 10 hours
Definitions and basic concepts, Linked tree representations, binary tree traversal algorithms, Type of Trees: General tree, Binary tree, Binary search tree (BST), B-trees and their applications. Making a program that implement Binary Tree & BST.
Unit-5 Graphs, Hashing & Sorting Algorithms 8 hours
Graphs: introduction , types of Graphs, Breadth-first and Depth-first Search, Symbol Table, Hashing: Hash function, Hash table, Collision resolution techniques, sorting: Insertion sorts, Bubble sort, Quick sort, Merge sort, Heap sort. Making a program that implement different sorting & searching techniques.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	DATA STRUCTURE USING C LAB
Course Code	DPCS2013
Prerequisite	DPCS1014

Corequisite	DPCS2009			
Antirequisite				
	L	T	P	C
	0	0	4	2

Course Objectives: 1. To teach efficient storage mechanisms of data for an easy access.
2. To design and implementation of various basic and advanced data structures.
3. To develop application using different types of data structures.

Course Outcomes

CO1	Create programs for implementation of various linear data structures like stacks, queues, linked lists and their applications using static and dynamic allocation. (S5)
CO2	Create programs for implementation of nonlinear data structure like Tree, binary search tree and their applications using static and dynamic allocation. (S5)

Text Book (s): 1. Ellis Horowitz, SatrajSahni and Susan Anderson-Freed, Fundamentals of Data Structures in C, W. H. Freeman and Company.
2. Seymour Lipschutz, Data Structures, Schaum's Outlines Series, Tata McGraw-Hill.
Reference Book (s):1. Data Structure using 'c' Tanenbaum PHI
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.

Experient-1
Implement List data structure using array.
Experient-2
Implement List data structure using singly linked list.
Experient-3
Implement basic operations on doubly linked list.
Experient-4
Implement stack using i) array ii) singly linked list
Experient-5
Implement Queue using i) array ii) singly linked list .
Experient-6
Implement basic operations on Circular Queue .
Experient-7

Implement basic operations (insertion, deletion) on Binary trees.
Experient-8
Implement basic operations (insertion, deletion, searching) on Binary Search trees.
Experient-9
Implement various sorting techniques.
Experient-10
Implement Breadh First search Techniques.
Experient-11
Implement Depth First search Techniques.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	Relational database management system				
Course Code	DPCSE2008				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objectives: 1. List and explain the fundamental concepts of a relational database system

2. Analyze database requirements and determine the entities involved in the system and their relationship to one another.

Course Outcomes

CO1	Understand the basic concepts of database management system. K2
CO2	Apply knowledge of database design methodology which give a good formal foundation in data model. K3
CO3	Understand the Relational algebra and Relational calculus in DBMS. K2
CO4	Demonstrate the normalization concept and functional dependency of database management system . K3
CO5	Apply the SQL command on the table in database management system.K3

Text Book (s): 1. Database System Concepts - A. Silberschatz& H. F. Korth

2. An Introduction to Database System - C. J. Date

3. Fundamental of Database System - R. Elmashri& S. B. Navathe

4. Database Concepts and Systems - LvanBayroos/SPD

Reference Book (s):1. “Database Management Systems” by Raghu Ramakrishnan.

2. “An Introduction to Database Systems” by Bipin Desai

3. “Principles of Database Systems” by J D Ullman

4.”Database Systems: A Practical Approach to Design, Implementation and Management” by CONNOLY.

Unit-1 OVERVIEW OF DBMS 8 hours
Introduction to DBMS, DBMS Application, Advantage of DBMS over file processing system, DBMS Architecture, Three level DBMS architecture, View of data, data abstraction, Instance and Schema, Database User and DBA.
Unit 2 DATA MODELS 8 hours
Introduction of data model, Types of data model, Entity and Entity set, E-R diagram, Relational Model, Hierarchical Model, Network model, Object-oriented model, Generalization, Specialization, Aggregation, Constrains, Cardinality, Types of keys in DBMS.
Unit-3 RELATIONAL DATABASE 8 hours
RDBMS Concepts, Table, record, Field, Domain, Relational algebra, basic operation select, project, union , set difference, Cartesian product, rename, derived operations: natural join, cross join, left, right join, Intersection, division
Unit-4 NORMALIZATION 8 hours
Introduction of Functional dependency, Type of functional dependency, Trivial Functional dependency, Non-trivial Functional dependency,Multivalued Functional dependency, Transitive Functional dependency, First Normal Form(1 NF),Second Normal Form(2 NF),Third Normal Form(3 NF), Boyce & Cod normal form (BCNF)

Unit-5 STRUCTURE QUERY LANGUAGE (SQL) & security 9 hours	
DBMS language, SQL Database, Syntax, Data Types, Operators, Expression, Create database, Drop database, Create, table, Alter table, Drop Table, Insert query, Select query, Where clause, AND & OR clause, Update query, Delete query, Like clause, order by, group by, Distinct keyword, SQL constraints. Database integrity, Authentication, Access Control and Encryption.	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	Relational database management system LAB				
Course Code	DPCSE2012				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		0	0	2	1

Course Objectives: 1. List and explain the fundamental concepts of a relational database system
2. Analyze database requirements and determine the entities involved in the system and their relationship to one another.
3. Create a relational database using a relational database package.
Course Outcome: 1. Write the DDL/ DML/DCL Command which deal with database and apply the concept of Constraints triggers view and index. S4
2. Create the relational algebra, and use the normalization techniques with the database and reconstruct the transaction, integrity, and concurrency. S5
Text Book (s): 1. Database System Concepts - A. Silberschatz& H. F. Korth.
2. An Introduction to Database System - C. J. Date.
3. Fundamental of Database System - R. Elmashri& S. B. Navathe.
4. Database Concepts and Systems - LvanBayroos/SPD.
Reference Book (s):1. "Database Management Systems" by Raghu Ramakrishnan
2. "An Introduction to Database Systems" by Bipin Desai
3. "Principles of Database Systems" by J D Ullman
4."Database Systems: A Practical Approach to Design, Implementation and Management" by CONNOLY.

Experiment 1
Write a program to Create the database.
Experiment 2
Write a program to Create the table in database.
Experiment 3
Write a program to ALTER the table in database
Experiment 4
Write a program to use the SELECT and SELECT DISTINCT command.
Experiment 5
Write a program to use the WHERE & HAVING command
Experiment 6
Write a program to use the INSERT command
Experiment 7
Write a program to use the UPDATE & DELETE command
Experiment 8
Write a program to use the ORDER BY command.
Experiment 9
Write a program to use the AND,OR & NOT command.
Experiment 10
Write a program to use the IS NULL VALUES command.
Experiment 11
Write a program to use the IS NOT NULL VALUES command.
Experiment 12
Write a program to use the BETWEEN command.
Experiment 13

Write a program to use the PRIMARY KEY command.
Experiment 14
Write a program to use the INDEX command.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50		50	100

Name of The Course	Software Engineering				
Course Code	DPCS2003				
Prerequisite	Fundamentals of Computer Programming.				
Corequisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objectives: 1. The objective of software engineering to make students early careers will be capable of team and organizational leadership in computing project settings, and have a broad understanding of ethical application of computing-based solutions to societal and organizational problems.

2. Be employed in industry, government, or entrepreneurial endeavours to demonstrate professional advancement through significant technical achievements and expanded leadership responsibility.

Course Outcomes:

CO1	Know about software engineering process life cycle, including the specification, design, implementation, and testing of software.
CO2	Elicit, and specify Software Requirements Specification(SRS)
CO3	Analyze and translate a specification into a design, and then realize that design practically, using an appropriate software engineering methodology.
CO4	Analyze the different Code and Design Standards for Development of Project.
CO5	Explain the working and use of Software Testing and Software Quality Assurance in Software Development.

Text Book (s): 1. Software Engineering, A Practitioner's Approach / Roger S. Pressman / McGraw-Hill

Reference Book (s):1. Software Engineering Concepts / Richard E. Fairly / Tata McGraw Hill

2. Software Engineering Principles and Practice / Hans Van Vlient / Wiley

Unit-1 Software Engineering and Software Development Models 8 hours
The evolving role of Software – software engineering, Phases in Software Engineering, Features of Software Engineering, Software Crisis/ challenges. Software Life Cycle Model, Water Fall Model Spiral Model, Prototype Model, View Model, Verification and Validation.
Unit-2 Software Requirement Analysis Software Design 8 hours
Introduction of Software Engineering, Feasibility study, Requirement Analysis, Software Requirement Specification (SRS). Basics of Software Design; Data Design; Architectural Design Evolution of software design; Fundamental Design concepts- Abstraction, Refinement, Information hiding, Structure, Modularity, Software architecture, Data structure, Concurrency, Verification Effective Modular Design, Basic concepts of Data Flow-Oriented Design & Object-Oriented Design.
Unit-3 Software Planning & Scheduling and Cost Estimation 8 hours
Software planning & scheduling: Project planning, scheduling & Staffing, Software Cost Estimation: Basics of Software Cost estimation: Software Cost Estimation Techniques – Expert Judgment; & COCOMO, Gantt Chart and its role in Software Planning.
Unit-4 Software Testing 8 hours
Software Testing Introduction, Testing Objectives; Test plan, Model of software testing, & Testing Strategies, Functional Testing and Structure Testing Types, Test Case Designing and Bug Report Layout.
Unit-5 Software Quality Assurance, &Maintenance 8 hours

Software Quality Concept, Software Quality Assurance (SQA), SQA activities, Software Quality Assurance Framework, Basics of Software maintenance, enhancing maintainability during development,

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	**Software Engineering Lab**				
Course Code	**DPCS2006**				
Prerequisite					
Corequisite					
Antirequisite					
		L	**T**	**P**	**C**
		0	**0**	**2**	**1**

Course Objectives:

1. The objective of software engineering to make students early careers will be capable of team and organizational leadership in computing project settings, and have a broad understanding of ethical application of computing-based solutions to societal and organizational problems.
2. Be employed in industry, government, or entrepreneurial endeavors to demonstrate professional advancement through significant technical achievements and expanded leadership responsibility.

Course Outcomes

CO1	**Write the Software Requirement Specification Document for the Project.**
CO2	**Perform Software Testing Methodologies for Testing the Project and Test Case Execution.**

Text Book (s):

1. Software Engineering, A Practitioner's Approach / Roger S. Pressman / McGraw-Hill

Reference Book (s):

1. Software Engineering Concepts / Richard E. Fairly / Tata McGraw Hill

2. Software Engineering Principles and Practice / Hans Van Vlient / Wiley

Unit-1 Software Engineering Requirement Phase and SRS Document.
Practical 1: Create a level 0 DFD using smart draw. Practical 2: To perform the Requirement analysis of the specified problem and draw a flow chart. Practical 3: Understanding of System modeling: Data model i.e. ER –Diagram and draw the ER Diagram with generalization, specialization and aggregation of specified problem statement. Practical 4: Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents for some problems. Practical 5: Preparation of Software Configuration Management and Risk Management related documents.
Unit-2 Software Testing and Bug Reports
Practical 1: Create Software Testing Test Plan. **Practical 2: Preparation of Test Cases for given Project.** **Practical 3: Execution of Test Cases.** **Practical 4: Preparation of a Bug Reports.** **Practical 5: Understanding of Bug Reports Factors.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	**JAVA PROGRAMMING**
Course Code	**DPCS-2018**
Prerequisite	**DPCS2004**
Corequisite	
Antirequisite	

	L	T	P	C
	3	0	0	3

Course Objectives

1. Its main objective is to teach the basic concepts and techniques which form the object oriented programming paradigm.
2. To understand Object oriented concepts like data abstraction, encapsulation, etc.
3. To solve the real world scenarios using top down approach.

CO1	**Discuss object oriented programming: abstract data types, encapsulation, inheritance and polymorphism**
CO2	**Apply Java programming constructs. (K3)**
CO3	**Develop Java programs to solve real world problems using object classes, encapsulation, inheritance, polymorphism and interfaces. (K4)**
C04	**Develop Java programs to implement error handling techniques using exception handling and Java applets. (K4)**
C05	**Demonstrate programs on multithreading and applets. (K3)**

Text Book (s)

1. Core Java II Advanced Feature 8th Edition, Sun Microsystem
2. The Complete Reference JAVA Seventh Edition
3. Thinking in Java, Third Ediction, Bruce Eckel Pearson Eduction.
4. Database Concepts and Systems - LvanBayroos/SPD

Reference Book (s)

1. JAVA 6 By Rogers Cadenhead, Laura Lemay, Pearson Education.
2. Programming in JAVA by E. Balagursamy by TMH publications.
3. Introduction to Java by Sedgewick
4. "Java in a Nutshell" by Benjamin J. Evans & David Flanagan

Unit-1 AN OVERVIEW OF JAVA **8 hours**
Introduction to Object Oriented Programming (two paradigms, abstraction, the three oops principles), creation of JAVA,JAVA Applets& applications, security & portability.
Unit-2 DATA TYPES & CONTROL STATEMENT **10 hours**
Integer, floating point type, character, Boolean, all Operators, JAVA's selection statements, iteration and jump statement.
Unit-3 CLASSES AND METHODS **8 hours**
Class fundamentals, declaring objects, overloading methods &constructs, access control, nested and inner classes, exploring the string class.
Unit-4 INHERITANCE AND MULTITHREADING **8 hours**
Inheritance basics, member access and inheritance. Making a program that implement Inheritance etc. The JAVA thread model, thread priority, synchronization, messaging. Making a program that implement thread model, synchronization.
Unit-5 INPUT & OUTPUT AND APPLET **8 hours**
I/O Basics, byte streams & character streams, predefined streams, reading and writing console input/output, reading and writing files, applet fundamentals, and applet class. Making a program that implement applets etc.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	**JAVA PROGRAMMING LAB**				
Course Code	**DPCS-2019**				
Prerequisite	**DPCS2004**				
Corequisite					
Antirequisite					
		L	**T**	**P**	**C**
		0	**0**	**4**	**2**

Course Objectives

1. Its main objective is to teach the basic concepts and techniques which form the object oriented programming paradigm.
2. To understand Object oriented concepts like data abstraction, encapsulation, etc.

3. To solve the real world scenarios using top down approach.

Course Outcomes

CO1	Write a programs to implement the concept of encapsulation, inheritance, polymorphism, interfaces and exception handling.
CO2	Write a programs to implement the concept of multi-threading and Applet

Text Book (s):

1. Core Java II Advanced Feature 8th Edition, Sun Microsystem
2. The Complete Reference JAVA Seventh Edition
3. Thinking in Java, Third Ediction, Bruce Eckel Pearson Education.
4. Database Concepts and Systems - LvanBayroos/SPD

Reference Book (s):

1. JAVA 6 By Rogers Cadenhead, Laura Lemay, Pearson Education.
2. Programming in JAVA by E. Balagursamy by TMH publications.
3. Introduction to Java by Sedgewick
4. "Java in a Nutshell" by Benjamin J. Evans & David Flanagan

List of Experiments
Ex.1
Write a Java program to display Hello World on the screen.
Ex.2
Write a Java program to display the asterisk pattern as shown below: ***** *****
Ex.3
Write a Java program to declare two integer variables, one float variable, and one string variable and assign 10, 12.5, and "Java programming" to them respectively. Then display their values on the screen.
Ex.4
Write a Java program by using BufferedReader class to prompt a user to input his/her name and then the output will be shown as an example below: Hello Dara!
Ex.5
Write a java program to implement the Control statements (if- else, Switch, Loop etc).
Ex.6
Write a java program to implement the constructor.
Exp.7
Write a java program to implement Inheritance.
Exp.8
Write a java program to implement the method overloading.
Exp.9
Write a java program to implement the method overriding .
Exp.10
Write a java program to implement the Abstraction Class.
Exp.11
Write a java program to implement the Interface.
Exp.12
Write a java program to implement the Package.
Exp.13
Write a java program to implement the Multithreading.
Exp.14
Write a Program to Implement Applet.
Exp.15
Write a Program to connect java application with database.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50		50	100

Name of The Course	Computer Graphics				
Course Code	DPCS3008				
Prerequisite	Fundamentals of computers, C and C++				
Corequisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objectives: 1.The subject aims at imparting knowledge and skill components in the field graphics and multimedia design.
2. It deals with the various real life object creation on computer.

Course Outcomes

CO1	Fundamentals of points and pixels
CO2	Line drawing technique
CO3	Circle drawing techniques
CO4	Complex object drawing techniques
CO5	3D objects drawing techniques

Unit-1 OVERVIEW OF GRAPHICS SYSTEM 8 hours
Refresh Cathode Ray Tubes, Random Scan and Raster Scan Monitors, Color CRT Monitors, DVST, Plasma Panel Displays, LED and LCD Monitors, Laser Devices, Three dimensional Monitors, Hard copy devices - Printer, Plotters, Display processes- Random-Scan systems, DVST system, Raster Scan System. Logical input devices, Locator devices, Stroke devices, String device, Valuator devices.
Unit-2 OUTPUT PRIMTIVES 8 hours
Points and lines, Line drawing algorithms, DDA algorithm, Presentations Line algorithm, Anti aliasing Lines, circle generating algorithms - Circle equation, Presentations circle algorithm
Unit-3 ATTRIBUTES OF OUTPUT PRIMITIVES 8 hours
Line styles, Line type, Line width, Line colour, Area filling- Scan line algorithm, Boundary fill algorithm, Flood fill algorithm.
Unit 4- TWO/ THREE DIMENSIONAL TRANSFORMATIONS 10 hours
Basic transformations Translation, Scaling and Rotation, Matrix representation of homogeneous co-ordinates, Projection parallel and perspective. Composite transformations, Translations, scaling and protection, scaling relative to a fixed point, Rotation about fixed point, Arbitrary scaling directions, Three dimensional transformations: Three dimensional graphics concept, Matrix representation of 3 D Transformations, Composition of 3-D transformation.

Text Book (s): 1. Introduction to Computer Graphics – Tata Mc Gra Hill
Reference Book (s): 1. Computer Graphics by Neeta Awasthi

Unit-5 WINDOWING AND CLIPPING 12 hours
Windowing concepts, Clipping algorithms - Line clipping, Area clipping, Text clipping, linking, Window to viewport transformations. Illumination models, shading models for polygons, shadows, transparency.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

XX---

Name of The Course	Computer Graphics Lab			
Course Code	DPCS3008			
Prerequisite	C and C++			
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives: 1. To basic knowledge of point and pixels
2. To introduce the students with the basics of graphics premitieves like line, circle and complex geometry.
3. To learn about need, and utilization of computer graphics.

Course Outcomes

CO1	Draw Geometric primitives using C.
CO2	Implement basic transformations on objects and clipping algorithms.

Text Book (s): 1. Donald D Hearn "Computer Graphics, C Version"ISBN-13: 978-9332535879, Pearson Education.
Reference Book (s):1. Andries van Dam; F. Hughes John "Computer Graphics Principles and Practice in C: Principles & Practice in

c,ISBN-13: 978-8131705056,Pearson Education India.

Ex.1
Implementation of Bresenhams Algorithm – Line, Circle, Ellipse.
Ex.2
Implementation of Line, Circle and ellipse Attributes.
Ex.3
Two Dimensional transformations - Translation, Rotation, Scaling, Reflection, Shear.
Ex.4
Composite 2D Transformations.
Ex.5
Cohen Sutherland 2D line clipping and Windowing.
Ex.6
Sutherland – Hodgeman Polygon clipping Algorithm.
Ex.7
Three dimensional transformations - Translation, Rotation, Scaling.
Ex.8
Composite 3D transformations.
Ex.9
Drawing three dimensional objects and Scenes.
Ex.10
Generating Fractal images.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	Internet & Web Technology				
Course Code	DPCS3003				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objectives:

This course is intended to teach the basics involved in publi
Wide Web.
This includes the 'language of the Web' – HTML, the funda
and the Web function, a basic understanding of graphic pro
on creating graphics for the Web, and a general grounding
topics such as programming and scripting.

This will also expose students to the basic tools and applicat

Course Outcomes

CO1	Understand a web page,identify its elements and attributes. K2
CO2	Develop web pages using XHTML and Cascading Style Sheets. K4
CO3	Develop dynamic web pages using JavaScript (Client side programming) and DHTML. K4
CO4	Understand a Java Servelt Life Cycle and its importance in Web Based designing. K2
CO5	Develop a server side java application called Servlet /JSP to catch form data sent from client, process it and store it on database. K4

Text Book (s): 1. AchyutGodbole,AtulKahate"WebTechnologies: TCP/IP,Web/Java Programming, and Cloud Computing",ThirdEdition,McGraw Hill Education.
2. Deitel, Goldberg, "Internet & World Wide Web How to Program", Third Edition, Pearson Education, 2006.
3. Raj Kamal, "Internet and Web Technologies", Tata McGraw-Hill.
4. Web Technologies, Black Book, Dreamtech Press
Reference Book (s):1. Ralph Moseley and M. T. Savaliya, Developing Web Applications, Wiley-India
2. HTML 5, Black Book, Dreamtech Press
3. P.J. Deitel & H.M. Deitel, Internet and World Wide Web How to program,Pearson
4. Joel Sklar, Web Design,Cengage Learning

Unit-1 INTERNET 8 hours
Introducing Internet, Its Uses : Why Internet(Social Impact of Internet), Basic Internet Tools, E-Mail, Ftp, Telnet, Usenet News, WebBrowsers, Search Engines, Yahoo,

Archie, Infoseek, Veronica,World Wide Web.How Internet works, Administration of Internet, Internet : Requirements, Hardware, Software, ISP, Internet Account PPP/Shell. Email Services On Internet Introducing Hotmail/Yahoo/Vsa-Net, How To Operate E-Mail address, Email operations
Unit-2 HTML 8 hours
Elements of HTML, HTML sources & Rules of nesting, syntaxconventions, HTML Categories, text tags, Formatting WebPagesby using Styles, adding pictures, image attribute ,Introduction to forms, tables and models,advantages &limitations of tables, frames, links. CSS cascading stylesheets, XHTML, XML, Client Side Scripting, Server SideScripting, Managing data with SQL,Dynamic Web Pages:Overview of DHTML,the need of dynamic web pages,Cascading Style Sheet (CSS),
Unit-3 JAVA SCRIPTS 9 hours
Introduction of Java Scripts, adding, Java scripts to documents,embedding java scripts, linking java scripts, creating apage program with scripts. Java and its applets, make webpages run server scripts, activeX.Data types, variables, operators, conditional statements,array object, date object, string object.
Unit-4 JAVA SERVLET 8 hours
Servlet environment and role, HTML support, Servlet API, servlet life cycle, Cookies and Sessions.
Unit-5 JSP 9 hours
JSP architecture, JSP servers, JSP tags, understanding thelayout in JSP, Declaring variables, methods in JSP,inserting java expression in JSP, processing request fromuser and generating dynamic response for the user, insertingapplets and java beans into JSP, using include and forwardaction, comparing JSP and CGI program, comparing JSP and ASPprogram; Creating ODBC data source name, introduction to JDBC, prepared statement and callable statement.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	Web Technology Lab			
Course Code	DPCS3009			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	4	4

Course Objectives: 1. This course is intended to teach the basics involved in publishing content on the World Wide Web.
2. This includes the 'language of the Web' HTML, the fundamentals of how the Internet and the Web function, a basic understanding of graphic production with a specific stress on creating graphics for the Web, and a general grounding introduction to more advanced topics such as programming and scripting.
3. This will also expose students to the basic tools and applications used in Web publishing.

Course Outcomes

CO1	Create the dynamic web page using HTML, Java Script. S5
CO2	Create server side JSP application to catch form data sent from client, process it and store it on database. S5

Text Book (s): 1. AchyutGodbole,AtulKahate"WebTechnologies: TCP/IP,Web/Java Programming, and Cloud Computing",ThirdEdition,McGraw Hill Education.
2. Deitel, Goldberg, "Internet & World Wide Web How to Program", Third Edition, Pearson Education, 2006.
3. Raj Kamal, "Internet and Web Technologies", Tata McGraw-Hill.
4. Web Technologies, Black Book, Dreamtech Press.
Reference Book (s):1. Ralph Moseley and M. T. Savaliya, Developing Web Applications, Wiley-India
2. HTML 5, Black Book, Dreamtech Press.
3. P.J. Deitel & H.M. Deitel, Internet and World Wide Web How to program,Pearson.

Text Book (s): 1. Charles R. Severance, “Python for Everybody: Exploring Data Using Python 3”, 1st Edition, CreateSpace Independent Publishing Platform, 2016.

Reference Book (s): 1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist”, 2ndEdition, Green Tea Press, 2015.

Experiment-3
Write a program to implement TABLE & IMAGE.
Experiment-4
Write a program to implement INTERNAL & EXTERNAL CSS.
Experiment-5
Write a program to display date and time.
Experiment-6
Write a program to implement LISTS & FORM .
Experiment-7
Write a program to validate Email Id using java script.
Experiment-8
Write a program to validate Name , Password & Numeric Value.
Experiment-9
Write a program to develop Xml Schema
Experiment-10
Write a program to print the user name using JSP scriptlet.
Experiment-11
Write a program to implement JSP request & response implicit object.
Experiment-12
Write a program to implement JSP implicit object & JSP application implicit object.
Experiment-13
Write a program to implement JSP session implicit object.
Experiment-14
Write a program to implement JSP Cookies handling.
Experiment-15
Write a program to database connection using JSP

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	**PYTHON & DATA SCIENCE**				
Course Code	**DPCS3011**				
Prerequisite	**DPCS2001**				
Corequisite	**DPCS2008**				
Antirequisite					
		L	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives: 1.The subject aims at imparting knowledge and skill components in the field of python and data science
2. It deals with various tools of python like Anaconda, NumPy, Pandas, Matplotlib.

Course Outcomes

CO1	**Understand basic tools of Python.**
CO2	**Apply the basic concept of python for writing programs to a simple problem.**
CO3	**Identify the given problem statement to use the concepts like lists, dictionaries and regular expressions in developing applications.**
CO4	**Evaluate the concepts of Object-Oriented Programming using Python**
CO5	**develop applications using python.**

Unit-1 Introduction to Python 8 hours
Introduction to Python and Basic Syntax, class, Data types and variables Conditional statements, Local and Global variables. Working with Python & Anaconda installation.
Unit-2 Python List, Dictionary & Function 8 hours
Discussion on Python List, Dictionary , function and modules.
Unit-3 Python Classes and objects 8 hours
Classes and objects, Classes and functions, Classes and methods. Inheritance & Data hiding.

Unit 4- Files in python 8 hours
Files: Kinds of files, Opening a File, Techniques for Reading Files, Files over the Internet, Writing Files,
Unit-5 GUI Programming 8 hours
Building a Basic GUI, Models, Views, and Controllers, Customizing the Visual Style Introducing few more Widgets, Object Oriented GUIs, Keeping the Concepts from Being a GUI Mess..

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	Mobile Computing				
Course Code	DPCS3005				
Prerequisite	Basic Understanding of Computer Networks				
Corequisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objectives: 1. Mobile computing and wireless communication are the most important technology and standard for data communication for various electronics systems for home and industry application. Students understands the various wireless data communication networks e.g. GSM,CDAM, GPRS, GPS and other accessing technologies of wireless data communications.

2. In this course students also learn about the adhoc and mobile adhoc networks basic working and call drooping algorithm of of mobile adhoc netwoks.In this course students also learn the working of mobile commerce application and aware about the structure of mobile commerce.

Course Outcomes:

CO1	Understand the working, characteristics and limitations of mobile hardware devices including their user-interface modalities
CO2	Illustrate the working of OSI and TCP/IP models and Generalize view on different Types of Accessing Techniques and Understand the working of MAC Technologies
CO3	Analyze the working of GSM and GPRS Mobile Communication Technologies and different core components of Mobile Communication Networks.
CO4	Analyze the working of Ahdoc Networks, MANET and Identify the root causes of call dropping, and concept of call forwarding in roaming in Adhoc Networks.
CO5	Understand the Mobile Operating System framework, different development resource kit of Mobile Operating System and structure of Mobile -Payment System

Text Book (s): 1 Mobile computing by Raj Kamal (Oxford)

Reference Book (s):1. Kaveh Pahlavan, Prasanth Krishnamoorthy- “Principles of Wireless Networks”

2. Wireless communication and networking" by William Stallings..

Unit-1 Introduction of Mobile Computing 8 hours
Mobile Computing Features Mobile Computing Vs wireless Networking, Mobile Computing Applications – Characteristics of Mobile computing – Structure of Mobile Computing Application. MAC Protocols – Wireless MAC Issues – Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes.
Unit-2 MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER 8 hours
Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization. Overview of TCP/IP – Architecture of TCP/IP- Adaptation of TCP Window – Improvement in TCP Performance.
Unit-3 MOBILE TELECOMMUNICATION SYSTEM 8 hours
Global System for Mobile Communication (GSM), Architecture of GSM, General Packet Radio Service (GPRS) ,Universal Mobile

Telecommunication System(UMTS), Code Division Multiple Access (CDMA) Mobile Networks.GSM Vs CDMA.
Unit-4 MOBILE AD-HOC NETWORKS 8 hours
Ad-Hoc Basic Concepts, Characteristics, Applications, Adhoc Networks Design Issues, Routing Protocol, and Traditional Routing Protocols –Popular Routing Protocols – Vehicular Ad Hoc networks (VANET) – MANET Vs VANET – Security.
Unit-5 MOBILE PLATFORMS AND APPLICATIONS 8 hours
Mobile Device Operating Systems, Special Constrains & Requirements, Commercial Mobile Operating Systems – Software Development Kit: IOS, Android, BlackBerry, Windows Phone – M-Commerce – Structure – Pros & Cons – Mobile Payment System – Security Issues.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	**Mobile Computing Lab**				
Course Code	**DPCS3012**				
Prerequisite	**Basic knowledge of Computer Networking**				
Corequisite					
Antirequisite					
		L	**T**	**P**	**C**
		0	**0**	**2**	**1**

Course Objectives:

1. This course is designed to enable the students get a detailed knowledge Mobile Computing and different Mobile Communication Networks: GSM, GPRS, GPS, and CDMA.

2. Be Familiar with Wireless Access Protocol (WAP) and different Networks Protocol and also understand the Simulation Techniques of Mobile Communication.

Course Outcomes

CO1	**Perform simulation operation for Authentication and Encryption Technique used in GSM.**
CO2	Performs simulation operation to design a game, calculator and browsing the internet.

Text Book (s):

1. Mobile computing by Raj Kamal (Oxford).

Reference Book (s):

1. Fundamentals of Mobile Computing by Pattnaik, Mall (PHI)

Unit-1 Study of Mobile Communication Networks:
Practical 1: Study of Global System for Mobile (GSM). Practical 2: Study of GPRS, GPS and CDMA. Practical 3: Study of Computer Networks Topologies and Wireless Access Protocol. Practical 4: Study of Floppy Drive, CD Drive and Hard Disk. Practical 5: Understand the working of Network Devices Switch and Routers.
Unit-2 Simulation Techniques for Mobile Device:
Practical 1: Study of WML and J2ME simulator. Practical 2: Design of simple Calculator having + – * and / using WML/J2ME3. Practical 3: Design of Calendar for any given month and year using WML/J2ME4. Practical 4: Design a Timer to System Time using WML/J2ME5. Practical 5: Design of simple game using WML/J2ME6 Practical 6: Simulation of Authentication and encryption technique used in GSM. Practical 7: Design a personal phone book containing the name, phone no., address, e-mail, etc. Practical 8: Animate an image using WML/J2ME7. Practical 9: Browsing the Internet using Mobile phone simulator Practical 10: Study of Glomo Sim Simulator.

Project DPCS9998 CO
CO1- Understand basics of project reporting and planning.
CO2- Creating DFD and analyzing different phases of project with SDLC.
CO3- Designing the project.
CO4- Implementing different phases.
CO5- Apply testing phases on project.

DPCS9999	PROJECT-II						
Version	4	School	GUPOL	Date of Approval			
				L	T	P	C
Total Number of Contact Hours				0	0	14	7
Pre-requisites							
Alternate Exposure	This course will Increase practical knowledge of student.						
Co-requisites							
Course Outcomes	1	Understand basics of project reporting and planning.					
	2	Creating DFD and analyzing different phases of project with SDLC.					
	3	Designing the project.					
	4	Describe presentation on project.					
	5	Apply testing phases on project.					
Specific Instructional Objectives	1	Overcome the gap between planning and execution.					
	2	increase the presentation skill.					
	3	Describe the different types of Circuits.					
Text Books	1	Software project management, Jalote					
Reference	1	NPTEL					
Online resources	1	NITTTR CHANDIGARH VIDEOS ON YOUTUBE					
	2	youtube					

Details	
1	planing the project
2	creating the group to work on
3	prepare plan of project include report,Circuit Design,drawing,ppt
4	creating model of project
5	final project report

(Established under Galgotias University Uttar Pradesh Act No. 14 of 2011)

Program: Diploma in Production Engineering

Scheme: 2020-2021

Vision:

To be a cradle for inventions and innovations that provides transformative education to create leaders and innovators, and generating new knowledge for society and industry

Mission:

- **To impart need based Production engineering knowledge through relevant curriculum.**
- **To prepare employable personnel and entrepreneurs through industry-institute interaction.**
- **Enrich departmental infrastructure and facilities.**
- **To inculcate sense of discipline, responsibility towards society and promote lifelong learning**

Program Educational Objectives:

The Diploma in Production Engineering Undergraduate Program at Galgotias University has the following Program Educational Objectives (PEOs):

5. **Impart knowledge of Mathematics, Applied sciences and Engineering.**
6. **Ability to work in teams on multi-disciplinary projects in industry.**
7. **Ability to identify, formulate and solve mechanical engineering problems based on data Interpretation, experiment and analysis of results.**
8. **Develop awareness in the community through the application of knowledge of ethical responsibility to society, employers and employees.**

Program Specific Objectives:

Production Engineering Diploma Students will able to:

PSO1- Ability to solve contemporary issues related to manufacturing, design, and Industrial automation through internship integrated program curriculum.

PSO2- Demonstrate and test Production engineering related system for application with real time constraints.

Curriculum

Semester 1									
Sl. No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	PHYE1001	APPLIED PHYSICS-I	3	2	0	4	20	50	100
2	MATH1002	APPLIED MATHEMATICS-I	4	0	0	4	20	50	100
3	SLPC1003	PROFESSIONAL COMUNICATION-I	3	0	0	3	20	50	100
4	DPME1005	ENGINEERING GRAPHICS	0	6	0	3	20	50	100
5	DPCS1001	INTERNET OF THING	2	0	0	2	20	50	100
6	PHYE1006	APPLIED PHYSICS-I LAB	0	0	2	1	50	-	50
7	SLPC1007	PROFESSIONAL COMUNICATION-I LAB	0	0	4	2	50	-	50
8	DPCS1008	COMPUTER FUNDAMENTALS LAB	0	0	2	1	50	-	50
9	SPYO1001	SPORTS AND YOGA	0	0	2	0	50	-	50
10	DPME1009	WORKSHOP PRACTICE	0	0	6	3			
11		Total Credits	10	8	20	23			
Semester II									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	PHYE-1010	APPLIED PHYSICS-II	3	2	0	4	20	50	100
2	MATD1011	APPLIED MATHEMATICS-II	3	2	0	4	20	50	100
3	SLPC1012	PROFESSIONAL COMUNICATION-II	3	0	0	3	20	50	100
4	DPME1013	ELEMENTRY WORKSHOP TECHNOLOGY	2	0	0	2	20	50	100
5	CHEM1014	BASIC CHEMISTRY	3	2	0	4	20	50	100
6	DPME-1006	ELEMENTS OF MECHANICAL ENGINEERING	3	0	0	3	20	50	100
7	PHYE1015	APPLIED PHYSICS-II LAB	0	0	2	1	50	-	50
8	SLPC1016	PROFESSIONAL COMUNICATION-II LAB	0	0	2	1	50	-	50
9	DPCS1009	ARTIFICIAL INTELLIGENCY	0	0	2	1	50	-	50
10	CHEM1017	BASIC CHEMISTRY LAB	0	0	2	1	50	-	50
		Total	17	6	8	24			
Semester III									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	MATD-2001	APPLIED MATHEMATICS-III	3	2	0	4	20	50	100
2	DPME-2001	APPLIED MECHANICS	3	0	0	3	20	50	100
3	DPME-2002	THERMAL ENGINEERING	3	0	0	3	20	50	100
4	DPEE-2010	BASICS OF ELECTRICAL & ELECTRONIC ENGG.	3	0	0	3	20	50	100
5	DPME-2003	MANUFACTURING PROCESS	3	0	0	3	20	50	100
6	DPME-2005	MACHINE DRAWING	0	4	0	2	20	50	100

7	DPME-2006	APPLIED MECHNICS LAB	0	0	2	1	50	-	50
8	DPME-2007	THERMAL ENGINEERING LAB	0	0	2	1	50	-	50
9	DPME-2026	MANUFACTURING PROCESS LAB	0	0	4	2	50	-	50
10	DPEE-2011	BASICS OF ELECTRICAL & ELECTRONIC ENGG. LAB	0	0	2	1	50	-	50
		Total	15	2	14	23			
Semester IV									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	DPME-2008	MECHANICS OF SOLID	3	2	0	4	20	50	100
2	DPPE-2003 /DPPE2007	(ELECTIVE-I THEORY)	3	2	0	4	20	50	100
3	DPME-2025	HYDRAULICS AND HYDRAULIC MACHINES	3	0	0	3	20	50	100
4	DPME-2012	INSPECTION & QUALITY CONTROL	3	0	0	3	20	50	100
5	EEDM-3002	ENVIRONMENT EDUCATION & DISASTER MANAGEMENT	2	0	0	2	50	-	50
6	DPME-2028	MECHANICS OF SOLID LAB	0	0	2	1	50	-	50
7	DPPE-2005 /DPPE2008	(ELECTIVE-I PRACTICAL)	0	0	2	1	50	-	50
8	DPME-2027	HYDRAULICS AND HYDRAULIC MACHINES LAB	0	0	2	1	50	-	50
9	DPME-2016	CAD LAB	0	0	4	2	50	-	50
10	DPME-2017	INSPECTION & QUALITY CONTROL LAB	0	0	2	1			
11	DPME-9001	DISRUPTIVE TECHNOLOGY	0	0	2	1	50	-	50
		Total	14	4	14	23			
Semester V									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	DPME-3001	THEORY OF MACHINE	3	2	0	4	20	50	100
2	DPME-3002	MACHINE DESIGN	3	2	0	4	20	50	100
3	IMED-3001	INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT	3	0	0	3	20	50	100
4	DPME-3003	MACHINE TOOL TECH. & MAINTENANCE	3	0	0	3	20	50	100
5	DPPE-3001	PRODUCTION TECHNOLOGY II	3	0	0	3	20	50	100
6	DPPE-3002	Elective –II (Theory)	3	0	0	3	20	50	100

	/DPPE3005								
7	DPME-3004	THEORY OF MACHINE LAB	0	0	2	1	50	-	50
8	DPPE-3003	PRODUCTION TECHNOLOGY II LAB	0	0	2	1	50	-	50
9	PDSS-3008	PERSONALITY DEVELOPMENT & SOFT SKILLS	0	0	4	2	50	-	50
10	DDPPE-3004 /DPPE3006	Elective –II (Practical)	0	0	2	1	50	-	50
		Total	18	4	10	25			

Semester VI									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	DPPE-9998	FIELD VISIT AND PRESENTATION OR MINOR PROJECT	0	0	0	2	50	-	50
2	DPPE-9999	MAJOR PROJECT	0	0	0	10	50	-	50
		Total	0	0	0	12			

List of Electives

Elective-1

Sl No	Course Code	Name of the Electives	L	T	P	C
1	DPPE-2003	COMPUTER AIDED DESIGN AND MANUFACTURING	3	0	0	3
2	DPPE2007	3D PRINTING	3	0	0	3
3	DPPE-2005	COMPUTER AIDED DESIGN AND MANUFACTURING LAB	0	0	2	1
4	DPPE2008	3D PRINTING LAB	0	0	2	1
		Total	6	0	4	8

Elective-2

Sl No	Course Code	Name of the Elective	L	T	P	C
1	DPPE-3002	CNC MACHINES AND AUTOMATION	3	0	0	3

2	DPPE3005	ROBOTICS	3	0	0	3
3	DPPE-3004	CNC MACHINES AND AUTOMATION LAB	0	0	2	1
4	DPPE3006	ROBOTICS LAB	0	0	2	1
		Total Credits	6	0	4	8

Name of The Course	Engineering Graphics				
Course Code	DPME1005				
Prerequisite	None				
Co-requisite					
Anti-requisite					
		L	T	P	C
		0	6	0	3

Course Objectives

1. To develop the concept and applicability of engineering graphics to the industry. To develop the ideas, vision and its practical reality through engineering graphics.To follow basic drawing standards and conventions.
2. To develop skills in three-dimensional visualization of engineering component.

Course Outcomes

CO1	Use the techniques and able to interpret the drawing in Engineering field.
CO2	Interpret engineering drawings using fundamental technical mathematics.
CO3	Construct basic and intermediate geometry.
CO4	To improve their visualization skills so that they can apply these skills in developing new products
CO5	Create and modify two-dimensional orthographic drawings using AutoCAD software, complete with construction lines and dimensions.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: Introduction 06 hours
Graphics: An Overview, its need and objectives. Introduction to Computer Aided Drafting- Introduction to AutoCAD; Initial setup commands, Utility commands, drawing aids, entity draw commands, display commands and edit commands
Unit II:Lettering, Numerals and dimensioning 6 Hours
Drawing Instruments and its uses. Lettering. Drawing scale, various types of lines and their uses. Dimensioning; Basic types of dimensioning- linear, angular and radial dimensioning. Dimensioning technique as per SP-46. Title block. Conventional Presentation.
Unit III: Geometrical Construction and Engineering Curves 9 Hours
To draw an ellipse by, Directrix and focus method , Arcs of circle method, Concentric circles method. To draw a parabola by: Directrix and focus method, Rectangle method, To draw a hyperbola by: Directrix and focus method , passing through given points with reference to asymptotes , Transverse Axis and focus method.
Unit IV: Principles of Projection 6 Hours
(a) Orthographic, Pictorial and perspective. Concept of horizontal and vertical planes. Difference between I and III angle projections. (b) Projections of points, lines and planes. Orthographic Projections of Simple Geometrical Solids. Orthographic views of simple composite solids from their isometric views. Exercises on missing surfaces and views
Unit V: Isometric Projections 9 Hours

Overview of Formal Languages :   **Representation of regular languages and grammars, finite state Machines**

Suggested Reading

1. Bhatt N. D., "Engineering Drawing", Charotar publishing House, 1998

Reference Book (s)

2. French and Vierk, "Fundamentals of Engineering Drawing", McGraw Hill, 2002.
3. John K.C., "Engineering Graphics for Degree", PHI Learning Private Limited, New Delhi, 2010.

Name of The Course	Workshop Practice				
Course Code	**DPME1009**				
Prerequisite	**None**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	6	3

Course Objectives

1. Develop and enhance relevant technical hand skills required by the technician working in the various engineering industries and workshops.

2. Impart basic know-how of various hand tools and their use in different sections of manufacturing

Course Outcomes

CO1	**Operate the working principle of various machines used in manufacturing**
CO2	**Grasp the appropriate production process and machines**
CO3	**Perform ,Explain and Identify the basic welding concepts**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

Unit I: GENERAL INTRODUCTION:
(a) Scope of subject "Workshop" in engineering.   **(b) Different shop activities and broad division of the shops on the basis of nature of work done such as**   **(i) Carpentry Shop**   **(ii) Painting, Polishing & Plumbing Shop**   **(iii) Sheet Metal & Soldering Shop**   **(iv) Fitting Shop**   **(v) Welding Shop (Elet ARC/ Brazing)**   **(vi) Machine Shop**
Unit II: Carpentryshop
Fundamental of wood working operations: **Marking & Measuring.**   **Holding & Supporting.**   **Cutting & Sawing.**   **Drilling & Boring.**   **Turning/ Smoothing**   **Jointing.**
Unit III: Painting, Polishing & Plumbing shop
Painting & Polishing   **Its need, Introduction to methods of paintings (Classification only); Mannual, Machine (spray) and dip painting at room temperature, operations involved- discription of steps only eg. surface preparation method for old and new surface in timber and iron structure-sanding, derusting, deqreasing, filling of pore and dents, paint application- manual, machine (spray and dip painting drying of paint air drying and oven drying under coat and filler material (red oxide, putty, yellow clay), surface preparation materials (sand and emery papers); tools and equipments used (Name,size specification for indification). Brushes- Round and flat wire brush, scraper, trowel , spraygun, compressor. Defects likely to occur in painting and their remedies Safety of Personnel, Equipment & Tools to be observed.**   **Exp No-1 Introduction & demonstration of tools used in Painting & Polishing shop**   **Exp No-2 (Job No- PPS1) Painting on the wooden & metal surface**   **Exp No-3 (Job No- PPS2) Polishing on the plastic & metal sheet**   **(ii) Plumbing**   **Introduction, Study Of Plumbing Tools, Pipe Fittings, Types Of Pipe Joints, Pipe Threading**   **Exp No-1 Introduction & demonstration of tools used in Plumbing shop**   **Exp No-2 (Job No- PS1) Threading on G.I. pipe by**

die
Exp No-3 (Job No- PS2) Internal tapping by tap set

Unit IV: Sheet Metal shop

Sheet Metal
Tools and Operation:
(1) Operations involved (Names and concept only) Laying out, marking and measuring,cutting, Shearing and blanking, Straightening bending and seaming, Punching and piercing , burring and stamping,
(2) Sheet metal joints - Lap, seam, Locked seam, cup or circuler, Flange, angular and cap.
(3) Tools and equipments used (Name, size, specification for identification only).
(4) Marking Tools- Scriber, Divider and Trammel, Protractor, Trysquare, Dot punch, Steel Rule, Steel tape, Sheet metal gauge.
(5) Cutting and shearing Tools-hand Shear and lever, Snips, Chisels.
(6) Straightening tool-Straight edge.
(7) Striking Tools-Mallet, Hammer.
(8) Holding Tools-Vice, Plier, C or G clamps, Tongs.
(9) Supporting Tools-Stakes and Anvil.
(10) Bending Tools-Crimpers, Form dies, Roundnose plier, Rails.
(11) Punching-Piercing and Drifting tools.
(12) Burring Tools-Files.
(13) Common defects likely to occur during and after operation-Their identification and remedy. Defects due to wrong operation or wrong tool.
(14) Safety of Personnel, Equipment & Tools to be observed.
Exp No-1 Introduction & demonstration of tools used in Sheetmetal shop
Exp No-2 (Job No- SMS1) Making a rectangular tray
Exp No-3 (Job No- SMS2) Making a hollow cylinder
Exp No-4 (Job No- SMS3) Making a hollow square
Exp No-5 (Job No- SMS4) Making a funnel
(ii)-Soldering

Unit V:Fitting shop

1- Introduction to fitting shop tools, common materials used in fitting shop, Identification of materials
2- Description and demonstration of various types of work benches, holding devices and files. Precautions while filing.
3- Description and demonstration of simple operation of hack-sawing, demonstration and description of various types of blades and their specifications, uses and method of fitting the blade.
4- Care and maintenance of measuring tools like calipers, steel rule, try square, vernier calipers, micrometer, height gauge, combination set. Handling of measuring instruments, checking of zero error, finding of least count (all gauges including dial gauge).
Exp No-1 Introduction & demonstration of tools used in Fitting shop
Exp No-2 (Job No- FS1)Filing, Hacksawing, Drilling & Tapping on the workpiece
Exp No-3 (Job No- FS2)Making a male & female workpiece

Unit VI: Welding shop

(i)Elet ARC Welding
1- (a) Introduction to welding and its importance in engineering practice; types of welding; common materials that can be welded, introduction to welding equipment e.g. a.c. welding set, d.c. rectifier, electrode holder, electrodes and their specifications, welding screens and other welding related equipment, accessories and gloves.
(b) Safety precautions during welding
(c) Hazards of welding and its remedies
2- Electric arc welding, (a.c. and d.c.) precautions while using electric arc welding, Practice in setting current and voltage for striking proper arc. Earthing of welding machine.
3- Various types of joints and end preparation.
Exp No-1 Introduction & demonstration of tools used in Welding shop
Exp No-2 (Job No- WS1) Making a T joint
Exp No-3 (Job No- WS2) Making a single V butt joint
Exp No-4 (Job No- WS3) Making a over lap joint

(ii) Brazing/Gas welding
Mild steel & steel sheet,brass sheet.
(1) Its concept, comparison with welding as joining method and classification, Brazing
(2) Brazing operation- edge preparation of joints,Pickling and degreasing, Fluxing, Tinning and brazing.
(3) Materials Used-Common fluxes, brazing rod, and their specifications and discription (For Identification Only), brazing
(4) Common defects likely to occurs during and after brazing.
(5) Safety of Personnel, Equipment & Tools to be observed.

Exp No-1 Introduction & demonstration of tools used in Brazing shop **Exp No-2 (Job No- BS1) Making a T joint** **Exp No-3 (Job No- BS2) Making a single V butt joint** **Exp No-4 (Job No- BS3) Making a over lap joint**
Unit VII: Machine shop
Introduction to machine tools viz lathe, drilling machine, shaper and planer simple line and block diagram of components and their functions. Safety of Personnel, Equipment, Tools & to be observed. **Exp No-1 Introduction & demonstration of tools used in machine shop** **Exp No-2 (Job No- MS1) Facing** **Exp No-3 (Job No- MS2) Turning, Stap Turning, Chamfering** **Exp No-3 (Job No- MS3) Grooving, Knurling**

Suggested Reading:

1. Amitabh Ghosh and Ashok kumar Malik, 'Manufacturing science', Edition: 2nd Edition, 2010, Publisher: East West Press, ISBN: 9788176710633, 8176710636
2. Dr.P.C.Sharma, 'Production technology', (Manufacturing Processes).

Reference Book (s)

Serope Kalpakjian and Steven R.Schmid,' Manufacturing Engineering and Technology;4th Edition, 2001;Publisher: PEARSON,'ISBN: 9788177581706

Name of The Course	ELEMENTS OF MECHANICAL ENGINEERING				
Course Code	**DPME1006**				
Prerequisite	**None**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**

Course Objectives

5. Develop an ability to apply knowledge of mathematics, science, and engineering
6. To develop an ability to design a system, component, or process to meet desired needs within realistic constraints

Course Outcomes

CO1	**Identify various Energy sources, Fuel & combustion and lubrication systems**
CO2	**Define the basic concepts of units and dimensions, systems and its boundaries, properties, state, process, cycle, etc.- required as foundation for development of principles and laws of thermodynamics**
CO3	**Discuss application and usage of various engineering mechanical components.**
CO4	**Describe different lubrication system for lubricating the components of machine**
CO5	**Recognize Basic idea of Transmission of Motion by various drives.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Thermal Engineering: Sources of Energy **6 hour**
Definition, Concept of thermodynamic system and surroundings, Closed system, Open system, Isolated system, Thermodynamics definition of work. Zeroth low of thermodynamics Basic ideas, conventional and nonconventional forms Thermal, Hydel, Tidal, wind, Solar, Biomass and Nuclear and their uses.
Unit- 2 Thermal Engineering : Fuel and Combustion **10 hour**
Introduction to common fuels - solid, liquid and gases and their composition. Combustion of fuels- their higher and lower calorific values. Combustion equations for carbon, sulphur, hydrogen and their simple compounds
Unit-3 Machine Components **20 hours**
(i) Pins, Cottor and Knuckle Joints. **(ii) Keys, Key ways and spline on the shaft.** **(iii)Shafts, Collars, Cranks,** **(iv) Bearings-Plane, Bushed, Split-step, ball, Roller bearing, Journal bearing, Foot step bearing, thrust bearing, collar bearing and Special type bearings and their applications.** **(v) Gears: Different types of gears, gear trains and their use for transmission of motion. Determination of velocity ratio for spur gear trains; spur gear,**

single and double helical gears, Bevel gears, worms, Rack and Pinion. Simple and compound and epicyclic gear trains and their use. Definition of pitch and pitch circle & module. (vi) Springs: Compression, Tension, Helical springs , Torsion springs, Leaf and Laminated springs. Their use and material. (vii) Basic idea of Transmission of Motion By Belts, Ropes & Pulleys, Chain & Sprockets. Classification and uses of ropes in transmission operation, Chains and their classifications, their application in power transmission, their comparison with other drive systems
Unit-4 Lubrication **4 hours**
Different lubrication system for lubricating the components of machines. Principle of working of wet sump and dry sump system of lubrication.

Suggested Reading

Text Book (s)

3. Elementary of Mechanical Engineering by Katsons Publications.

Reference Book (s)

1. **Basics of Mechanical Engineering by Katsons publications .**

Name of The Course	ELEMENTARY WORKSHOP TECHNOLOGY				
Course Code	**DPME1013**				
Prerequisite	**None**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	6	0	3

Course Objectives

1. To develop general machining skills in the students.

2. Develop a skill in dignity of labor, precision, safety at work place, team working and development of right attitude.

Course Outcomes

CO1	**Recognize different shops of central workshop on the basis of nature of work done**
CO2	**Analyze the operations involved in casting process**
CO3	**Determine the use of various machine tools**
CO4	**Apply the various welding processes**
CO5	**Differentiate between soldering, brazing and welding**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 General Introduction **5 hour**
Scope of subject "Workshop Technology" in engineering. Different shop activities and broad division of the shops on the basis of nature of work done - (i) Wooden Fabrication (Carpentry) (ii) Metal Fabrication (shaping and Forming, Smithy, Sheet metal and Joining-welding, Riveting, Fitting and Plumbing.(c) Organization and layout of workshop.(d) General safety precaution in workshop
Unit-2 Casting **12 hour**
Basic steps in making a casting, Pattern Materials, Patterns allowances, colour coding of pattern, Types of pattern, Pattern making tools. Mould materials, Types of sand, Moulding processes - Sand moulding, Pit moulding, machine moulding. Shell moulding. Cores and core classification, Testing of sand. Types of furnaces - Cupola furnace, Crucible furnace, Electric arc furnace, Cleaning of casting — Fettling, Shot blasting, Cutting & trimming, Casting defects Shrinkage, Hot tear, blow holes, misrun and cold shut, scabs, fins, rat tail. Special casting processes -

die casting, centrifugal casting, Investment casting. Elements of gating system.
Unit-3Basic Machining Processes **10 hours**
Lathe Introduction, Types of lathes — light duty, Medium duty and heavy duty geared lathe, CNC lathe, Specifications, Basic parts and their functions. Operations and tools — Turning, parting off, Knurling, facing, boring, drilling, threading, step turning, taper turning, Drilling Introduction, Classification, Types of operations, Specifications of drilling machine, Types of drills and reamers, Basic parts and their functions. introduction, Classification, Principle of operation, up and down milling. Types of milling cutters, Basic parts and functions of column and knee type milling machine.
Unit-4 Welding **10 hours**
Introduction, Classification, Safety precautions, Gas welding techniques, Types of welding flames, Arc welding – principle, equipments, applications. Shielded metal arc welding, Submerged arc welding, TIG/MIG Welding, Electro slag welding, plasma arc welding, Resistance welding – spot welding, Seam welding, Projection welding, welding defects.
Unit-5 Soldering and Brazing **8 hours**
Its concept, comparison with welding as joining method and classification, electric soldering and forge soldering. Soldering operation- edge preparation of joints, Pickling and degreasing, Fluxing, Tinning and Soldering. Materials Used-Common fluxes, soft and hard solder, solder wire (Plain and Resin core) and sticks, spelters and their specifications and description (For Identification Only), forge soldering bits. Electric soldering iron. Common defects likely to occurs during and after soldering. Safety of Personnel, Equipment & Tools to be observed.

Suggested Reading

Text Book (s)

3. S.K. Hajara Chaudhary - "Workshop Technology" - Media Promotors and Publishers,New Delhi

Reference Book (s)

5. B.S. Raghuwanshi - "Workshop Technology" - Dhanpat Rai and sons, New Delhi
6. H.S.Bawa - "Workshop Technology" -Tata McGraw Hill Publishers, New Delhi.

Name of The Course	APPLIED MECHANICS				
Course Code	**DPME2001**				
Prerequisite	**PHYE1001**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

5. To prepare students about to solve the mechanics problems.
6. Student able o analysis the performace of a mechanical machine.

Course Outcomes

CO1	**Describe basic knowledge of Engineering Mechanics where in Laws of Physics are applied to Solve Engineering problems.**
CO2	**Analyse force system and apply them to practical engineering system design and development.**
CO3	**Examine a mechanical system and derive all forces, couples and moment about it.**
CO4	**Calculate different parameters for a machine like mechanical advantage, velocity ratio and Machine law.**
CO5	**Recognize Concept of moment of inertia and its applications.**

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Exam (MTE)**	**End Term Exam (ETE)**	**Total Marks**
20	30	50	100

Course Content:

Unit-1 Introduction **2 hour**

Mechanics and its utility. Concept of scalar and vector quantities. Effect of a force. Tension & compression. Rigid body. Principle of physical independence of force. Principle of transmissibility of a force.
Unit-2 System of Forces, General Condition of Equilibrium 06 hour
Concept of coplanar and non-coplanar forces including parallel forces. Concurrent and non-concurrent forces. Resultant force. Equilibrium of forces. Law of parallelogram of forces. Law of triangle of forces and its converse. Law of polygon of forces. Solution of simple engineering problems by analytical and graphical methods such as simple wall crane, jib crane and other structures. Determination of resultant of any number of forces in one plane acting upon a particle, conditions of equilibrium of coplanar concurrent force system.General condition of equilibrium of a rigid body under the action of coplanar forces, statement of force law of equilibrium, moment law of equilibrium, application of above on body.
Unit-3 Moment & couple 06 hours
Concept of Varignon's theorem. Generalized theorem of moments. Application to simple problems on levers-Bell crank lever, compound lever, steel yard, beams and wheels, lever safety valve, wireless mast, moment of a couple; Properties of a couple ; Simple applied problems such as pulley and shaft.
Unit-4 Friction 06 hours
Definition of a machine. Mechanical advantage, velocity ratio, input, output, mechanical efficiency and relation between them for ideal and actual machines. Law of a machine Lifting machines such as levers, single pulley, three system of pulleys. Weston differential pulley, simple wheel and axle, differential wheel and axle. Simple screw jack, differential screw jack, simple worm and worm wheel..
Unit-5 Machines 06 hours
Its concept, comparison with welding as joining method and classification, electric soldering and forge soldering. Soldering operation- edge preparation of joints, Pickling and degreasing, Fluxing, Tinning and Soldering. Materials Used-Common fluxes, soft and hard solder, solder wire (Plain and Resin core) and sticks, spelters and their specifications and description (For Identification Only), forge soldering bits. Electric soldering iron. Common defects likely to occurs during and after soldering. Safety of Personnel, Equipment & Tools to be observed.
Unit-6 Centre of Gravity 06 hours
Concept, definition of centroid of plain figures and center of gravity of symmetrical solid bodies. Determination of centroid of plain and composite lamina using moment method only, Centroid of bodies with removed portion. Determination of center of 'gravity' of solid bodies - cone, cylinder, hemisphare and sphere, composite bodies and bodies with portion removed.
Unit-7 Moment of Inertia 06 hours
Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common geometrical section : rectangle, triangle, circle (without derivations). Second moment of area for L, T, I and channel section, section of modulus

Suggested Reading:

Text Book (s)

7. A Textbook of Engineering Mechanics by D.S. Kumar
8. **A Textbook of Engineering Mechanics, written by Dr. R. K. Bansal.**
9. **Engineering Mechanics, written by R. K. Rajput.**

Reference Book (s)

5. Beer – Johnson Engineering Mechanics Tata McGraw Hill, Delhi
6. Basu Engineering Mechanics Tata McGraw Hill, Delhi

Name of The Course	THERMAL ENGINEERING				
Course Code	DPME2002				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	T	P	C

	3	0	0	3

Course Objectives:

5. To This course aims to provide a good platform to mechanical engineering students to understand, model and appreciate concept of dynamics involved in thermal energy transformation.
6. To prepare them to carry out experimental investigation and analysis at later stages of graduation

Course Outcomes

CO1	**Define the fundamentals of laws of thermodynamics and its applications.**
CO2	**Calculate heat and work interactions for various system.**
CO3	**Use & Practice two property rule and hence thermodynamic tables, thermodynamic diagrams and concept of equation of state, also their simple application.**
CO4	**Evaluate change in entropy to determine reversibility and irreversibility.**
CO5	**Calculate efficiencies of Heat engine, Heat pump, Refrigerator and Vapour power cycle.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 FUNDAMENTAL OF THERMODYNAMICS 12 hour
Definition, concept of thermodynamic system and surroundings. Closed system, open system, isolated system, and thermodynamics definition of work. Zeroth law of thermodynamics. First law of thermodynamics for cyclic and non-cyclic processes. Idea of internal energy and enthalpy. Thermodynamic processes - constant volume, constant pressure, constant temperature (Isothermal) processes, adiabatic process, polytrophic process, their representation on P-V diagram and calculation of work done.
Unit-2 SECOND LAW OF THERMODYNAMICS 08 hour
Definition, concept of thermodynamic system and surroundings. Closed system, open system, isolated system, and thermodynamics definition of work. Zeroth law of thermodynamics. First law of thermodynamics for cyclic and non-cyclic processes. Idea of internal energy and enthalpy. Thermodynamic processes - constant volume, constant pressure, constant temperature (Isothermal) processes, adiabatic process, polytrophic process, their representation on P-V diagram and calculation of work done.
Unit-3 ENTROPY 06 hours
Physical concept and significance, reversibility and efficiency, Irreversibility and entropy. Expression for change of entropy in various thermodynamic processes. Simple numerical problems concerning the above.
Unit-4 GAS POWER CYCLES 08 hours
Air Standard cycles: Carnot, Otto, Diesel, Dual and Stirling cycles, P-V and T-S diagrams, description, efficiencies and mean effective pressures, Comparison of Otto, Diesel and dual cycles.
Unit-5 PROPERTIES OF STEAM 10 hours
Idea of steam generation beginning from heating of water at 0°C to its complete formation into saturated steam. Pressure temperature curve for steam. Idea of dry saturated steam, wet steam and its dryness fraction, super-heated steam and its degree of super heat. Enthalpy, entropy, specific volume and saturation pressure and temperature of steam. Use of steam table and mollier chart. Simple numerical problems.

Suggested Reading:

Text Book (s)

7. "Thermal Engineering: Engineering Thermodynamics and Energy Conversion Techniques" by P L Ballaney
8. **Thermodynamics and Thermal Engineering" by J Selwin Rajadurai**
9. **Thermal Engineering" by R K Rajput**

Reference Book (s)

5. Nag, P.K., Engineering Thermodynamics, 3rd ed., Tata McGraw-Hill, 2005
6. Cengal, Y.A and Boles, M.A, Thermodynamics: An Engineering Approach, 5th ed., McGraw-Hill, 2006.

Name of The Course	**MANUFACTURING PROCESS**				
Course Code	**DPME2003**				
Prerequisite	**DPME1013**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

5. An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities
6. An ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes

Course Outcomes

CO1	**Identify and know basic press operations and tools.**
CO2	**Identify basic manufacturing processes like forging, rolling and extrusion, for required component**
CO3	**Discus process parameters for different operations**
CO4	**Classify the products simply in terms of their basic shape**
CO5	**Describe the difference between the hot and cold working of metals and give the advantages of each process**

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Exam (MTE)**	**End Term Exam (ETE)**	**Total Marks**
20	30	50	100

Course Content:

Unit-1 METAL FORMING PROCESSES **18 hour**
Press Working - Types of presses, type of dies, selection of press die, die material. Press Operations-Shearing, piercing, trimming, punching, notching, shaving, gearing, embossing, stamping **Forging** - Open die forging, closed die forging, Press forging, upset forging, swaging, up setters, roll forging, Cold and hot forging.**Rolling** - Elementary theory of rolling, Types of rolling mills, Thread rolling, roll passes, Rolling defects and remedies. **Extrusion and Drawing** - Type of extrusion- Hot and Cold, Direct and indirect. Pipe drawing, tube drawing, wire drawing.
Unit-2 POWDER METALLURGY **12 hour**
Introduction, principle, scope and names of processes. Production of metal powders, compaction, sintering and sizing. Self lubricated bearings. Advantages of the process and its limitations. (Elementary concept only).
Unit-3 MODERN MACHINING PROCESS **10 hours**
Ultrasonic Machining (USM), Electro Chemical Machining (ECM), Electro Chemical Grinding (ECG), Electrical Discharging Machining(EDM), Laser Beam Machining (LBM), Electron Beam Machining (EBM), Plasma Arc Machining (PAM)

Suggested Reading:

Text Book (s)

5. Amitabh Ghosh and Ashok kumar Malik, 'Manufacturing science', Edition: 2nd Edition, 2010, Publisher: East West Press, ISBN: 9788176710633, 8176710636
6. **Dr.P.C.Sharma, 'Production technology', (Manufacturing Processes).**

Reference Book (s)

3. Serope Kalpakjian and Steven R.Schmid,' Manufacturing Engineering and Technology;4th Edition, 2001;Publisher: PEARSON,'ISBN: 9788177581706, 8177581708

Name of The Course	**MACHINE DRAWING**
Course Code	**DPME2005**
Prerequisite	**DPME1005**
Co-requisite	

Anti-requisite					
		L	T	P	C
		0	4	0	2

Course Objectives:

5. Provide the fundamental concepts of machine drawing elaborating on how to concretize the idea of new structure such as a machine element.
6. Help the student in the visualization of assembly and sub assembly of various machine elements.

Course Outcomes

CO1	**Draw the isometric view of a given three dimensional object/part**
CO2	**Draw the orthogonal projection of a solid body**
CO3	**Practice different kinds of materials and Mechanical components conventionally.**
CO4	**Identify the elements of a detailed drawing.**
CO5	**Produce the assembly drawing using part drawings.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 GENERAL CONCEPT OF MACHINE DRAWING 06 hour
(a) Views and sections (Full and half), dimensioning Technique -Unidirectional and aligned practice conventions as per latest code of practice for general engineering drawing. (b) General concept of IS working drawing symbols for (i) Welding & Rivetting (ii) Serews & Screw threads (iii) Surface Finish Marks (iv) Limits, Fits & Tolerances

Unit-2 FAMILIARIZATION WITH AUTO CAD COMMOANDS 09 hour
CAD, Different type of CAD software available, Advantages of using CAD, AUTOCAD graphical user interface? Setting up drawing environment: Setting units, drawing limits, Snap, Opening and Saving a drawing, Setting drafting properties, Different co-ordinate system used. Commands and their aliases, Different methods to start a command **Selecting object, removing object from selection set, Editing with grips, Editing object properties. Use of draw commands - Line, Arc, Circle, Polygon, Polygon, Polyline, rectangle, Ellipse, construction line, Spline Use of modify commands - erase offset, Move, Copy, Mirror,** **Fillet, Chamfer, Array, Scale, Stretch, rotate, Explode, Lengthen Creating 2D objects using Draw and Modify commands, Use of Hatch commands. Controlling the drawings display; Zoom, PAN, view ports, Aerial view. Drawing with precision: Adjusting snap and Grid alignment. Use of Tools Menu bar for calculating distance, angle, area, ID points, Mass using inquiry command, Quick select. Adding text to drawing, creating dimension Use of UCS, Alignment of UCS, Move UCS, Orthographic UCS Creating 3 D objects using region, boundary, 3D Polyline, Extrude, revolve feature. Use of solid 3D edit features, Shell, Imprint, Separate, Section, Boolean functions like Union, Subtract and Intersect, Extrude faces, Move faces, Delete face, Offset faces, Copy faces and colour faces commands. To show the section - Use of slice, Section commands Rendering and imaging, Produce hard copies.**
Unit-3 Assembly Drawing 21 hours
Sectioned View of (i) Knuckle joint- Part drawing, Solid Modelling, Assembly and Sectioning. **(ii) Protective type flange coupling- Part drawing, Solid Modelling, Assembly and Sectioning.** **(iii) Bench vice - Part drawing, Solid Modelling, Assembly and Sectioning.** **Assembly Drawing of (i) Knuckle joint- Part drawing, Solid Modeling, Assembly and Sectioning.** **(ii) Protective type flange coupling- Part drawing, Solid Modeling, Assembly and Sectioning.**

(iii) Bench vice - Part drawing, Solid Modeling, Assembly and Sectioning. **Assembly Drawing from detail and vice versa**
Unit-4 Assembly Drawing from detail and vice versa **09 hours**
(i) Tail stock of Lathe machine **(ii) Screw jack** **(iii) Drilling Jig** **B). Assembly and Disassembly Drawings** **Plummer block, Footstep bearings, Couplings etc., Rivetted & Welded Joints, Screw and form of screw thread** **Spur gear profile drawing and free hand sketching** **Spur gear profile drawing from given data.**
Unit-5 Free hand sketching **6 hours**
(i) Pipe fittings-Such as-Elbows-Reducers, T-Cross and Bibcock. **(ii) I. C. engine piston, Simple bearing, Cottor and Knuckle joint, pulleys and flywheel-Sectioned views.** **(iii)Cutting tools of Lathe machine, shaper and common milling cutters.** **(iv) Gear puller and C-clamp** **(v) Sketching of ortho graphics views from isometric views be practiced.**

Suggested Reading:

Text Book (s)

3. Bhatt N. D., "Engineering Drawing", Charotar publishing House, 1998

Reference Book (s)

3. French and Vierk, "Fundamentals of Engineering Drawing", McGraw Hill, 2002.

Name of The Course	**APPLIED MECHANICS LAB**				
Course Code	**DPME2006**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives:

5. Perform and solve problems concerning simple application of moments and forces.
6. Grasp the idea of the mechanical advantage, velocity ratio and efficiency of Simple machine.

Course Outcomes

CO1	**Perform and solve problems concerning simple application of moments and forces.**
CO2	**Grasp the idea of the mechanical advantage, velocity ratio and efficiency of Simple machine.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

25. To verify the law of Polygon of forces.
26. To verify the law of parallelogram and triangle of forces.
27. To verify the law of principle of moments.
28. To find the coefficient of friction between wood, steel, copper and glass.
29. To find the coefficient of friction on inclined surface
30. To find the reaction at supports of a simply supported beam carrying point loads only.
31. To find the forces in the jib & tie of a jib crane.
32. To find the mechanical advantage, velocity ratio and efficiency of Simple wheel & axle.
33. To find the mechanical advantage, velocity ratio and efficiency of Simple Screw jack.
34. To find the mechanical advantage, velocity ratio and efficiency of Simple Worm & worm wheel.
35. To find out center of gravity of regular lamina.

36. To find out center of gravity of irregular lamina.

Suggested Reading:

Name of The Course	**THERMAL ENGINEERING LAB**				
Course Code	**DPME2007**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives:

5. Define the fundamentals of laws of thermodynamics and its applications.
6. Calculate heat and work interactions for various system.

Course Outcomes

CO1	**Define the fundamentals of laws of thermodynamics and its applications.**
CO2	**Calculate heat and work interactions for various system**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

15. Determination of temperature by: - I. Thermo couple ii. Pyrometer
16. Study of constructional details and specification of high pressure boiler and sketch
17. Demonstration of mounting and accessories on a boiler for study and sketch (field visit).
18. Performance testing of steam boiler.
19. Study of steam turbines through models and visits.
20. Determination of dryness fraction of wet steam sample
21. To study various types of compressors with the help of their models.

Name of The Course	**MANUFACTURING PROCESS LAB**				
Course Code	**DPME2026**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	4	2

Course Objectives:

1. Operate the working principle of various machines used in manufacturing
2. Grasp the appropriate production process and machines

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Course Outcomes:

CO1	**Perform and solve problems concerning simple application of moments and forces.**
CO2	**Grasp the idea of the mechanical advantage, velocity ratio and efficiency of Simple machine.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

1. PATTERN MAKING: **(a) Making Patterns (Any two Experiments).**

(i) Solid one piece pattern. (ii) Split two piece patterns. (iii) Split three piece patterns. (iv) Gated pattern. (v) Four Piece pattern. (vi) Sweep pattern. (vii) Skeleton pattern. (viii) Segmental pattern.
(b) MAKING CORE BOXES (Any two Experiments). (i) Straight Core Box. (ii) Bent Core Box. (iii) Unbalanced Cores.
(a) Sand Testing (Any two Experiments). (i) Grading (Grain Size). (ii) Determination of Moisture content (iii) Determination of Clay content. (iv) Determination of Permeability for gases. (b) Preparation of : (i) Green Sand Composition. (ii) Dry Sand Composition. (iii) Loam Sand Composition. (iv) Oil Sand For Cores.
MOULDING: (All Experiments). (a) Making at least 8 sands moulds of different forms with different types of pattern using. (i) Floor Moulding. (ii) Two Box Moulding. (iii)Three Box (or more) Moulding. (b) At least one of the following: (i) Making and setting of cores of different types. (ii) Making one shell mould apparatus.
CASE STUDY OF: (All Experiments). At least 2 sand casting products from sand preparation, pattern layout to final finished casting by shell moulding, centrifugal casting, investment casting and continuous casting.
ADVANCE WELDING SHOP: (All Experiments). Study of various Gas cutting and welding equipments:- Welding transformer, Generator/rectifier, Gas cylinder, Gas cutting machines, Cutting torches etc., various electrodes and filler metals and fluxes.
Practice of welding and cutting of different metals by making suitable jobs by different methods:- 1. Arc Welding practice of mild steel (M.S.) and Spot welding on stainless steel jobs. 2. Tig Welding practice of Non-Ferrous metals, like Copper, Brass and Aluminum. 3. Practice of Gas cutting manually. 4. Practice of Gas cutting by cutting machine. 5. Practice of Arc cutting.

Suggested Reading:

Name of The Course	**MECHANICS OF SOLIDS**				
Course Code	**DPME2008**				
Prerequisite	**DPME2001**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	2	0	4

Course Objectives:

5. To provide the basic concepts and principles of strength of materials.
6. To give an ability to calculate stresses and deformations of objects under external loading.

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Course Outcomes:

CO1	**Analyze and design structural members subjected to tension, compression, torsion, bending and combined stresses using the fundamental concepts of stress, strain and elastic behavior of materials.**
CO2	**Utilize appropriate materials in design considering engineering properties, sustainability, cost and weight.**
CO3	**Determine the deflections and rotation produced by the three fundamental types of load: axial, tensional and flexural.**
CO4	**Develop an understanding of the concepts of stress and strain and their use in the analysis and design of machine members and structures.**
CO5	**Develop an understanding of material behavior under a condition of pure torsion (twisting moment) on circular shafts.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 INTRODUCTION TO STRESS AND STRAIN 10 hour

Introduction of Mechanical properties of materials, Definition of stress and strain, axial loading, different types of stresses and strains, tensile and compressive stress and strain, elastic limit, Hooke's law, stress-strain curve for ductile and brittle material, salient features of stress-strain curve. Young's modules of elasticity, Factor of safety, Stress and strain in straight, stepped bars and taper bar of circular cross section, determination of stress and elongation of a bolt in a bolted joint when subjected to direct external load only. Temperature stresses,Stress and strain on composite section under axial loading, stress and strain due to temperature variations in homogeneous and composite bars and metallic tires, Shear load, shear stress and strain, modulus of rigidity, lateral strain, Poisson's ratio, volumetric strain, bulk modulus relation between modulus of elasticity, modulus of rigidity and bulk modulus.
Unit-2 PRINCIPAL STRESSES AND STRAIN, STRAIN ENERGY 08 hour
Compound stress and strains: Introduction, normal stress and strain, shear stress and strain, stresses on inclined sections, strain energy, impact loads and stresses, state of plane stress, principal stress and strain, maximum shear stress, Mohr's stress circle, three dimensional state of stress & strain, equilibrium equations, generalized Hook's law, theories of failure. Thermal Stresses.Meaning of strain energy and resilience, Derivation of formula for resilience of a uniform bar in tension, Proof resilience, modulus of resilience, suddenly applied load, Impact or shock load. Strain energy in a material subjected to uniaxial tension and uniform shear stress. General expression for total strain energy of simple beam subjected to simple bending.: Pure Bending
Unit-3 SHEAR FORCE AND BENDING MOMENT 10 hours
Types of beam,Types of load and support ,Shear force and bending moment for concentrated and uniformly distributed loads on simply supported beams, cantilever and overhanging beam. Shear force and bending moment diagrams. Relationship between shear force and bending moment, Point of contra flexure, calculations for finding the position of contra flexure, Condition for maximum bending Moment

Unit-4 THIN AND THICK CYLINDRICAL AND SPHERICAL SHELLS 08 hours
Thin cylinders & spheres: Introduction, difference between thin walled and thick walled pressure vessels, Thin walled spheres and cylinders, hoop and axial stresses and strain, volumetric strain.Thick cylinders:Radial, axial and circumferential stresses in thick cylinders subjected to internal or external pressures, compound cylinders, stresses in rotating shaft and cylinders, stresses due to interference fits.
Unit-5 SLOPES AND DEFLECTIONS OF BEAMS, TORSION 10 hours
Definition of slope and deflection, sign convention, Circular bending, Calculation of maximum slope and deflection for the following standard cases by double integration or moment area method: (1) Cantilever having point load at the free end. Cantilever having point load at any point of the span, Cantilever with uniformly distributed load over the entire span Cantilever having U.D.L. over part of the span from free end Cantilever having U.D.L. over a part of span from fixed end (2) Simply supported beam with point load at centre of the span. Simply supported beam with U.D. load over entire span. NOTE: All examples will be for constant moment of inertia without derivation of formula.Strength of solid and hollow circular shafts, Derivation of torsion equation, Polar modulus of section, Advantages of hollow shafts over solid shaft, Comparison of weights of solid and hollow shafts for same strength, Horse power transmitted. Calculation of shaft diameter for a given horse power.

Suggested Reading:

Text Book (s)

5. Rajput R. K., Strength of Materials, S.Chand & Co. Ltd., Delhi.
6. **Kapoor J.K., Strength of Materials, Asian Publication, Muzaffarnagar.**

Reference Book (s)

5. Ramamarutham S., Strength of Materials, Dhanpat Rai & Sons, Delhi..
6. Strength of Materials by Timoshenko and Yσungs, East West Press.

Name of The Course	**COMPUTER AIDED DESIGN AND MANUFACTURING**				
Course Code	**DPPE2003**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	2	0	4

Course Objectives:

5. To provide a comprehensive knowledge of CAD/CAM.
6. To introduce the students with the hardware and software system used in CAD system.
7. To learn about need, applications and various components of CAM.

Course Outcomes:

CO1	Design and analyze about Computer aided design and manufacturing. Apply the concept of heat transfer to find heat flow in different metals.
CO2	Demonstrate the process of 2D & 3D transformations.
CO3	Analyze the method of viewing objects in 3D space.
CO4	Explain CNC operations for turning and milling tool path generation and verification.
CO5	Identify flexible manufacturing system.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Introduction **8 hours**
Introduction to CAD/CAM/CIM,Advantages of CAD/CAM,Product Cycle and CAD/CAM,Automation and CAD/CAM,Reasons for implementation of CAD/CAM,Steps involved in CAM operation
Unit-2 Surface / Solid Modelling Using CAD/CAM **8 hours**
Introduction to parametric and non-parametric surfaces:Creation of simple surfaces using revolved surface, ruled surface and 3D surfaces commands,Designing Software used in creation of solid models. **Concept of solid models:Solid Primitives- Box, cylinder, Cone, Sphere, Wedge and torus,Construction of solid using Region, Extrude and Revolved feature,Creation of Composite solid using Boolean function e.g. Union, Subtraction and Intersection.Sectioning of Solids and modification of solid Edges and faces using solid editing commands. Shell, Separate ,Performing 3D operations like 3D array, mirror and rotate,Creation of fillets and chamfers** **Dimensioning of solids:2D and 3D transformation: Translation, Scaling, rotation, mirror, zooming, panning and clipping.**
Unit-3 Viewing Objects in 3D Space **8 hours**
Viewing the objects in different views,Concept of SW, SE, NE and Isometric Views,View Ports,Layout, changing from Model to Paper space

Layout,Arranging the Drawing showing different views to get the hard copy,Plotting the drawing
Unit-4 CAM (Computer Aided Manufacturing) 10 hours
Setting up the jobs, defining the operation, creating geometry,Specifying the tools, machining parameters and type of machining,Back plotting and verification of operation,Post processing - Converting the generated tool path in NC code depending on the system,Setting up the parameter relating to communication like transfer of programs to CNC machine,Transfer of drawing data from any CAD software to CNC MIC and generation of G-codes, M-codes,3D printing
Unit-5 Flexible Manufacturing System 8 hours
Introduction to FMS,Principles of flexibility, changes in manufacturing system - external changes and internal changes job flexibility, machine flexibility.Features of FMS – production equipment, support system, material handling system, computer control system.Advantages & limitations of FMS.

Suggested Reading:

Text Book (s)

7. CAD/CAM by Mikell Groover and Zimmers; Prentice Hall of India Pvt. Ltd., Delhi.

Reference Book (s)

5. Computer Aided Manufacturing by Rao, Kundra and Tiwari; Tata McGraw Hill, New Delhi
6. Industrial Robot by Groover; Prentice Hall of India Pvt. Ltd., Delhi.

Name of The Course	**HYDRAULICS AND HYDRAULIC MACHINES**				
Course Code	**DPME2025**				
Prerequisite	**DPME2001**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

5. To prepare students to know the basic knowledge of different types of hydraulic machine.
6. Apply the concept of fluid mechanics to find fluid flow in different channel.

Course Outcomes:

CO1	**Identify understanding of fluid mechanics fundamentals, including concepts of mass and momentum conservation**
CO2	**Apply the Bernoulli equation to solve problems in fluid mechanics.**
CO3	**Discuss of laminar and turbulent boundary layer fundamentals**
CO4	**Correlate the recent developments in fluid mechanics, with application to aerospace systems.**
CO5	**Apply the concepts developed for fluid flow analysis to issues in aerospace design**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Properties of fluid 06 hour
Fluid : Real fluid, ideal fluid., Fluid Mechanics, Hydraulics, Hydrostatics, Hydro kinematics, Mass density, specific weight, specific gravity, cohesion, adhesion, viscosity, surface tension, capillarity, vapour pressure and compressibility. Hydrostatic Pressure: Pressure, intensity of pressure, pressure head, Pascal's law and its applications.
Unit- 2 Measurement of Pressure 08 hour
Atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure. Use of simple manometer, differential manometer and mechanical gauges Measurement of pressure by manometers and pressure gauges. Fundamental of Fluid Flow, Types of Flow, Steady and unsteady flow, Laminar and turbulent flow

Uniform and non-uniform flow. Discharge and continuity equation (flow equation)
Unit-3 Bernoulli's Theorem **07 hours**
Types of hydraulic energy, Potential energy, Kinetic energy, Pressure energy Bernoulli's theorem; statement and description (without proof of theorems) Venturimeter (horizontal and inclined) Orifice: Definition of Orifice, and types of Orifices, Hydraulic Coefficients.
Unit-4 Flow through Pipes and Flow Measurement **10 hours**
Definition, laminar and turbulent flow explained through Reynold's Experiment. Reynolds Number, critical velocity and velocity distribution. Head Losses in pipe lines due to friction, sudden expansion and sudden contraction entrance, exit, Hydraulic gradient line and total energy line.Measurement of velocity by Pitot tube , Measurement of Discharge by a Notch Difference between notches and orifices. Dimension less numbers types (definition only)
Unit-5 Pumps and Turbines **07 hours**
Reciprocating pumps (parts, working, discharge, work done, %slip only), Centrifugal pumps (parts, working), Reciprocating v/s Centrifugal pumps, Turbine (layout, efficiency, classification), Construction & working of (Pelton turbine).

Suggested Reading:

Text Book (s)

5. Fluid Mechanics & Hydraulic Machines, Laxmi Publication (P) Ltd., New Delhi
6. Vijay Gupta & Gupta S.K., Fluid Mechanics, New Age International Publishers, New Delhi.

Reference Book (s)

5. Garde R.J., Fluid Mechanics, New Age International Publishers, New Delhi
6. Modi P.N., Fluid Mechanics, New Age International Publishers, New Delhi.

Name of The Course	**INSPECTION & QUALITY CONTROL**
Course Code	**DPME2012**
Prerequisite	
Co-requisite	
Anti-requisite	

	L	T	P	C
	3	0	0	3

Course Objectives:

5. To reduce the reduction of defect goods or unsatisfying services.
6. To ensure that the product and services fit for purpose and suitable for the intended purpose.

Course Outcomes:

CO1	**Express the concepts of quality control, improvement and management**
CO2	**Apply the concept of design for quality.**
CO3	**Employ the concepts of reliability.**
CO4	**Generalize and carry out reliability data analysis**
CO5	**Assess various reliability prediction and evolution methods.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Inspection **08 hour**
Introduction, units of measurement, standards for measurement and interchangeability International, national and company standard, line and wavelength standards Planning of inspection: what to inspect? When to inspect? Who should inspect? Where to inspect? Types of inspection: remedial, preventive and operative inspection, incoming, in-process and final inspection. Study of factors influencing the quality of manufacture
Unit- 2 Measurement and gauging **14 hour**
Basic principles used in measurement and gauging, mechanical, optical, electrical and electronic.

Study of various measuring instruments like: calipers, micrometers, dial indicators, surface plate, straight edge, try square, protectors, sine bar, clinometer, comparators – mechanical, electrical and pneumatic. Slip gauges, tool room microscope, profile projector. Limit gauges: plug, ring, snap, taper, thread, height, depth, form, feeler, wire and their applications for linear, angular, surface, thread and gear measurements, gauge tolerances
Unit-3 Statistical Quality Control **10 hours**
Basic statistical concepts, empirical distribution and histograms, frequency, mean, mode, standard deviation, normal distribution, binomial and Poisson, Simple-examples. Introduction to control charts, namely X, R, P and C charts and their applications. Sampling plans, selection of sample size, method of taking samples, frequency of samples. Inspection plan format and test reports
Unit-4 Modern Quality Concepts **06 hours**
Concept of total quality management (TQM) National and International Codes. ISO-9000, concept and its evolution QC tools Introduction to Kaizen, 5S
Unit-5 Instrumentation **06 hours**
Measurement of mechanical quantities such as displacement, vibration, frequency, pressure temperature by electro mechanical transducers of resistance, capacitance & inductance type.

Suggested Reading:

Text Book (s)

5. Statistical Quality Control by M.Mahajan: Dhanpat Rai and Sons, Delhi
6. Engineering Metrology by RK Jain

Reference Book (s)

3. French and Vierk, "Fundamentals of Engineering Drawing", McGraw Hill, 2002.

Name of The Course	**MECHANICS OF SOLID LAB**

Course Code	**DPME2013**				
Prerequisite	**DPME2001**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives:

5. Ability to conduct standard tension tests of steel and other metals.
6. Ability to conduct compression tests of concrete, cast iron and steel.

Course Outcomes:

CO1	**Ability to conduct standard tension tests of steel and other metals.**
CO2	**Ability to conduct compression tests of concrete, cast iron and steel.**
CO3	**Ability to conduct tests with materials subjected to torsion.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

21. To find the shear force at a given section of simply supported beam for different loading.
22. To find the value of 'E' for a steel beam by method of deflection for different loads.
23. To determine the Max-Fibre stress in X-section of simply supported beam with concentrated loads and to find the neutral axis of the section.
24. To determine the ultimate tensile strength, its modulus of Elasticity, Stress at yield point, % Elongation and contraction in x-sectional area of a specimen by U.T.M. through necking phenomenon.
25. To determine the ultimate crushing strength of materials like steel and copper and compare their strength.
26. To determine Rock Well Hardness No. Brinell Hardness No. of a sample.

27.	To estimate the Shock Resistance of different qualities of materials by Izod's test and charpy test.
28.	To determine the bending moment at a given section of a simply supported beam for different loading.
29.	To determine the various parameters of Helical coil spring.
30.	To determine the angle of twist for a given torque by Torsion apparatus and to plot a graph between torque and angle of twist.

Suggested Reading:

Name of The Course	**COMPUTER AIDED DESIGN AND MANUFACTURING LAB**				
Course Code	**DPPE2005**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives:

5. To provide a comprehensive knowledge of CAD/CAM
6. To introduce the students with the hardware and software system used in CAD system.
7. To learn about need, applications and various components of CAM.

Course Outcomes:

CO1	**Performing 3D operations in solid works.**
CO2	**Prepare CNCprogram for milling,drilling.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

15.	Performing 3D operations like Array, mirror, rotation, translation using solid works.
16.	Performing 3D operation- panning, zooming, clipping etc.
17.	CNC Programming for turning operation
18.	CNC Programming for pocket milling
19.	CNC Programming for profile milling
20.	CNC Programming for facing and drilling
21.	Performing operation on trainer Lathe
22.	Designing of Simple machine components
23.	Designing of Crank shaft (Connecting Rod)
24.	Performing simple assembly operations like- nut, bolt, coupling etc.

Suggested Reading:

Name of The Course	**Hydraulics and Hydraulics Machine Lab**				
Course Code	**DPME2028**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives:

5. Perform standard measurement techniques of fluid mechanics and their applications.
6. Operate different hydraulic machines and measure different parameters.

Course Outcomes:

CO1	**Grasp compare the results of analytical models introduced in lecture to the actual behavior of real fluid flows.**
CO2	**Perform standard measurement techniques of fluid mechanics and their applications.**

CO3	Operate different hydraulic machines and measure different parameters.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

To verify Bernoulli's Theorem.
To find out venturimeter coefficient
To determine Coef. of velocity (Cv), Coef. of discharge (Cd) Coef. of contraction (Cc) and verify the relation between them
To perform Reynold's Experiment.
To determine Darcy's coefficient of friction for flow through pipes.
To verify loss of head due to: (a) Sudden enlargement (b) Sudden Contraction.
To determine velocity of flow of an open channel by using a current meter.
To determine coefficient of discharge of a rectangular notch/triangular notch.
Study of the following:(i) Reciprocating Pumps or Centrifugal Pumps. (ii) Impulse turbine or Reaction turbine (iii)Pressure Gauge/water meter/mechanical flow meter.

Suggested Reading:

Name of The Course	INSPECTION AND QUALITY LAB				
Course Code	DPME2017				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	T	P	C
		0	0	2	1

Course Objectives:

4. Perform dial indicator for measuring taper.Operate different hydraulic machines and measure different parameters.
5. Apply the concept of design for quality.

Course Outcomes:

CO1	Perform dial indicator for measuring taper.
CO2	Displays & Plot frequency distribution for 50 turned components.
CO3	Apply the concept of design for quality.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

Use of dial indicator for measuring taper.
Use of combination set, bevel protector and sine bar for measuring taper.
Measurement of thread characteristic using vernier and gauges.
Use of slip gauge in measurement of centre distance between two pins.
Use of tool maker's microscope and comparator.
Plot frequency distribution for 50 turned components.
With the help of given data, plot X, R, P and C charts

Suggested Reading:

Name of The Course	**COMPUTER AIDED DESIGN LAB**				
Course Code	**DPME2016**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	4	2

Course Objectives:

5. Perform the different techniques of graphical representation for simple parts and assemblies apply the concept of design for quality.
6. Manipulate drawings through editing and plotting techniques

Course Outcomes:

CO1	**Perform the different techniques of graphical representation for simple parts and assemblies**
CO2	**Displays basic concepts of the AutoCAD software**
CO3	**Manipulate drawings through editing and plotting techniques**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

Setting up of drawing environment by setting drawing limits, drawing units, naming the drawing, naming layers, setting line types for different layers using various type of lines in engineering drawing, saving the file with drawing extension
Layout drawing of a building using different layer and line colors indicating all Building details. Name the details using text commands, Make a Title Block
Make an Isometric dimensioned drawing of Connecting Rod using isometric grid and snap
Draw quarter sectional isometric view of a cotter joint
Draw different types of bolts and nuts with internal and external threading in Acme and Square threading standards. Save the bolts and nuts as blocks suitable for insertion
Draw 3D models by extruding simple 2D objects, dimension and name the objects
Draw a spiral by extruding a circle
To Draw Orthographic Projection Drawings (Front, Top, Side) of boiler safety valve giving name the various components of the valve.

Suggested Reading:

Name of The Course	**THEORY OF MACHINE**				
Course Code	**DPME3001**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	2	0	4

Course Objectives:

5. Understand the fundamentals of the theory of kinematics and dynamics of machines.
6. To Use computer software packages in simple design of machines.

Course Outcomes:

CO1	**Identify with common mechanisms used in machines and everyday life.**
CO2	**Calculate mobility (number of degrees-of-freedom) and enumerate rigid links and types of joints within mechanisms.**
CO3	**Analyse ability to conduct a complete (translational and rotational) mechanism position, velocity and acceleration analysis**
CO4	**Compare between various cam mechanism classification and cam motion profiles, and familiarity with introductory cam design considerations.**
CO5	**Compare between various gear mechanism classification and gear train analysis, and familiarity with gear standardization and specification in design.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Inspection **08 hour**
Statics and dynamics, links, classification of links, kinematic pairs classification, degrees of freedom, constrained motion-types, kinematic chains, mechanisms, inversions of quadratic chain, single slider crank chain and double slider crank chain. Straight line motion mechanisms: classification of straight line motion mechanisms, peaucellier's, grass hopper and Pantograph mechanisms.
Unit- Velocity and Acceleration Mechanism **12 hour**
Velocity and acceleration in Mechanisms: Motion of a link in machine, velocity of a point on a link – Instantaneous center – types of instantaneous centers – kennedy theorem – velocity measurement by Instantaneous center method, Relative velocity method. Acceleration of a point on a link - acceleration in slider crank mechanism, Coriolis component of acceleration. Steering gear mechanism: Davis and Ackerman steering gear, Single and Double Hook Joint analysis.
Unit-3 Cams **10 hours**
Definitions, Types of cams and followers, types of follower motion, generation of cam profiles for uniform velocity, uniform acceleration and simple harmonic motion. Maximum velocity and maximum acceleration, analysis of roller follower and circular cam with straight flanks.
Unit-4 Gears **10 hours**
Friction wheels and toothed gears- types-law of gearing, condition of constant velocity ratio for transmission of motion- cycloidal and involute teeth profiles, velocity of sliding-interference - condition for minimum number of teeth to avoid interference-expressions for arc of contact and path of contact.
Unit-5 Vibrations **04 hours**
Concept of vibrations and its types – longitudinal, transverse and tensional vibrations (simple numerical), Damping of vibrations.

Suggested Reading:

Text Book (s)

11. Theory of Machines by D.R. Malhotra; Satya Prakashan, New Delhi.
12. Theory of Machines by V.P Singh; Dhanpat Rai and Sons, New Delhi

Reference Book (s)

6. Theory of Machines by Jagdish Lal; Metropolitan Publishers, New Delhi.
7. Theory of Machines by R.C. Jindal; North Publications

Name of The Course	MACHINE DESIGN			
Course Code	DPME3002			
Prerequisite	DPME2004			
Co-requisite				
Anti-requisite				
	L	T	P	C
	3	2	0	4

Course Objectives:

1. To prepare students for design various machine components.
2. Analysis the various mechanical properties of materials.

Course Outcomes:

CO1	Analyze the stress and strain on mechanical components and identify and quantify failure modes for mechanical parts.
CO2	Describe variety of mechanical components available and emphasize the need to continue learning.
CO3	Express the basic machine elements used in machine design; design machine elements to withstand the loads and deformations for a

	given application, while considering additional specifications.
CO4	Appraise a design problem successfully, taking decisions when there is not a unique answer.
CO5	Apply mechanical engineering design theory to identify and quantify machine elements in the design of commonly used mechanical systems.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Introduction to Design **08 hour**
1.1 Basic requirements for machine elements design **1.2 General design process** **1.3 Mechanical properties** **1.4 General design considerations like fatigue, creep, fabrication methods, economic considerations, material selection, ergonomic etc.** **1.5 Designing for strength**
Unit- Riveted And Welded Joints **07 hour**
2.1Types of riveted joints **2.2 Possible failure of riveted joints** **2.3 Design of lap and butt type riveted joints (simple cases)** **2.4 Strength and efficiency of riveted joints** **2.5 Common types of welded joints** **2.6 Transverse fillet and parallel fillet welded joint**
Unit-3 Screwed Joints **08 hours**
3.1 Introduction to screw and various definitions of screw threads **3.2 Advantages and disadvantages of screwed joints over riveted and welded joints** **3.3 Common types of screw fastening; through bolt, tap bolt, stud, cap screw, machine screw and set screw.** **3.4 Designation of screw threads** **3.5 Stresses in screw fastenings** **3.6 Design of bolts for cylinder cover**
Unit-4 Keys And Couplings **08 hours**
Keys And Couplings : **4.1 Definition of term Key; its various types** **4.2 Splines** **4.3 Forces acting on sunk keys** **4.4 Shaft couplings and its various types** **4.5 Design of flange coupling** **Shafts:** **5.1 Various types of shafts** **5.2 Stresses in shafts** **5.3 Design of shaft (solid and hollow) subjected to torque and Bending moment**
Unit-5 Design Of Cotter and Knuckle Joint **08 hours**
Design Of Cotter Joint : **6.1 Design of cotter** **6.2 Design of socket** **6.3 Design of spigot** **Design Of Knuckle Joint :** **7.1 Design of rod** **7.2 Design of pin**

Suggested Reading:

Text Book (s)

5. R.S.khurmi, Machine design, S.Chand, New Delhi
6. V. Bhandari, Machine Design, Tata Mcg Hill, New Delhi

Reference Book (s)

3. Mechanical Engineering Design" by Joseph Edward Shigley

Name of The Course	**MACHINE TOOL TECHNOLOGY AND MAINTAINENCE**				
Course Code	**DPME3003**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	0

Course Objectives:

5. To revise the fundamentals of Manufacturing Process I and hence educate the students about the scope of the subject.

6. To emphasize upon the prominent theories, concepts and constructional features of machines related to them.

Course Outcomes:

CO1	**Discuss basic principles and working of machine tools**
CO2	**Discuss detail knowledge of lathe machine**
CO3	**Discuss detail knowledge of shaping planning and slotting machine.**
CO4	**Discuss detail knowledge of drilling and boring machine**
CO5	**Discuss detail knowledge of milling and grinding machine**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Basic features of Machine tools **06 hour**
Various types of machining operations and machine tools. Common features of all basic machine tools, work holding and tool holding devices, Drive systems, sources of power, Bed, body or frame. Mechainaical drive system for providing reciprocating, oscillating and rotational movement. Systems of stepped and stepless, friction and positive drives.
Unit-2 Center Lathe **10 hour**
The centre lathe and its principle of working. Types of lathes, Lathe specification and size, Features of lathe bed. Head stock and tail stock. Feed mechanism and change-gears, carriage saddle, Cross slide, Compound rest, Tools post, Apron mechanism, lathe accessories, Chucks, Face plate, Angle plate, Driving plate, Lathe dogs, mandrils, Steady rest, Lathe attachements. Lathe operations-plane and step turning, Taper turning, Screw cutting, Drilling, Boring, reaming,Knurling, Parting off, Under cutting, Relieving. Types of lathe tools and their uses. **Brief description of semi automatic and automatic lathes such as capstan and turret lathes, their advantages and disadvantages over centre lathe, types of job done on them. General and periodic maintance of a centre lathe.**
Unit-3 Shaping Planning and Slotting Machine **04 hours**
Working principles of planer, shaper and slotter. Differences and similarities among them, quick return mechanism applied to the machines. Types of work done on them, types of tools used, their geometry . General and periodic maintenance of a shaper.
Unit-4 Drilling and Boring Machine, Milling and Grinding Machine **10 hours**
Types of tools used in drilling and boring. Classification of drilling and boring machines, principle of working and constructional details of simple and radial drilling M/C and general and periodic maintenance. Operations like facing, counter boring, tapering.Types of milling machines, constructional features of horizontal milling M/C. general maintenance of the machine, types of milling cutters, milling operations like plane milling, space milling, angular milling form milling, straddle milling, gang milling, Negative rack milling. Common abrasive grinding wheel materials, Bonds, Grain or grits of abrasive, Grain structure and shapes of common wheels, various speeds and feeds, Use of coolants, Methods of grinding. Types of grinding machines, precision finishing operations like honing.
Unit-5 Cooling Process and Plant Maintenance **10 hours**
Action of cutting fluids. Requirement of good cutting fluids, their selection for different materials and operations. Maintenance: maintenance definition, scope of maintenance, maintenance strategies, economics and performance measures, objective of maintenance, concepts of general approach to eliminate Losses, classification of maintenance-corrective, scheduled, preventive, predictive and productive maintenance. common techniques to monitor the conditions of systems-vibration based,

radiographic, thermographic, ferro graphic, computer based diagnosis etc, forms of wear, wear on guide surfaces, breakdown and remedies of machine tools, repair cycle, installation and maintenance of machine tools, PERT in maintenance.

Suggested Reading:

Text Book (s)

2. Machine tool technology by Anup Goel technical publication

Reference Book (s)

3. Manufacturing Process Vol 2 by P N RAO

Name of The Course	**Project**				
Course Code	**DPPE9999**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	0	10

Course Objectives:

5. Perform the different techniques of graphical representation for simple parts and assemblies apply the concept of design for quality.
6. Manipulate drawings through editing and plotting techniques

Course Outcomes:

CO1	**Create a own data or implementation on previous data project.**
CO2	**Create model to exhibit project**
CO3	**Develop understanding of subject based knowledge given in the classroom in the context of its application at work places.**
CO4	**Develop firsthand experience and confidence amongst the students to enable them to use and apply polytechnic/institute based knowledge and skills to solve practical problems related to the world of work.**
CO5	**Develop abilities like interpersonal skills, communication skills, positive attitudes and values etc.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

Projects connected with repair and maintenance of machines.
Estimating and costing projects.
Design of jigs / fixtures.
Projects related to quality control.
Projects relating to installation, calibration and testing of machines.
Projects related to wastage reduction.
Project, related to fabrication.
Project work related to increasing productivity.

Suggested Reading:

Name of The Course	**PRODUCTION TECHNOLOGY II**				
Course Code	**DPPE3001**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

1. To make student familiar with fundamentals of cutting mechanics, kinematics,constructional features and selection criterion for various basic machine tools.
2. To understand various conventional work holding devices and cutting tools and tool holders used on the same machines.

Course Outcomes:

CO1	**Select various machine tools and lubricants.**

CO2	Perform turning, step turning, taper turning, threading and knurling operation on lathe machine.
CO3	Explain boring ,shaping,planing,broaching operations.
CO4	Operate cutter grinder,cylindrical grinder, surface grinder, internal grinder.
CO5	Explain the working and use of modern machining methods.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Metal Cutting and Lubricants 8 hours
1.1Metal cutting: Single and multi-point cutting; Orthogonal cutting, various force components,Chip formation, Tool wear and tool life, Surface finish and integrity, Machinability, cutting tool materials,cutting fluids, Coating; Turning, Drilling: Classification of drilling machines and their description, Types of drills and their features, nomenclature of a drill, Milling :Classification, brief description and applications of milling machines, Milling methods - up milling and down milling, face milling, angular milling, form milling, straddle milling and gang milling. Cutting speed and feed, simple numerical problems. Function of cutting fluid. Types of cutting fluids. Difference between cutting fluid and lubricant. Selection of cutting fluids for different materials and operations. Common methods of lubrication of machine tools.
Unit-2 Lathe Machine 8 hours
2.1 Principle of turning 2.2 Description and function of various parts of a lathe 2.3 Classification and specification of various types of lathe 2.4 Drives and transmission 2.5 Work holding devices 2.6 Lathe tools: Parameters/Nomenclature and applications 2.7 Lathe operations :- Plain and step turning, facing, parting off, taper turning,eccentric turning, reaming, boring, threading and knurling, form turning, spinning.2.8 Cutting parameters – Speed, feed and depth of cut for various materials and for various operations, machining time.2.9 Speed ratio, preferred numbers of speed selection.2.10 Lathe accessories:-Centers, dogs, different types of chucks, collets, face plate,angle plate, mandrel, steady rest, follower rest, taper turning attachment, tool post grinder, milling attachment, Quick change device for tools.2.11 Brief description of capstan and turret lathe, comparison of capstan/Turret lathe,work holding and tool guiding devices in capstan and turret lathe.
Unit-3 Shaping, Planing, Boring and Broaching 8 hours
Working principle of shaper and planer. Type of shapers 6.3 Type of planers. Quick return mechanism applied to shaper and planer machine. Work holding devices used on shaper and planer. Types of tools used and their geometry. Specification of shaper and planer. Speeds and feeds in above processes. Principle of boring . Classification of boring machines and their brief description. Specification of boring machines. Boring tools, boring bars and boring heads. Description of jig boring machine. Introduction to broaching, Types of broaching machines – Single ram and duplex ram horizontal type,vertical type pull up, pull down, push down. Elements of broach tool, broach tooth details – nomenclature, types, and tool material.
Unit-4 Grinding 8 hours
Purpose of grinding , Various elements of grinding wheel – Abrasive, Grade, structure, Bond. Common wheel shapes and types of wheel – built up wheels, mounted wheels and diamond wheels. Specification of grinding wheels as per BIS. Truing, dressing, balancing and mounting of wheel. Grinding methods – Surface grinding, cylindrical grinding and centreless grinding. Grinding machine – Cylindrical grinder, surface grinder, internal grinder,centreless grinder, tool and cutter
Unit-5 Modern Machining Processes 8 hours
Mechanical Process - Ultrasonic machining (USM): Introduction, principle,process, advantages and limitations, applications. Electro Chemical Processes - Electro chemical machining (ECM) – Fundamental

principle, process, applications. Electrical Discharge Machining (EDM) - Introduction, basic EDM circuit,Principle, metal removing rate, dielectric fluid, applications. Laser beam machining (LBM) – Introduction, machining process and applications. Plasma arc machining (PAM) and welding – Introduction, principle process and applications

Suggested Reading:

Text Book (s)

4. Workshop Technology by B.S. Raghuwanshi; Dhanpat Rai and Sons; Delhi

Reference Book (s)

1. Manufacturing Technology by Rao; Tata McGraw Hill Publishers, New Delhi
2. Workshop Technology Vol. I, II, III by Chapman; Standard Publishers Distributors. New Delhi.

Name of The Course	**Robotics**				
Course Code	**DPME3006**				
Prerequisite	**DPME2001**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

5. Be familiar with the history, concept development and key components of robotics technologies.
6. Be familiar with various robot sensors and their perception principles that enable a robot to analyze their environment, reason and take appropriate actions toward the given goal.

Course Outcomes:

CO1	**Importance of robotics in today and future goods production**
CO2	**Discuss Robot configuration and subsystems**
CO3	**Discuss Principles of robot programming and handle with typical robot**
CO4	**Discuss Working of mobile robots**
CO5	**Discuss detail knowledge of application of robots**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit- Introduction 10 hour
Definition, Classification of Robots - Geometric classification and Control classification, Laws of Robotics, Robot Components, Coordinate Systems, Power Source. Robot anatomy, configuration of robots, joint notation schemes, work volume, manipulator kinematics, position representation, forward and reverse transformations, homogeneous transformations in robot kinematics, D-H notations, kinematics equations, introduction to robot arm dynamics.
Unit-2 ROBOT DRIVES AND POWER TRANSMISSION SYSTEMS 10 hour
Robot drive mechanisms: Hydraulic / Electric / Pneumatics, servo & stepper motor drives, Mechanical transmission method: Gear transmission, Belt drives, Rollers, chains, Links, Linearto-Rotary motion conversion, Rotary-to-Linear motion conversion, Rack and Pinion drives, Lead screws, Ball Bearings.
Unit-3 ROBOT END EFFECTORS 06 hours
Classification of End effectors – active and passive grippers, Tools as end effectors, Drive system for grippers. Mechanical, vacuum and magnetic grippers. Gripper force analysis and gripper design
Unit-4 ROBOT SIMULATION 05 hours
Methods of robot programming, Simulation concept, Off-line programming, advantages of offline programming.
Unit-5 ROBOT APPLICATIONS 10 hours
Robot applications in manufacturing-Material transfer and machine loading/unloading, Processing operations like Welding & painting, Assembly operations, Inspection automation, Limitation of

usage of robots in processing operation. Robot cell design and control, Robot cell layouts-Multiple robots & Machine interference.

Suggested Reading:

Text Book (s)

2. Robotic: Control, Sensing, Vision and Intelligence, by Fu, McGraw Hill.

Reference Book (s)

3. Robotics for Engineers, by Y. Koren, McGraw Hill

Name of The Course	**CNC MACHINES AND AUTOMATION**				
Course Code	**DPPE3002**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

1. This course covers Fundamentals and concepts of CNC machining centres, NC part programming,Programming through CAD/CAM (MasterCAM), and Maintenance and Trouble shooting the CNC machine tools
2. This course offers more hands on experience through which the participants will be developing CNC programs and machining complicated shapes by using the CNC machine tools.

Course Outcomes:

CO1	**Explain the trends in the field of automation.**
CO2	**Explain the construction and tooling of CNC machine.**
CO3	**Prepare simple part programme for different operations.**
CO4	**Operate a CNC lathe, CNC milling machine**
CO5	**Diagnose common problems in CNC machines.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Introduction 8 hours
Introduction to NC, CNC & DNC, their advantages, disadvantages and applications,Machine Control Unit, input devices, serial communication and Ethernet techniques,selection of components to be machined on CNC machines, Problems with conventional NC, New developments in NC, Axis identification, PLC Control and its components.
Unit-2 Constructional details and Tooling 8 hours
Design features, specification Chart of CNC machines, use of slideways, balls, rollers and coatings, motor and leadscrew, swarf removal, safety and guarding devices, various cutting tools for CNC machines, overview of tool holder, different pallet systems and automatic tool changer system, management of a tool room.Actuators, Transducers and Sensors, Tachometer, LVDT, opto-interrupters,potentiometers for linear and angular position, encoder and decoder, axis drives, open loop system, close loop system.
Unit-3 Part Programming 8 hours
Part programming and basic concepts of part programming, NC words, part programming formats, simple programming for rational components, part programming using canned cycles, subroutines and do loops, tool off sets, cutter radius compensation and wear compensation.
Unit-4 Automation, NC system and operations 8 hours
Role of computer in automation, emerging trends in automation, automatic assembly,manufacture of magnetic tape, manufacture of printed circuit boards, manufacture of integrated Circuits, Overview of FMS, Group technology, CAD/CAM and CIM. Introduction to operations involved in turning machines- Facing OD and ID Rough cut, Finish cut, Taper turning, Drilling, Threading, Grooving and cut-off (parting). Introduction to operations involved in Milling-contouring, pocketing, Drilling,Facing, Circular tools paths. Different terms like clearance, Retract, Feed plane, Depth of cut, lead

in, lead out,overlap. Simple programmes in Milling and Turning involving different operations.
Unit-5 Cutting Fluids , Lubricants and problems in CNC 8 hours
Function of cutting fluid, Types of cutting fluids , Difference between cutting fluid and lubricant, Selection of cutting fluids for different materials and operations, Common methods of lubrication of machine tools.Common problems in mechanical, electrical, pneumatic, electronic and PC components of NC machines, diagnostic study of common problems and remedies, use of on-time fault finding diagnosis tools in CNC machines.

Suggested Reading:

Text Book (s)

3. CNC Machines – Programming and Applications by M Adithan and BS Pabla; New Age International (P) Ltd., Delhi.

Reference Book (s)

1. Computer Aided Manufacturing by Rao, Kundra and Tiwari; Tata McGraw Hill, New Delhi

2. CNC Machine by Bharaj; Satya Publications, New Delhi.

Name of The Course	**PRODUCTION TECHNOLOGY II LAB**				
Course Code	**DPPE3003**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives: :

1. To make student familiar with fundamentals of cutting mechanics, kinematics,constructional features and selection criterion for various basic machine tools.

2. To understand various conventional work holding devices and cutting tools and tool holders used on the same machines.

Course Outcomes:

CO1	**Perform advance machining operations on lathe machine.**
CO2	**Perform boring ,shaping,planing,broaching operations.**
CO3	**Explain the working and use of modern machining methods.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

Ex.1 TURNING SHOP
Job 1. Grinding of single point turning tool. **Job 2. Exercise of simple turning and step turning.** **Job 3. A composite job involving, turning, taper turning, external thread cutting and knurling.**
Ex.2 ADVANCE FITTING SHOP
Job 1. Exercise on drilling, reaming, counter boring, counter sinking and taping **Job 2. Dove tail fitting in mild steel** **Job 3. Radius fitting in mild steel**
Ex.3 MACHINE SHOP
Job 1. Prepare a V-Block up to ± 0.5 mm accuracy on shaper machine **Job 2. Exercise on key way cutting and spline cutting on shaper machine.** **Job 3. Produce a rectangular block by facing on a slotting machine** **Job 4.. Produce a rectangular slot on one face with a slotting cutter** **Job 5. Produce a rectangular block using a milling machine**
Ex.4 FORGING SHOP/FITTING SHOP/SHEET METAL SHOP
Job 1. Preparation of single ended spanner by hand, machine forging **Job 2. Preparation of simple die** **Job 3. Demonstration of spinning process on lathe and spinning a bowl on a lathe machine**

Job 4. Demonstration of grinding process on lathe machine and grinding a job on a lathe machine **Job 5. Preparation of utility item out of G.I. sheet** **Job 6. Preparation of drilling jig**
Ex.5 ADVANCE TURNING SHOP
1. Exercise of boring with the help of boring bar **2. Exercises on internal turning on lathe machine** **3. Exercises on internal threading on lathe machine** **4. Exercises on external turning on lathe machine** **5. Resharpening of single point cutting tool with given geometry**
Ex.6 MACHINE SHOP
1. Job on grinding machine using a surface grinder **2. Prepare a job on cylindrical grinding machine.** **3. Exercise on milling machine with the help of a form cutter** **4. Exercise on milling machine to produce a spur gear** **5. Grinding a drill-bit on tool and cutter grinder** **6. Exercise on dressing a grinding wheel**

Suggested Reading:

Text Book (s):

1. Workshop Technology by B.S. Raghuwanshi; Dhanpat Rai and Sons; Delhi

Reference Book (s):

1. Manufacturing Technology by Rao; Tata McGraw Hill Publishers, New Delhi

2. Workshop Technology Vol. I, II, III by Chapman; Standard Publishers Distributors. New Delhi.

Name of The Course	**ROBOTICS LAB**				
Course Code	**DPME3009**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives:

Course Outcomes:

CO1	**Describe in detail how industrial robot systems are used, structured and operate,**
CO2	**Describe in detail the structure and operation of robotic tooling, including actuators, mechanics and sensors,**

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Exam (MTE)**	**End Term Exam (ETE)**	**Total Marks**
50	-	50	100

Course Content:

ASSIGNMENT ON INTRODUCTION TO ROBOT CONFIGURATION
DEMONSTRATION OF ROBOT WITH 2 DOF, 3 DOF, 4 DOF etc.
TWO ASSIGNMENTS ON PROGRAMMING THE ROBOT FOR APPLICATIONS
TWO ASSIGNMENTS ON PROGRAMMING THE ROBOT FOR APPLICATIONS IN VAL II
TWO PROGRAMMING EXERCISES FOR ROBOTS
TWO CASE STUDIES OF APPLICATIONS IN INDUSTRY
EXERCISE ON ROBOTIC SIMULATION SOFTWARE

Suggested Reading:

Name of The Course	**CNC MACHINES AND AUTOMATION LAB**				
Course Code	**DPPE3004**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives:

1. This course covers Fundamentals and concepts of CNC machining centres, NC part programming,Programming through CAD/CAM (MasterCAM), and Maintenance and Trouble shooting the CNC machine tools

Course Outcomes:

CO1	**Explain the constructional details of CNC.**
CO2	**Prepare CNC program for turning ,milling operatons.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

Ex.1
Study the constructional details of CNC lathe.
Ex.2
Study the constructional details of CNC milling machine.
Ex.3
Study the constructional details and working of:Automatic tool changer and tool setter -a)Multiple pallets b)Swarf removal c)Safety devices
Ex.4
Develop a part programme for following lathe operations and make the job on CNC lathe and CNC turning center. A) Plain turning and facing operations b)Taper turning operations c)Operation along contour using circular interpolation.
Ex.5
Develop a part programme for the following milling operations and make the job on CNC milling : a)Plain milling b)Slot milling c) Contouring d)Pocket milling
Ex.6
Preparation of work instruction for machine operator
Ex.7
Preparation of preventive maintenance schedule for CNC machine.
Ex.8
Demonstration through industrial visit for awareness of actual working of FMS in production.
Ex.9
Use of software for turning operations on CNC turning center.
Ex.10
Use of software for milling operations on machine centres.

Suggested Reading:

Text Book (s):

1. CNC Machines – Programming and Applications by M Adithan and BS Pabla; New Age International (P) Ltd., Delhi.

Reference Book (s):

1. Computer Aided Manufacturing by Rao, Kundra and Tiwari; Tata McGraw Hill, New Delhi

2. CNC Machine by Bharaj; Satya Publications, New Delhi.

GALGOTIAS UNIVERSITY

(Established under Galgotias University Uttar Pradesh Act No. 14 of 2011)

Program: DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING

Scheme: 2020-2021

Curriculum

Semester 1

Sl. No.	Course Code	Name of the Course	L	T	P	C	IA	MTE	ETE
							Assessment Pattern		
1	PHYE1001	APPLIED PHYSICS-I	3	2	0	4	20	50	100
2	MATD1002	APPLIED MATHEMATICS-I	4	0	0	4	20	50	100
3	SLPC1003	PROFESSIONAL COMUNICATION-I	2	0	0	2	20	50	100
4	DPCS1004	COMPUTER FUNDAMENTALS	3	0	0	3	20	50	100
5	CHEM1005	BASIC CHEMISTRY	3	2	0	4	20	50	100
6	PHYE1006	APPLIED PHYSICS-I LAB	0	0	2	1	50	-	50
7	SLPC1007	PROFESSIONAL COMUNICATION-I LAB	0	0	4	2	50	-	50
8	DPCS1008	COMPUTER FUNDAMENTALS LAB	0	0	2	1	50	-	50
9	CHEM1009	BASIC CHEMISTRY LAB	0	0	4	2	50	-	50
		Total Credits	15	4	12	23			

Semester II

Sl No	Course Code	Name of the Course	L	T	P	C	IA	MTE	ETE
							Assessment Pattern		
1	PHYE1010	APPLIED PHYSICS-II	3	2	0	4	20	50	100
2	MATD1011	APPLIED MATHEMATICS-II	4	2	0	5	20	50	100
3	SLPC1012	PROFESSIONAL COMUNICATION-II	3	0	0	3	20	50	100
4	DPEE1013	BASIC ELECTRICAL ENGG.	3	2	0	4	20	50	100
5	DPCO1014	ELECTRONIC COMPONETS & DEVICES	3	0	0	3	20	50	100
6	PHYE1015	APPLIED PHYSICS-II LAB	0	0	2	1	50		50
7	SLPC1016	PROFESSIONAL COMUNICATION-II LAB	0	0	4	2	50	-	50
8	DPME1017	WORKSHOP PRACTICE	0	0	6	3	50	-	50
9	DPEE1018	BASIC ELECTRICAL ENGG.LAB	0	0	2	1	50	-	50
10	DPCO1019	ELECTRONIC COMPONETS & DEVICES LAB	0	0	2	1	50	-	50
		TOTAL CREDITS	16	6	16	27			

Semester III

Sl No	Course Code	Name of the Course	L	T	P	C	IA	MTE	ETE
							Assessment Pattern		
1	MATD2001	APPLIED MATHEMATICS-III	3	2	0	4	20	50	100
2	DPCO2001	NETWORK FILTERS & TRANSMISSION LINES	3	0	0	3	20	50	100
3	DPCO2002	ELECTRONIC DEVICES AND CIRCUITS	3	0	0	3	20	50	100
4	DPCO2003	PRINCIPLES OF DIGITAL ELECTRONICS	3	0	0	3	20	50	100
5	DPCO2004	TECHNICAL DRAWING	2	0	0	2	20	50	100
6	DPME2018	ENGINEERING MECHANICS & MATERIAL	3	0	0	3	20	50	100
7	DPCO2005	NETWORK FILTERS & TRANSMISSION LINES LAB	0	0	2	1	50	-	50
8	DPCO2006	ELECTRONIC DEVICES AND CIRCUITS LAB	0	0	2	1	50	-	50
9	DPCO2007	PRINCIPLES OF DIGITAL ELECTRONICS LAB	0	0	2	1	50	-	50
10	EEDM2001	ENVIRONMENT EDUCATION & DISASTER MANAGEMENT	2	0	0	2	20	30	100
		Total Credits	15	2	14	23			

Semester IV

Sl No	Course Code	Name of the Course	L	T	P	C	Assessment Pattern IA	MTE	ETE
1	DPCO2008	PRINCIPLE OF COMMUNICATION ENGINEERING	3	0	0	3	20	50	100
2	DPCO2009	ANTENNA,MICROWAVE & RADAR ENGG.	3	0	0	3	20	50	100
3	DPCO2010	MICROPROCESSOR AND ITS APPLICATIONS	3	0	0	3	20	50	100
4	DPCS2015	COMPUTER PROGRAMMING AND APPLICATIONS	3	0	0	3	20	50	100
5	DPCO2011	ELECTRONIC INSTRUMENTS AND MEASUREMENT.	3	0	0	3	20	50	100
6	DPCO2012	PRINCIPLE OF COMMUNICATION ENGINEERING LAB	0	0	2	1	50	-	50
7	DPCO2013	ANTENNA,MICROWAVE & RADAR ENGG. LAB	0	0	2	1	50	-	50
8	DPCO2018	MICROPROCESSOR AND EMBEDDED SYSTEM LAB	0	0	2	1	50	-	50
9	DPCS2016	COMPUTER PROGRAMMING AND APPLICATIONS LAB	0	0	4	2	50	-	50
10	DPCO9001	DISRUPTIVE TECHNOLOGY	0	0	2	1	50		50
11	DPCO2019	ELECTRONIC INSTRUMENTS AND MEASUREMENT LAB	0	0	2	1	50	-	50
		Total Credits	15	0	14	22			

Semester V

Sl No	Course Code	Name of the Course	L	T	P	C	Assessment Pattern IA	MTE	ETE
1	IMED3001	INDUSTRIAL MANAGEMENT AND ENTERPRENURSHIP DEVELOPMENT	3	0	0	3	20	50	100
2	DPCO3002	MODERN COMMUNICATION SYSTEM	3	0	0	3	20	50	100
3	DPCO3003	INDUSTRIAL ELECTRONICS & TRANSDUCERS	3	0	0	3	20	50	100
4	DPCO3004	MICROELECTRONICS-I(ELECTIVE-I)	3	0	0	3	20	50	100
5	DPCO3005	BIO-MEDICAL ELECTRONICS (ELECTIVE SUBJECT-II)							
6	DPCO3007	MODERN COMMUNICATION SYSTEM LAB	0	0	2	1	50		50
7	DPCO3008	INDUSTRIAL ELECTRONICS & TRANSDUCERS LAB	0	0	2	1	50	-	50
8	PDSS3008	PERSONALITY DEVELOPMENT & SOFT SKILLS	0	0	4	2	50	-	50
9	DPCO9998	PROJECT-I	0	0	4	2	50	-	50
		Total Credits	12	4	12	18			

Semester VI

Sl No	Course Code	Name of the Course		Assessment Pattern

			L	T	P	C	IA	MTE	ETE
1	DPCO3009	FIELD VISIT AND PRESENTATION	0	0	0	2	50	-	50
2	DPCO9999	PROJECT-II	0	0	0	16	50	-	50
		Total Credits	0	0	0	18			
						18			

List of Electives

Basket-1

Sl No		Course Code	Name of the Electives				
				L	T	P	C
1	Elective-1	DPCO3004	MICROELECTRONICS	3	0	0	3

Basket-2

Sl No		Course Code	Name of the Elective				
				L	T	P	C
1	Elective-2	DPCO3005	BIOMEDICAL ELECTRONICS	3	0	0	3

Detailed Syllabus

Name of The Course	**Electronic Components & Devices**				
Course Code	**DPCO1014**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives

1. Understand the working of diodes, transistors.

2. Understand the application of different electronic devices and simple circuits.

3. To expose students to the function and application of the diodes, bipolar junction and field effect transistors in electronic circuits.

Course Outcomes

CO1	**Explain the basic electrical components like resistors, capacitors, inductors and diodes with its applications.**
CO2	**Design the rectifier, clipper and clamper circuits using diodes.**
CO3	**Illustrate the various special purpose diodes such as zener, schottky, varactor and photo diode.**
CO4	**Explain the BJT and its analysis as CE,CC and CB amplifier.**
CO5	**Develop the basic understanding of FET, MOSFET .**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: INTRODUCTION TO ELECTRONICS   **9 Hours**
1.1. Application of Electronics in different fields. 1.2. Brief introduction to active components and devices. 1.3. Introduction to passive components:Resister-Working characteristics/properties, Resistors-Carbon film, metal-film, carbon composition, wire wound and variable type (presets and potentiometers) constructional details, characteristics
1.4. Capacitors- Working characteristics/properties, Capacitors polyester, Metalized polyester, ceramic paper mica. 1.5. Inductors, Transformers and RF coils- Working characteristics/properties Methods of manufacture of inductors, RF coils and small power and AF transformer and their testing. Properties of cores.
Unit II:VOLTAGE AND CURRENT SOURCES   **8 Hours**
Concept of constant voltage sources, symbol and graphical representation, characteristics of ideal and practical voltage sources. Concept of constant current source, symbol and graphical representation, characteristics of ideal and practical current sources. Conversion of voltage source into a current source and vice-versa Concept of floating and grounded D.C. supplies.
Unit III: SEMICONDUCTOR DIODE   **Hours**
P-N junction diode, Mechanism of current flow in P-N junction drift and diffusion currents, depletion layer, potential barrier, P-N junction diode characteristics, zener& avalanche breakdown, concept of junction capacitance in forward & reverse bias conditions. Semiconductor diode characteristics, dynamic resistance & their calculation from diode characteristics, dynamic resistance of diode in terms of diode current. Diode (P-N junction) as rectifier, Half wave rectifier full wave rectifier including bridge rectifier, rela Different types of diodes, characteristics and typical application of power diodes, zener diodes, varactor diodes, point contact diodes, tunnel diodes, and LED's and photo diodes. Important specifications of rectifier diode and zener diode.
Unit IV: INTRODUCTION TO BIPOLAR TRANSISTOR AND ITS BIASING   **Hours**
Concept to bipolar transistor as a two junction three terminal device having two kinds of charge carriers, PNP and NPN transistors, their symbols and mechanisms of current flow, CB, CE and CC configurations. (a) Common base configuration (CB): inputs and

output characteristics, determination of transistor parameters (input and output) dynamic resistance, current amplification factor. (b) Common emitter configuration: current relations in CE configuration, collector current in terms of base current and leakage current (ICEO), relationship between the leakage current in CB and CE configuration, input and output characteristics, determination of dynamic input and output resistance and current amplification factor B from the characteristics. (C) Common collector configuration: Expression for emitter current in terms of base current and leakage current in CC configuration. Comparison of CB and CE configuration with regards to dynamic input and output resistance, current gain and leakage current performance of CE configuration for low frequency voltage amplification. Typical application of CB configuration in amplification. Transistor as an amplifier in CE configuration. (a) DC load line, Its equation and drawing it on collector characteristics. (b) Determination of small signal voltage and current gain of a basic transistor amplifier using CE output characteristic and DC load line, Concept of power gain as a product of voltage gain and current gain. Different transistor biasing circuits for fixing the operating points, effect of temperature on operating point. Need and method for stabilization of operating point. Effect of fixing operating point in cut-off or saturation region on performance of amplifier. Calculation of operating point for different biasing circuits, use of Thevenin's theorem in analyzing potential divider biasing circuit. Simple design problems on potential divider biasing circuit.
Unit V:FIELD EFFECT TRANSISTOR (FET,MOSFET) **8 Hours**
8.1. Construction, operation, characteristics and Biasing of Junction FET. 8.2. Construction, operation, Characteristics and Biasing of MOSFET in both depletion and enhancement modes.

Suggested Reading

1. Thomas L. Floyd - Electronic Devices, 2-nd Ed, Merrill Publ.Co, Columbus-Ohio, 1988
2. Albert Paul Malvino - Electronic Principles, Tata McGraw-Hill, New Delphi, 1982
3. Stephan Senturia, Bruce Wedlock - Electronic Circuits and Applications, John Willey&Sons Inc. NY 1975

Name of The Course	ELECTRONIC CIRCUITS AND DEVICES LAB				
Course Code	DPCO1019				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		0	0	2	1

Course Objectives:1.Understand the working of resistors, capacitors, inductors, transformers, diodes, transistors.
2. Understand the application of different electronic devices and simple circuits.

Course Outcomes

CO1	Test the basic electrical components like resistors, capacitors, inductors and diodes with its applications.
CO2	Design the rectifier, clipper and clamper circuits using diodes.

Text Book (s):1. N.N.Bhargava, Kulshreshtha& Gupta - "Baisc Electronics & Linear Circuits" - Tata Mc.Graw-Hill.

Reference Book (s):1.Thomas L. Floyd - Electronic Devices, 2-nd Ed, Merrill Publ.Co, Columbus-Ohio, 1988
2.Albert Paul Malvino - Electronic Principles, Tata McGraw-Hill, New Delphi, 1982

Ex.1
Familiarization with lab instrument (Millimeter/CRO), etc.
Ex.2
Semiconductor diode characteristics: (i) Identifications of types of packages, terminals and noting different ratings using data books for various types of semiconductor diodes (Germanium, point contact, silicon low power and high power and switching diode). (ii) Plotting of forward V-I characteristics for a point contact and junction P-N diode (Silicon & Germanium diode).
Ex.3

Rectifier circuits using semiconductor diode, measurement of input and output voltage and plotting of input and output wave shapes **(i) Half wave rectifier.** **(ii) Full wave rectifier (centre tapped and bridge rectifier circuits)**
Ex.4
To Plot forward and reverse V-I characteristics for a zener diode.
Ex.5
To Plot wave shapes of a full wave rectifier with shunt capacitor, series inductor and pi filter circuit.
Ex.6
To Plot the input and output characteristics and calculation of parameters of a transistor in common base configuration.
Ex.7
Transistor Biasing circuits **(i). Measurement of operating point (Ic&Vce) for a fixed bias circuit.** **(ii).Potential divider biasing circuits.** **(Measurement can be made by changing the transistor in the circuits by another of a same type number.**
Ex.8
Plot the FET characteristics and determination of its parameters from these characteristics.
Ex.9
To Plot input and output characteristics and calculation of parameters of a transistor in common emitter configuration
Ex.10
Measurement of voltage gain and plotting of the frequency response curve of a JFET amplifier circuits.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	**Network, Filters and Transmission Lines**				
Course Code	**DPCO2001**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives

1. To become familiar with propagation of signals through lines.

2. Calculation of various line parameters by conventional and graphical methods

3. Design of different types of filters, equalizer and attenuators.

Course Outcomes

CO1	**Demonstrate Network theorems.**
CO2	**Calculate various Network parameters by conventional methods.**
CO3	**Design of different types of attenuators and their analysis.**
CO4	**Design and analysis of different types of filters.**
CO5	**Apply knowledge of mathematics, science, and engineering in electromagnetic waves analysis**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: REVIEW OF NETWORK THEOREMS

Review of the following, network theorem; superposition,Thevenin's Norton's and maximum power transfer.

Unit II:NETWORKS 8 Hours

2.1 One Port Network : Series and parallel tuned circuit,expression for their impedance.

2.2 Two Port (Four Terminals Networks) : Basic concept of thefollowing terms :

(a) Symmetrical and asymmetrical networks.

(c) T-network, L Network,Bridge Network.

(d) Representation of a two port Network in terms of Z and H parameters.

Unit III: ATTENUATORS 6 Hours

3.1 Units of attenuation (decibel and nepers)

3.2 General characteristics of attenuators.

3.3 Analysis and design of simple attenuator of following types

(a) Symmetrical T and π type.

(b) L type.

Unit IV: FILTERS 9 Hours

4.1 Brief idea of the uses of filters networks in different communication system.

4.2 Connecting of low pass, high pass, band passes and band stop filters.

4.3 Theorem connecting attenuation constant a andcharacteristics impedance (Zo) determination of cut offrequency constant K section.

4.4 Prototype filter section

(a) T and π low pass filter section.

(b)Attenuation Vs frequency; phase shift Vs frequency characteristics impedance Vs frequency of T and π.

4.5Basic Concept of active filter and comparison with passive.

Unit V: TRANSMISSION LINE

16 Hours

5.1 Transmission lines and their application: Shapes ofdifferent types of transmission lines; including 300 ohmantenna feeder cable, 75 ohm co-axial cable, optical fibercable, Also other different types of cables.

5.2 Distributed (or primary) constants of a transmission lineequivalent circuit of infinite line;

5.3 Definition ofcharacteristic impedance of line ; concept of short linetermination in Zo currents no voltages long an infinite line; graphical representation; propagation constant,attenuation and phase shift constant of the line.

5.4 Relationship of characteristics impedance,

propagation constant, attenuation constant and phase constant in term ofdistributed constants of the line.
5.5 Conditions for minimum distortion and minimum attenuation ofsignal on the line; necessity and different methods ofloading the communication lines.
5.6 Concept of reflection and standing waves on a transmissionline; definition of reflection coefficient in terms ofcharacteristics impedance and load impedance; Definition ofstanding wave ratio (SWR), relation between VSWR andvoltage reflection coefficient, maximum impedance on a line in term of characteristics impedance and VWSR.
5.7 Transmission line equation; expression for voltage, currentand impedance at a point on the lines for lines with and without losses. Expression for the input impedance of theline.
5.8 Input impedance of an open and short circuited line and itsgraphical representation.

Suggested Reading
1. A. Chakravorty- An Introduction to Network, Filters &Transmission Line- Dhanpatrai& Co.
2. J. P. Ryder-Network Filters & Transmission Line- PHI
3. Principles of Electromagnetics - Mathew N.O. Sadiku
4. V. K. Aatre- Network Theory & Filter Design- New AgeInternational Pub.

Name of The Course	NETWORK FILTERS AND TRANSMISSION LINES LAB				
Course Code	DPCO2005				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		0	0	2	1

Course Objectives:1.To become familiar with propagation of signals through lines
2. Calculation of various line parameters by conventional and graphical methods
3. Design of different types of filters, equalizer and attenuators.

Course Outcomes

CO1	Demonstrate Network theorems.
CO2	Calculate various line parameters by conventional methods.
CO3	Design of different types of filters, equalizer and attenuators.

Text Book (s):1. A. Chakravorty- An Introduction to Network, Filters &Transmission Line- Dhanpatrai& Co.
Reference Book (s):1.D. R. Chaudhry- Network Analysis- DhanpatRai& Co.
2.V. K. Aatre- Network Theory & Filter Design- New AgeInternational Pub.

Ex.1
Experimental verifications of the Thevenin's and Norton's theorem with an a.c. source.
Ex.2
To measure the characteristics impedance of a symmetrical T/Π (pi) network.
Ex.3
To design and measure the attenuation of a symmetrical T/Π(pi) type attenuator.
Ex.4
Determine the characteristics impedance of a prototype low pass filter.
Ex.5
Determine the characteristics impedance of a prototype high pass filter.
Ex.6
To plot the impedance characteristic of a prototype band pass filter.
Ex.7
Measurement of L & C of lossless transmission line.
Ex.8
Measurement of characteristics of a short transmission line.
Ex.9
Measurement of Zo of lossless transmission line.
Ex.10
Measurement of Attenuation of lossless transmission line.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50		50	100

Name of The Course	Electronic Devices and Circuits
Course Code	DPCO2002
Prerequisite	DPCO1014
Co-requisite	
Anti-requisite	

	L	T	P	C
	3	0	0	3

Course Objectives

1. Understand the working of diodes, transistors.

2. Understand the application of different electronic devices and simple circuits.

3. To expose students to the function and application of the diodes, bipolar junction and field effect transistors in electronic circuits

Course Outcomes

CO1	Discuss MultiStage Transistor Amplifier
CO2	Develop the understanding of power amplifiers.
CO3	Analyze different types of Feedback amplifier
CO4	Discuss Tuned voltage Amplifier.
CO5	Design Multi vibrators & Sinusoidal Oscillator Circuits.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: MULTISTAGE TRANSISTOR AMPLIFIERS 6 Hours
1.1 Need of multistage amplifier, different coupling schemes and their working, brief mention of application of each of the type of coupling. 1.2 Working of R.C. coupled and transformer coupled multistage amplifier, approximate calculation of voltage gain for a two stage R-C coupled amplifier. 1.3 Frequency response of R-C coupled and transformer coupled amplifiers and its physical explanation, definition and physical significance of the term as bandwidth, upper and lower cross over frequencies etc. 1.4 Direct coupled amplifier and its limitations, differential amplifier typical circuits diagram and its working.
Unit II: TRANSISTOR AUDIO POWER AMPLIFIERS 8 Hours
2.1 Difference between voltage and power amplifier, importance of impedance matching in power amplifier, collector efficiency of power amplifier. 2.2 Typical single ended power amplifier and its working, graphical method for calculation of output power, heat dissipation curve and importance of heat, sinks, class A, class B, class C amplifier (without derivation). 2.3 Working principle of push pull amplifier and circuits, its advantages over single ended power amplifier, cross over distortion in class B operation and its reduction, different driver stages for push pull amplifier circuit. 2.4 Working principle of complementary symmetry push pull circuit and its advantages. 2.5 Boot strap technique in amplifiers. 2.6 Transformer less audio power amplifiers and their typical application. 2.7 Mention of at least one popular IC with its block diagram, Pin configuration and it working of each type of power amplifier.
Unit III: FEED BACK AMPLIFIERS 6 Hours
3.1 Basic principle and types of feedback. 3.2 Effect of negative feedback on gain, stability, distortion and band width (Only physical explanation) 3.3 Typical feedback circuits: (a) A.C. coupled amplifiers with emitter by-pass, capacitor removed. (b) Emitter follower and its application, simple mathematical analysis for voltage gain and input impedance of above circuits.
Unit IV: TUNED VOLTAGE AMPLIFIERS 5 Hours
4.1 Classification of amplifiers on the basis of frequency. 4.2 Review of basis characteristics of tuned circuits, (Series and Parallel) 4.3 Single and Double tuned amplifier, their working principles and frequency response (no mathematical

derivation). Concepts of neutralization. 4.4 Staggered tuned amplifier and typical applications in brief. 4.5 Mention of at least one popular IC with its block diagram, Pin configuration and it working of each type of Tuned amplifier.
Unit V: SINUSOIDAL OSCILLATORS 10 Hours
5.1 Application of oscillators. 5.2 Use of positive feedback/negative resistance for generation of oscillation, barkhausen's criterion for oscillations. 5.3 Different oscillators circuits, tuned collector, Hartley, colpitts, phase shift, Wien's bridge and crystal oscillator and their working principles (no mathematical derivation). 5.4 Mention of at least one popular IC with its block diagram, Pin configuration and it working of each type of oscillators. 5.5 Ideal transistor switch; explanation using C.E. output characteristics, calculation of component values (collector and base resistors) for a practical transistor switch. 5.6 Transistor switching time. Use of speed up capacitor (Physical explanation). 5.7 Basic concept of working of collector coupled bistable, monostable and stable multivibrator circuits including principle of triggering. 5.8 Operation of Schmitt trigger, calculation of upper trigger potential (UTP) and lower trigger potential (LTP). 5.9 Mention of applications of multivibrators and Schmitt trigger. Its use as waveform generator.

Suggested Reading

1. Thomas L. Floyd - Electronic Devices, 2-nd Ed, Merrill Publ.Co, Columbus-Ohio, 1988
2. Albert Paul Malvino - Electronic Principles, Tata McGraw-Hill, New Delphi, 1982
3. Stephan Senturia, Bruce Wedlock - Electronic Circuits and Applications, John Willey&Sons Inc. NY 1975

Name of The Course	ELECTRONIC DEVICES AND CIRCUITS LAB				
Course Code	DPCO2006				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		0	0	2	1

Course Objectives:1.Understand the working of diodes, transistors.
2. Understand the application of different electronic devices and simple circuits.
3.To expose students to the function and application of the diodes, bipolar junction and field effect transistors in electronic circuits.

Course Outcomes

CO1	Develop the understanding of power amplifiers and tuned voltage amplifiers.
CO2	Analyze different types of oscillators and wave shaping circuits.
CO3	Design Multi vibrators & OP-AMP Circuits.

Text Book (s):1. N.N.Bhargava, Kulshreshtha& Gupta - "Baisc Electronics & Linear Circuits" - Tata Mc.Graw-Hill.
Reference Book (s):1.N.N.Bhargava, Kulshreshtha& Gupta - "Baisc Electronics & Linear Circuits" - Tata Mc.Graw-Hill.
2.Albert Paul Malvino - Electronic Principles, Tata McGraw-Hill, New Delphi, 1982

Ex.1
To measure the overall gain of two stage R.C. coupled amplifier at 1 Khz and note the effect of loading of second stage on the first stage
Ex.2
To plot the frequency response of R-C coupled amplifier
Ex.3
(a) To plot the load Vs output power characteristics to determine the maximum signal input for undistorted signal output. (b) The above experiment is to be performed with single ended power amplifier; Transistorized push; pull amplifier; Complementary Symmetry power Amplifier

Ex.4
To observe the effect of a by-pass capacitor by measuring voltage gain and plotting of frequency response for a single stage amplifier
Ex.5
Measurement of voltage gain input and output impedance and plotting of frequency response of an emitter follower circuit.
Ex.6
Measurement of resonant frequency, plotting of the response curve (i.e. graph between input frequency and impedance) and calculation of Q with the help of this curve for series and parallel resonant circuit.
Ex.7
measure the frequency response of a single stage tuned voltage amplifier and calculation of the Q of the tuned circuit load
Ex.8
Observe and plot the output wave shapes of; (a) R-C differentiating circuits. (b) R-C integrating circuits for square wave input (Observe the effect of R-C time constant of the circuits on the output wave shape for both the circuits).
Ex.9
Identification, Pin configuration and basic working of different popular IC's - Ex.- Power amplifier, Oscillator, Tuned amplifier, Multivibrator, Timer.
Ex.10
Use of Op-Amp. (for IC-741) as Inverting and non-inverting amplifier, adder, comparator, buffer, scale changer.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	Principle of Digital Electronics				
Course Code	DPCO2003				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	T	P	C
		3	0	0	3

Course Objectives

1.To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.

2.To prepare students to perform the analysis and design of various digital electronic circuits.

3. To understand number representation and conversion between different representation in digital electronic circuits.

4. To analyze logic processes and implement logical operations using combinational logic circuits

Course Outcomes

CO1	Have a thorough understanding of the fundamental concepts and techniques used in digital electronics.
CO2	The ability to understand, analyze and design half adder and full adder circuit.
CO3	To understand and examine the structure of various number systems and its application in digital design.
CO4	The ability to understand, analyze and design various combinational and sequential circuits.
CO5	To develop skill to build, and troubleshoot digital circuits.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: Number System 8 Hours
1.1 Basic difference between analog and digital signal. 1.2 Application and advantages of digital and analog signal. 1.3 Binary, Octal and Hexadecimal number system; conversion from decimal octal and hexadecimal to binary and vice-versa. 1.4 Binary addition, subtraction, multiplication and division including binary points.1's and 2's complements method of subtraction,Boolean Algebra.

1.5 Gray code, Gray to binary conversion and vice-versa, 8421 and excess-3 codes; mention of other popular BCD codes
Unit II:Logic Gates 6 Hours
2.1 Definition, symbols and truth tables of NOT, AND, OR, NAND,NOR, EXOR Gates. 2.2 Use of NAND and NOR gates as universal gates. 2.3 Design of Half adder and Half subtractor. 2.4 Design of Full adder circuits and its operation.
Unit III: Logic Simplification 6 Hours
3.1 Boolean algebra, Karnaugh-mapping (upto 4 variables) and simple application in developing combinational logic circuits. 3.2 Implementation of logic equations with gates.
Unit IV: Combinational Circuits 6 Hours
4.1 LED, LCD, seven segment display, basic operation of variouscommonly used types. 4.2 Four Decoder circuits for 7 segment display. 4.3 Basic decimal to BCD encoder circuits. 4.4 Use of decoders/driver ICs with reference to commercial ICs. 4.5 Basic Multiplexer and Demultiplexer
Unit V: Sequential Circuits 10 Hours
5.1 Latches, flip Flop, Clock Pulse, Triggering techniques 5.2 Operation using waveforms and truth tables of following flipflops. RS, T, RST, D, JK, Master/Slave JK Flip Flops mention of commonly used ICs Flip flops. 5.3 Basics of Counters,Ring counter. 5.4 Introduction and Basic concepts including shift left and shift right. Serial in serial out, Serial in parallel out, Parallel in serial out, Parallel in parallel out. 5.5.Semi-conductor ROMs, PROMs, EPROM, SRAM, DRAM, Basic structure and working of CCD, R/W memory.

School of Suggested Reading

1.Malvino& Leach- Digital Principles & Application- Mcgraw Hill- 5th Edition.
2.Mano, M. Morris- Digital Logic and Computer Design- Prentic Hall (India).
3.Digital Electronics by S.Salivahan.
4.Digital Fundamentals by Floyd.

Name of The Course	PRINCIPLES OF DIGITAL ELECTRONICS LAB				
Course Code	DPCO2007				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		0	0	2	1

Course Objectives:1.To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
2. To prepare students to perform the analysis and design of various digital electronic circuits.

Course Outcomes

CO1	Design combinational circuits.
CO2	Develop the understanding of various synchronous and asynchronous sequential circuits.

Text Book (s):1. Malvino& Leach- Digital Principles & Application- Mcgraw Hill- 5th Edition.
Reference Book (s):1.Digital Electronics by S.Salivahan.
2.Digital Fundamentals by Floyd.

Ex.1
Identification of Ic-nos, Pin-nos, Ic types.
Ex.2
Familiarization With TTL And MOS ICs.
Ex.3
To observe that logic low and logic high of logic gate.
Ex.4
To observe the propagation delay of TTL logic gate.
Ex.5
Observation of the difference between MOS and TTL gates under the following heads (a) Logic levels. (b) Operating voltages. (c) Propagation delay.
Ex.6
Familiarization and use different types of LEDs commonanode and common cathode seven segment display.
Ex.7
Use of 7447 BCD to 7-segment decoder.

Ex.8
Verification of truth table for 2 Input NOT, AND, OR, NAND,NOR, XOR Gates.Design and Implementation Of Simple Logic Circuits.
Ex.9
To construct a 4-bit even/odd parity generator/checker using XOR gates and to verify their truth tables.
Ex.10
To construct half adder and half subtract or using XOR and NAND gates verification of their truth tables.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	Technical Drawing				
Course Code	DPCO2004				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	T	P	C
		2	0	0	2

Course Outcomes

CO1	Use the techniques and able to interpret the drawing in Engineering field
CO2	Interpret engineering drawings using fundamental technical mathematics
CO3	Construct basic and intermediate geometry products
CO4	Develop their visualization skills so that they can apply these skills in developing new products
CO5	Draw two-dimensional orthographic drawings and three-dimensional isometric views

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
30	20	50	100

Course Content:

Unit I: STANDARD SYMBOLS OF PASSIVE DEVICES. 3 hours
. 1.1 Resistors Capacitors: Fixed, preset, variable, electrolytic and ganged types. 1.2 Inductors: Fixed, tapped and variable types, RF & AF chokes, Air cored, Solid cored &laminated cored. 1.3 Transformers: Step-up, step-down. AF & RF types, Auto-transformer, IF transformer. Antenna, Chassis, Earth, Loudspeaker, Microphone, Fuse Indicating lamp, Coaxial cable, Switches-double pole single throw (DPST), Double pole throw (DPT) and Rotary types terminal and connection of conductors.
Unit II: ACTIVE DEVICES 5 Hours
Semiconductor : Rectifier diode, Zener diode, Varactor diode, Tunnel diode, Photo, Light emitting diode (LED), Bipolar transistor, junction field effect transistor (JFET), Mosfet, Photo transistor, Uni junction transistor (UTJ), Silicon control rectifier (SCR), Diac, Triacs outlines (with their types numbers e.g TO3, TO5, TO18, TO39, TO65 etc) of the different types of semiconductor diodes, Transistors Scrs, Diacs, Triacs and ICs (along with indicators for pin identification etc.)
Unit III: COMMUNICATION INSTRUMENTS 2 Hours
Telephone Transmitter, Receiver, Filters & Hybrid transformer
Unit IV: LOGIC GATES 4 Hours
Draw standard symbols of NOT, AND, NAND, OR, NOR XOR, Expandable & Tristate gates, Op Amp IC, Flip-flops (Combination of 2,3,4 input gates should be drawn).
Unit V: SKETCHES/CIRCUIT DIAGRAMS 8 Hours
5.1 Circuit diagram of a Wein's bridge oscillator. 5.2 Circuit diagram of a Battery eliminator. 5.3 Block diagram of a typical Radio receiver. 5.4 Block diagram of an Electronic multimeter. 5.5 Circuit of Emergency light. 5.6 Circuit diagram of Voltage stabilizers.

5.7 Circuit diagram of Fan regulator. 5.8 Schematic Diagram of electrical & Electronic CKT.

School of Diploma Engineering

Suggested Reading

1.Jensen, Cecil. H , Engineering Drawing and Design, New York: McGraw-Hill

2. Basic Engineering Drawing by R.S. Rhodes & L.B. Cook

3. Electronics Engineering Drawing Book,A.K Mittal

Name of The Course	ENGG. MECHANICS & MATERIALS				
Course Code	DPME2018				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	T	P	C
		3	0	0	3

Course Objectives

1. Understand the basics of engineering mechanics and forces

2. Understand the laws of forces and their concept

3. compare and relate the stress and strain and properties of materialselectronic circuits

Course Outcomes

CO1	Recognize and analyse basic theory and principles of forces in mechanics and their relationship to engineering
CO2	Describe the resultant forces (combination of forces) and laws of forces
CO3	Describe and understand the rigid body concept and moment.
CO4	Calculate and Understand the concept of stress and strain and torsion
CO5	Differenciate different material properties and welding,soldering, brazing techniques

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: Introduction 6 Hours
Mechanics and its utility. Concept of scalar and vector quantities. Effect of a force. Tension & compression. Rigid body. Principle of physical independence of force. Principle of transmissibility of a force.
Unit II:Forces Analysis 8 Hours
Concept of coplanar and non-coplanar forces including parallel forces. Concurrent and non-concurrent forces. Resultant force. Equilibrium of forces. Law of parallelogram of forces. Law of triangle of forces and its converse. Law of polygon of forces. Solution of simple engineering problems by analytical and graphical methods such as simple wall crane, jib crane and other structures. Determination of resultant of any number of forces in one plane acting upon a praticle, conditions of equilibrium of coplanar concurrent force system.
Unit III: General Condition of Equilibrium 10 Hours
General condition of equilibrium of a rigid body under the action of coplaner forces, statement of force law of equilibrium, moment law of equilibrium, application of above on body.
Unit IV: Stresses and strains 10 Hours
Concept of stress and strain. Concept of various types of stresses and strains . Definitions of tension, compression shear, bending, torsion. Concept of volumetric and lateral strains, Poisson's ratio. Mechanical properties of MS, SS, CI Al and etc
Unit V:(A) Materials & Concept Used In Electronics & (B) Soldering & Brazing: 10 Hours
Soldering materials - Type, chemical composition and properties, Soldering alloys - Tin lead, Tin antimony, Tin silver, Lead silver, Tin zinc, Different types of flux and their properties, Properties of plastics materials, Epoxy materials for PCB (Single and multi layer board), Emulsion parameters, Film emulsion, Type of laminates (Phenolic, Epoxy, Polyster, Silicon, Melamine, Polymide), Properties of copper clad laminates, Material (Filler, Resin, Copper Foil) Photo printing basic for double side PCB, Photo resin materials coating process materials, Screen printing and its materials Etching agent, Film processing and

used materials.For black Galvanized and Tin coated Iron sheet, brass and copper sheets only. (1) Its concept, comparison with welding as joining method and classification, electric soldering and forge soldering. (2) Soldering operation- edge preparation of joints, Pickling and degreasing, Fluxing, Tinning and Soldering. Wave soldering, solder mask, Dip soldering, Drag soldering, (3) Materials Used-Common fluxes, soft and hard solder, solder wire (Plain and Resin core) and sticks, spelters and their specifications and description (For Identification Only), forge soldering bits. (4) Electric soldering iron, other soldering tools. (5) Common defects likely to occur during and after soldering. (6) Safety of Personnel, Equipment & Tools to be observed.

Suggested Reading

1. Karmveer, 'Engineering Mechanics and Material,First edition:2016,A unit of Krishna Group, I.S.B.N. No.:978-81-8283-860-4
2. Dr.P.C.Sharma, 'Production technology', (Manufacturing Processes)

Name of The Course	Principles of Communication Engineering			
Course Code	DPCO2008			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	3	0	0	3

Course Objectives

1 Develop and compare the functional blocks of coding/modulation and demodulation/decoding for analog and digital communication systems.

2. Analyze the analog-to-digital conversion process with emphasis on Nyquist Sampling Criteria, pulse shaping and optimum detection functions

3. Student understand the basic signals and systems

Course Outcomes

CO1	Illustrate the basic of analog communication.
CO2	Develop understanding about AM transmission and reception
CO3	Explain about FM and PM transmission and reception
CO4	Analyze different characteristics of pulse modulation
CO5	Identify different types of noise and predict its effect on various analog communication systems.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: Introduction 2 Hours
Need for modulation and demodulation in communication systems.) Basic scheme of modern communication system.
Unit II:AMPLITUDE MODULATION **8 Hours**
(a) Derivation of mathematical expression for an amplitude modulated wave showing Carrier and side band components. (b) Significance of Modulation index, spectrum and bandwidth of AM wave, relative power distribution in carrier and sidebands. PRINCIPLE OF AM MODULATORS-Working principles and typical applications of (a) Collector Modulator (b) Balanced Modulator DEMODULATION OF AM WAVES- (a) Principles of demodulation of AM wave using diode detector circuit, concept of diagonal clipping and formula for minimum distortion (No derivation). (b) Principle of demodulation of AM wave using synchronous detection (c) Elementary idea of DSB-FC, DSB-SC, SSB-SC, ISB and VSB modulations, their comparison and areas of applications
Unit III: FREQUENCY MODULATION **10 Hours**

(a) Derivation of expression for frequency modulated wave and its frequency spectrum (without proof and analysis of Bessel function), modulation index, maximum frequency deviation and deviation ratio, BW of FM signals, Carlson's rule. (b) Effect of noise on FM carrier, noise triangle, need for pre-emphasis and de-emphasis, capture effect. (c) Comparison of FM and AM communication system. PRINCIPLES OF FM MODULATORS-(a) Working principles and applications of reactance modulator, VCO and Armstrong phase modulator, stabilization of carrier using AFC. (b) Block diagram and working principles of reactance transistor and Armstrong FM transmitters DEMODULATION OF FM WAVES-(a) Basic principles of FM detection using slope detector. Principles & working of the following FM demodulators.Ratio Detector,Phase Locked Loop (PLL) FM Detector
Unit IV: PHASE MODULATION 10 Hours
Derivation of expression for phase modulated wave, modulation index, comparison with frequency modulation (a) Working principles and applications of reactance modulator, VCO and Armstrong phase modulator, stabilization of carrier using AFC. (b) Block diagram and working principles of reactance transistor and Armstrong FM transmitters Project Based Learning: digital data transmission system.
Unit V:MULTIPLEXING TECHNIQUE 10 Hours
(a) Statement of sampling theorem and elementary idea of sampling frequency for pulse modulation. (b) Basic concepts of time division multiplexing (TDM) and frequency division multiplexing (FDM). (c) Basic ideas about PAM,PPM,PWM and their typical applications. (d) Basic Block diagram and working principle of ASK, PSK, FSK & QPSK

Suggested Reading

1. "Introduction to Analog & Digital Communication Systems", "Haykin Simon", John Wile
2 .B.P.Lathi, "Digital and analog communication system", international 4th Edition, OXFORD university press, ISBN : 0195110099, 9780195110098

Name of The Course	PRINCIPLES OF COMMUNICATION ENGG. LAB			
Course Code	DPCO2012			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives:1. Develop and compare the functional blocks of coding/modulation and demodulation/decoding for analog and digital communication systems.
2. Analyze the analog-to-digital conversion process with emphasis on Nyquist Sampling Criteria, pulse shaping and optimum detection functions

Course Outcomes

CO1	Develop understanding about AM transmission and reception.
CO2	Demonstrate FM and PM transmission and reception.
CO3	Analyze different characteristics of pulse modulation.

Text Book (s):1. "Introduction to Analog& Digital Communication Systems", "Haykin Simon", John Wile
Reference Book (s):1.B.P.Lathi, "Digital and analog communication system", international 4th Edition, OXFORD university press, ISBN : 0195110099, 9780195110098
2.Kennedy" Electronic Communications" McGraw Hill Publication, ISBN-13:978-0-07- 463682-4; ISBN-10:0-07-463682-0

Ex.1
(a) To conserve an AM wave on CRO produced by a standard signal generator using internal and external modulation. (b) To measure the modulation index of the wave obtained in above practical.
Ex.2

a) To obtain an AM wave from a collector modulator circuit and observe the AM pattern on CRO. (b) To measure index of modulation of the AM signal for different levels of modulating signal.
Ex.3
To obtain a FM wave from reactance tube modulator/voltage controlled oscillator circuit and measure the frequency deviation for different modulating signals
Ex.4
To obtain modulating signal from an AM detector circuit and observe the pattern for different RC time constants and obtain its optimum value for least distortion.
Ex.5
To obtain modulating signal from a FM detector (Fosterseely/Ratio detector/quradrature/IC) circuit and plot the discriminator characteristics.
Ex.6
To observe the sampled signal and compare it with the analog input signal. Note the effect of varying the sampling pulse width and frequency on the sampled output
Ex.7
To verify the sampling theorem.
Ex.8
To time division multiplex the two given signals.
Ex.9
To measure the quantization noise in a 3 bit/4 bit coded PCM signal.
Ex.10
To study the process of delta modulation/demodulation.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	Antenna, Microwave & Radar Engineering				
Course Code	DPCO2009				
Prerequisite	DPCO2001				
Co-requisite					
Anti-requisite					
		L	T	P	C
		3	0	0	3

Course Objectives

1. To understand Analysis of Waveguides and gain complete knowledge about Microwave Components.

2. Design of Impedance Matching and Tuning using lumped and distributed elements for network

3. To Analysis and study characteristics of microwave tube
Generators and Amplifiers.

Course Outcomes

CO1	Identify basic antenna parameters
CO2	Design and analyze wire, aperture and microstrip antennas
CO3	Explain various antenna measurements
CO4	Analyze and measure different microwave components.
CO5	Identify characteristics of radio wave propagation.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: Introduction 2 Hours
Antenna as an element of wireless communication system, Types of antennas Antenna parameters: Radiation pattern (polarization pattern, Field and phase pattern), Radiation intensity, Beam width, Gain, Directivity, Polarization, Bandwidth, Efficiency,Effective height, Effective aperture of different antenna
Unit II:ANTENNA AS A TRANSMITTER AND RECEIVER 8 Hours
Power delivered to antenna as a receiver, Input impedance and friss transmission equation, Properties of uniform plane waves, Radiation from an infinitesimal small current element, Radiation from an elementary dipole (Hertzian dipole), Power density and radiation resistance for small current element and half wave dipole
Unit III: MICROSTRIP ANTENNAS 10 Hours

Microstrip Antennas & their advantages , Rectangular Patch , Circular Patch , Quality Factor, Bandwidth, and Efficiency, Transmission Line model analysis of Microstrip Antenna. Dielectric effect, Dielectric Loss Tangent- tan δ
Unit IV: MICROWAVE 10 Hours
Introduction to microwave and its applications, classification on the basis of its frequency band according ITU standards. Construction, Operating Principles, Performance characteristics and Applications of the following - (a) Microwave Tubes- Multi-cavity Klystron, Multi-cavity Magnetron, Reflex Klystron, Travelling wave tube and BWO. (b) Microwave Semiconductor Devices - PIN, Tunnel Diode, IMPATT and TRAPATT and Gun diode(in brief only) Different types of waveguides and their applications. Propagation constant of a rectangular waveguide, cut off wavelength, guide wavelength. (No Mathematical Derivation), Microwave components-Tees, Bends, Matched termination, Detector mount, Slotted section, directional coupler, Circulator and duplexar-their constructional features characteristics and application.
Unit V: RADAR SYSTEMS 8 Hours
Introduction to Radar, its various application. Radar range equation (No Derivation) and its application Block diagram and operating principle of basic pulse radar Block diagram, operating principle of CW (Doppler) and FMCW radars and their application. Project based learning: Working model of a Radar System

Suggested Reading

1. “Antennas and Radio Propagation, Collins, R. E, McGraw-Hill,1987
2 . Antennas, Kraus and RonalatoryMarhefka, John D., Tata McGraw-Hill, 2002

Name of The Course	ANTENNA,MICROWAVE & RADAR ENGG. LAB
Course Code	DPCO2013
Prerequisite	DPCO2005
Corequisite	
Antirequisite	

	L	T	P	C
	0	0	2	1

Course Objectives:1. To understand Analysis of Waveguides and gain complete knowledge about Microwave Components.
2. Design of Impedance Matching and Tuning using lumped and distributed elements for network

Course Outcomes

CO1	Identify basic antenna parameters
CO2	Design and analyzewire,aperture and microstrip antennas
CO3	Determine various antenna measurements

Text Book (s):1. Antenna Theory, Ballanis, John Wiley & Sons, 2003

Reference Book (s): Antennas and Radio Propagation, Collins, R. E, McGraw-Hill,1987.

List of Experiments
Ex.1
Study radiation pattern of any two types of linear antenna
Ex.2
Study of waveguide horn and its radiation pattern and determination of the beam width.
Ex.3
To study working of MIC Components like Micro strip Line, Filter, Directional Coupler,Wilkinson Power Divider, Ring resonator & coupler, antennas & amplifies.
Ex.4
Measurement of impedance of an unknown load connected at the output end of the slotted line carriage in a Micro wave Bench.
Ex.5
Measurement of guide wavelength and frequency of the signal in a rectangular Waveguide using slotted line carriage in a Micro wave Bench.
Ex.6
Study various parameters of Isolator .
Ex.7
Measurement of attenuation of a attenuator and isolation, insertion loss, cross coupling of a circulator.
Ex.8
Determine the S-parameter of a Magic Tee.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks

50	-	50	100

Name of The Course	Microprocessor and its Applications				
Course Code	DPCO2010				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	T	P	C
		3	0	0	3

Course Objectives

1. To understand basic architecture of 16 bit and 32 bit microprocessors

2. Develop worst-case execution time of programs programs, to maximize its run time memory or execution-time.

Course Outcomes

CO1	Develop assembly language programs of moderate complexity.
CO2	Identify an appropriate 'architecture' or program design to apply to a particular situation.
CO3	Develop worst-case execution time of programs programs, to maximize its run time memory or execution-time.
CO4	Explain the effects of the properties of the bus on the overall performance of a system.
CO5	Compare the characteristics of RISC and CISC architectures.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: OVERVIEW OF MICROCOMPUTERS SYSTEM 8 Hours

1.1 Functional block. (a) CPU.
(b) Memory.
(c) Input/Out devices (Key board, Floppy drive, Hard disk drive, Tape drive, VDU, Printer, Plotter).
1.2 Concept of programme and data memory.
(a) Registors (general purpose).
(b) External memory for storing data and results.
1.3 Data transfer between registers.
1.4 Concept of tristate bus.
1.5 Control on registers.

Unit II:MEMORY OF A MICROCOMPUTER 8 Hours

2.1 Concept of byte organized memory.
(a) Address inputs.
(b) Address space.
(c) Data input/output.
2.2 Addressing and Address decoding.
(a) Memory system organization.
(b) Partitioning of total memory space into small blocks.
(c) Bus contention and how to avoid it.
2.3 Memory chips.
(a) Types of ROM, RAM, EPROM, PROM.
(b) Read/Write inputs.
(c) Chip enable/select input.
(d) Other control input/output signals.
- Address latching.
- Read output.
- Address strobes.
(f) Power supply inputs.
2.4 Extension of memory.
- In terms of word length and depth

Unit III: C P U AND CONTROL 10 Hours

3.1 General microprocessor architecture.
3.1 Instruction pointer and instruction register.
3.2 Instruction format, Machine and Mnemonics codes, Machine and Assembly language.
3.3 Instruction decoder and control action.
3.4 Use of Arithmetic Logic Unit.
- Accumulator.
- Temporary Register.
- Flag flip-flop to indicate overflow, underflow, and zero result occurrences.
3.5 Timing and control circuit.
- Crystal and frequency range for CPU operation.
- Control bus to control peripherals.

Unit IV: ASSEMBLY LANGUAGE PROGRAMMING 10 Hours

4.1Evolution of Microprocessor, Internal organization of 8085 4.2Register Structure, ALU, BUS Organization 4.3Timing and Control, Pin Diagram of 8085 4.4 internal organization of 8086, Bus Interface Unit, Execuation Unit, Unit, register, Organization. 4.5Sequential Memory Organization, Bus Cycle, Pin Diagram of 8086. Addressing Modes. 4.6 Data

Transfer, Instructions, Arithmetic and Logic Instruction, Program Control Instructions (Jumps, Conditional Jumps, Subroutine Call) Loop and String Instructions, Assembler Directives.
Unit V: MICRO CONTROLLERS 8 Hours
5.1Brief idea of Microcontroller 8051 5.2Pentium and Power PC 5.3MEMORY INTERFACING 5.4Types of Memory, RAM and ROM Interfacing with Timing Considerations, DRAM Interfacing

Suggested Reading

1. A.K.Ray and K.M.Bhurchandi, "Advanced Microprocessors and Peripherals", Tata
2 . Muhammad Ali Mazidi and Janice Gillispie Mazidi, " The 8051 – Microcontroller and Embedded systems",7th Edition, Pearson Education , 2004.

Name of The Course	MICROPROCESSOR AND ITS APPLICATIONS LAB				
Course Code	DPCO2014				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		0	0	2	1

Course Objectives:1.To understand basic architecture of 16 bit and 32 bit microprocessors.
2. To understand interfacing of 8 bit microprocessor with memory and peripheral chips involving
system design.

Course Outcomes

CO1	Develop assembly language programs of moderate complexity.
CO2	Develop worst-case execution time of programs programs, to maximize its run time memory or execution-time.
CO3	Identify an appropriate 'architecture' or program design to apply to a particular situation.

Text Book (s):1. A.K.Ray and K.M.Bhurchandi, "Advanced Microprocessors and Peripherals",Tata McGrawHill,2000.

Reference Book (s):1.Ramesh S. Gaonkar, "Microprocessor & its Applications.
2.Doughlas.V.Hall, " Microprocessor and Interfacing : Programming and Hardware", 2nd edition, McGraw Hill, 1991.

Ex.1
Addition of two 8 bit numbers
Ex.2
(a) To obtain 2's complement of 8 bit number (b) To subtract a 8 bit number from another 8 bit number using 2's Complement
Ex.3
Extract fifth bit of a number in A and store it in another register.
Ex.4
Count the number of bits in high state in accumulator
Ex.5
Check even parity and odd parity of a binary number
Ex.6
Addition of two sixteen bit numbers
Ex.7
Subtraction of a sixteen bit number from another sixteen bit number
Ex.8
Multiplication of two 8 bit numbers by repetitive subtraction
Ex.9
Divide two 8-bit numbers by repetitive subtraction
Ex.10
(a) Smallest number of three numbers. (b) Largest number of three numbers

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	Electronic Instruments & Measurements
Course Code	DPCO2011

Prerequisite					
Co-requisite					
Anti-requisite					
		L	T	P	C
		3	0	0	3

Course Objectives

1. Understanding the requirements to generate electronic signals.

2. Discussing different techniques to stabilize strength and frequency.

3. Understanding different techniques to measure frequency.

Course Outcomes

CO1	Develop skill of multimeters, voltmeters, ammeters, CRO for electronics projects. Review basics of Measurements.
CO2	Design a system, component or process to meet desired needs in electronics engineering.Study of various measuring instruments and devices. 3. Measure R, L, C , Voltage, Current, Power factor , Power.
CO3	Measure R, L, C , Voltage, Current, Power factor , Power.Understand the basics of CRO and its applications.
CO4	Calculate unknown values for ac bridges.
CO5	Test frequency, phase with Oscilloscope & frequency generator

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: Basics of Measurement: **5 Hours**
(i) Review of performance, specifications of instruments, accuracy, precision, sensitivity, resolution range etc. Errors in measurement and loading effects.
Unit II:Measuring Devices:8 Hours
2.1 Concept of byte organized memory. (a) Address inputs. (b) Address space. (c) Data input/output. 2.2 Addressing and Address decoding. (a) Memory system organization. (b) Partitioning of total memory space into small blocks. (c) Bus contention and how to avoid it. 2.3 Memory chips. (a) Types of ROM, RAM, EPROM, PROM. (b) Read/Write inputs. (c) Chip enable/select input. (d) Other control input/output signals. - Address latching. - Read output. - Address strobes. (f) Power supply inputs. 2.4 Extension of memory. - In terms of word length and depth
Unit III: Cathode Ray Oscilloscope **10 Hours**
(i) Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only no mathematical treatment) Deflection sensitivity, brief mention of screen phosphor for CRT in relation to their visual persistence and chemical composition (ii) Explanation of time base operation and need for blanking during fly back ; synchronization (iii) Block diagram explanation of a basic CRO and a triggered sweep oscilloscope, front panel controls (iv) Specifications of a CRO and their significance (v) Use of CRO for the measurement of voltage (dc and ac) frequency, time period and phase angles (vi) Special features of dual trace, delayed sweep and storage CROs (brief mention only); introduction to digital CROs (vii) CRO probes, including current probes.
Unit IV: Signal Generators and Analysis Instruments **10 Hours**
(i) Block diagram, explanation and specifications of (a) Laboratory type low frequency and RF signal generators, (b) Pulse generator and function generator (ii) Brief idea for testing, specification for the above instruments (iii) Distortion factor meter, wave analysis and spectrum analysis (i) Block diagram explanation of working principles of a laboratory type (balancing type) RLC Bridge. Specifications of a RLC bridge. (ii) Block diagram and working principles of a Q-meter
Unit V:Digital Instruments **8 Hours**

(i) Comparison of analog and digital instruments, characteristics of a digital meter
(ii) Digital voltmeter
(iii) Block diagram and working of a digital multi-meter
(iv)Working principle of time interval, frequency and period measurement using universal counter/frequency counter, time-base stability, accuracy and resolution
(v) Principles of working and specifications of logic probes, signature analyzer and logic analyzer.
(vi) Digital, LCR bridges

Suggested Reading
1. J.B.JUPTA, "Electrical and Electronic Measurements and Instruments"
2 . A. K. Sawhney - A course in Electrical & Electronic Measurement & Instrumentation - Dhanpat Rai & Sons.

Name of The Course	Electronic Instruments & Measurements Lab				
Course Code	DPCO2019				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		0	0	2	1

Course Objectives:1. Understanding the requirements to generate electronic signals.
2. Discussing different techniques to stabilize strength and frequency

Course Outcomes

CO1	Develop skill of multimeters, voltmeters, ammeters, CRO for electronics projects.
CO2	Measure R, L, C , Voltage, Current, Power factor , Power.
CO3	Calculate unknown values for ac bridges.

Text Book (s):1. J.B.JUPTA, "Electrical and Electronic Measurements and Instruments"

Reference Book (s): A. K. Sawhney - A course in Electrical & Electronic Measurement & Instrumentation - Dhanpat Rai & Sons

List of Experiments
Ex.1
To observe the loading effect of a multimeter while measuring voltage across a low resistance and high resistance
Ex.2
To observe the limitations of a multimeter for measuring high frequency voltages and currents
Ex.3
To measure Q of a coil and observe its dependence on frequency, using a Q-meter
Ex.4
Measurement of voltage, frequency, time period, and phase angle using CRO
Ex.5
Measurement of time period, frequency, average period using universal counter/frequency counter
Ex.6
Measurement of rise, fall and delay times using a CRO
Ex.7
Measurement of distortion of a LF signal generator using distortion factor meter
Ex.8
Measurement of R,L and C using a LCR bridge/universal bridge

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	Computer Programming And Applications
Course Code	DPCS2015
Prerequisite	

Co-requisite					
Anti-requisite					
		L	T	P	C
		3	0	0	3

Course Objectives

1. To create awareness and emphasize the need for the roll of computer in Engineering.

2. To give a general understanding on working of computer.

Course Outcomes

CO1	Discuss the basic terminology used in computer programming.K2
CO2	Develop compile and debug programs in C language.K4
CO3	Use different data types in a computer program.K3
CO4	Develop programs involving decision structures, loops and functions.K4
CO5	Explain the difference between call by value and call by reference and programming skill.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: INTRODUCTION(Familiarization With Operating System): 5 Hours
(i) Review of performance, specifications of instruments, accuracy, precision, sensitivity, resolution range etc. Errors in measurement and loading effects.
Unit II:PROGRAMMING BASICS: :8 Hours
Introduction to computer Operating System (Dos, Windows'95). ? Introduction to Dos structure, system files, batch files & configuration files. Booting the system from floppy & hard disk. Brief Introduction to Dos internal & external commands. Familiarisation with windows structures, its use and application.
Unit III: ARRAYS AND STRINGS: 10 Hours
Arrays: Initialization – Declaration – One dimensional and two dimensional arrays. String-: String operations – String Arrays. Simple programs: sorting- searching – matrix operations.
Unit IV: FUNCTIONS AND POINTERS: 10 Hours
Function: definition of function – Declaration of function – Pass by value – Pass by reference – Recursion – Pointers: Definition – Initialization – Pointers arithmetic – Pointers and arrays- Example Problems (Programs with user defined functions – Includes Parameter Passing)
Unit V:Digital Instruments 8 Hours
Introduction – need for structure data type – structure definition – Structure declaration –- Union
Commercial and business data processing application. Engineering computation. CAD, CAM, CAE, CAI.

Suggested Reading

1. J.B.JUPTA, "Electrical and Electronic Measurements and Instruments"

2 . A. K. Sawhney - A course in Electrical & Electronic Measurement & Instrumentation - Dhanpat Rai & Sons.

Name of The Course	Computer Programming And Applications Lab				
Course Code	DPCS2014				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		0	0	2	1

Course Objectives:1. Understand the dynamics of memory by the use of pointers..

2. Explain the difference between call by value and call by reference and programming skill

Course Outcomes

CO1	Develop compile and debug programs in C language
CO2	Use different data types in a computer program.

CO3	Develop programs involving decision structures, loops and functions

Text Book (s):1. B. RAM " Computer Fundamentals Architecture and Organization " New Age International

Reference Book (s): Henry Lucas " Information Technology for Management " Mcgraw-Hill College

List of Experiments
Ex.1
Create database file
Ex.2
C Programming using Simple statements and expressions
Ex.3
Scientific problem solving using decision making and looping
Ex.4
Simple programming for one dimensional and two dimensional arrays.
Ex.5
Solving problems using String functions
Ex.6
Programs with user defined functions – Includes Parameter Passing
Ex.7
Program using Recursive Function.
Ex.8
Program using structures and unions.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	Modern Communication Systems				
Course Code	DPCO3002				
Prerequisite	DPCO2008				
Co-requisite					
Anti-requisite					
		L	T	P	C
		3	0	0	3

Course Objectives

1. Demonstrate understanding of various analog and digital modulation and demodulation techniques techniques.

2. To enable the student to become familiar with satellites and satellite services.

Course Outcomes

CO1	Discuss the basic ideas of Communication System
CO2	Apply basic concept of fiber optical system and optical communication
CO3	Identify Digital communication like sampling, modulation and error detection and correction capability
CO4	Illustrate the basic concepts of Satellite communication and ideas about different orbits.
CO5	Design and working principles of mobile communication.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: INTRODUCTION TO COMMUNICATION SYSTEM 3 Hours
Basic idea of telegraphy, telephonic, digital, microwave, fibre optics, satellite, mobile and data communication.
Unit II:OPTICAL COMMUNICATION AND DEVICES 8 Hours
2.1 Introduction : Block diagram of optical fiber communication system, advantages of optical communication 2.2 Optical Fibre : Structure of optical wave guide, light propagation in optical fiber, Ray and wave theory, Modes in optical fiber, Step and Graded index fibers 2.3 Transmission Characteristics of Optical Fibers : Signal degradation in optical fibers, Attenuation losses in optical fibers. Dispersion and pulse broadening in different types of fibers, Modal birefringence and polarization maintaining fibers. 2.4 Requirements for Photo detectors, Types of photo detectors, Characteristics of photo detectors. Principle of APD and Pin diodes. Phot transistor and Photo Conductors. 2.5 Components of an optical fiber communication system, Digital and

Analog Optical Communication System. 2.6 Semiconductor Lasers - Laser action, PN junction laser, Febry- Perot resonators. 2.7 Optical Detectors: Introduction, Photodiode- Material and types. Avalanche Photo Diode (APD), PIN diode,Temperature effect on avalanche gain, noice in APD.
Unit III: DIGITAL COMMUNICATION 10 Hours
3.1 Elements of Digital Communication and information theory : Model of a digital communication system, Logarithmic measure of information. Source coding fixed in and variable length code words. Hartely-Shannon law for channel. 3.2 Sampling Theory and Pulse Modualtion : Sampling theorem, Signal reconstruction in time domain. Types of analog pulse modulation, Method of generation and detection of PWM, PNM and PPM. 3.3 Waveform Coding Technique : Quantization, Quantization noise, Encoding and Pulse code modulation, Differential pulse code modulation, Delta modulation, Comparison of PCM and DM. 3.4 Digital Multiplexing : Fundamentals of time division multiplwxing electronic commutator. 3.5 Digital Modulation Techniques : Types of digital modulation, Wave forms for amplitude, Frequency and phase shift keying, Method of generation and detection of coherent and noncoherent binary ASK,FSK & PSK, Differential phase shift, Quadrature modulation techniques. (QPSK and MSK) Probability of error and comparison of various digital modulation techniques. 3.6 Error Control Coding : Error free communication over a noisy channel, Hamming sphere, Hamming distance and Hamming bound, Relation between minimum distance and error detecting and correcting capability.
Unit IV: SATELLITE COMMUNICATION 10 Hours
4.1 Introduction, historical background and basic Concepts of satellite communication. Elements of satellite communication link. 4.2 Geostationary orbits, Orbit mechanisms and launching of satellite. 4.3 Satellite space craft- Satellite sub system, Tracking and Command, Communication subsystem, Transponders, Space Craft antenna. 4.4 Satellite Channel and Link Design : Design of down links and uplinks. 4.5 Multiple access techniques :Frequency Division Multiple Access (FDMA), FDM/FM/FMFDMA, Time division, Multiple Access, Frame Structure and Synchronization, Code division, Multiple Access, random Access. 4.6 Introduction to DTH system
Unit V: MOBILE COMMUNICATION 8 Hours
5.1 Evaluation of mobile communication, A simplified reference model for mobile communications. 5.2 A brief introduction of frequency for radio transmission, signals, propagation, Multiplexing, Modulation, Spread spectrum, Cellular system. 5.3 Medium Access Control : Introduction To MAC, Advance Mobile Phone. Introduction to GSM(Global System For Mobile Communication), GPRS, GPS, Enable Positioning System.

Suggested Reading

1. J. Gowar - Optical Communication - PHI.
2. D. C. Agarwal - Satellite Communication - Khanna Pub.

Name of The Course	Modern Communication Systems Lab				
Course Code	DPCO3007				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		0	0	2	1

Course Objectives:1. Demonstrate understanding of various analog and digital modulation and demodulation techniques techniques.
2. To enable the student to become familiar with satellites and satellite services.

Course Outcomes

CO1	Apply basic concept of fiber optical system and optical communication
CO2	Illustrate the basic concepts of Satellite communication and ideas about different orbits.
CO3	Identify Digital communication like sampling, modulation and error detection and correction capability

Text Book (s):1. J. Gowar - Optical Communication - PHI.

Reference Book (s): D. C. Agarwal - Satellite Communication - Khanna Pub

List of Experiments
Ex.1
To study the parts of telephone hand set: (a) Frequency response of telephone receiver. (b) To observe the wave form of impulses by dialling a number.
Ex.2
Visit and study of Digital Switching System
Ex.3
Visit and study of Satellite transmission system.
Ex.4
Demonstration of sampling, FSk and PSK by simple experiment.
Ex.5
Demonstration of optical fibre communication through simple kits.
Ex.6
Study of working of mobile phones and its services.
Ex.7
Study and use of ISDN and Internet services
Ex.8
Testing and fault finding of mobile phone and its service.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	INDUSTRIAL ELECTRONICS AND TRANSDUCERS				
Course Code	DPCO3003				
Prerequisite	None				
Co-requisite					
Anti-requisite					
		L	T	P	C
		3	0	0	3

Course Objectives

1.Describe modern electronic devices available in industry e.g. thyristers, Inverters etc.

2.Discuss different types of heating

3.Explain single and three phase devices

4. Sensing devices (sensors & Transducers) and optoelectronics

Course Outcomes

CO1	Describe modern electronic devices available in industry e.g. thyristers, Inverters etc
CO2	Discuss different types of heating
CO3	Explain single and three phase devices
CO4	Examine sensing devices (sensors & Transducers)
CO5	Illustrate basic concepts of Opto-electronic devices

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: 1.1Name, symbol and typical applications of members of thyristor family.

1.2SCR, Triac and Diac-Basic structure, operation, V-I characteristics and ratings, gate circuits, ratings, triggering process and triggering circuits, turn off methods and circuits, selections of heat sinks, mounting of thyristor on heat sinks, basic idea of protection of thyristor circuits.

1.3Operation, V-I characteristics, equivalent circuit and parameters of an UJT: Description of UJT relaxation oscillator, use of UJT relaxation oscillator for triggering thyristors.

1.4Diac SCR and Triac switching circuits like automatic battery charger, voltage regulator, emergency light, alarm circuits, time delay relay circuits and circuits for over current and over voltage protection.

1.5 Single phase, various types of phase controlled rectifiers using SCR for resistive and inductive load explanation using wave shapes and appropriate mathematical equation (No derivation).

1.6 A.C. phase control using SCRs and triacs, Application of phase controlled rectifiers and A.C. phase control circuits in illumination control, temperature control, variable speed drives using d.c. moters and small a.c. Machines 1.7Half wave, full wave (including bridge) poly phase rectifiers using SCRs; explanation using wave shapes and formula (no derivation). Operation of three Phase Bridge controlled rectifier and its applications. 1.8Principle of operation of basic inverter circuits, basic series and parallel commutated inverters, principle of operation of cycloconverter, choppers and dual converter, mention of applications. Project Based Learning: Comparison chart of thyristor family elements.
Unit II:PRINCIPLES AND APPLICATIONS OF INDUCTION AND DIELECTRIC HEATING 8 Hours
2.1Introduction, importance of heating in industry, 2.2Principle of induction heating 2.3Industrial applications of induction heating 2.4Principle of dielectric heating, 2.5Industrial applications of dielectric heating
Unit III: Sensors And Transducers 9 Hours
3.1Temperature and pressure sensors: 3.2Basic working Principle and application. 3.3Basic idea and principle of operation and their use in 3.4measuring physical parameters of the following types of transducers a. Variable Resistance Type Potentiometric Resistance strain gauge Displacement and force b. Variable Capacitance Type Displacement and pressure
Unit IV: Processing of Transducers Signals 4 Hours
4.1Characteristics of instrumentation amplifiers in respect of input impedance, output impedance, drift, dc offset, noise, gain common mode rejection, frequency response etc. 4.2Relating the suitability of these characteristics for amplifying signals from various transducers.
Unit V:Optoelectronics devices 9 Hours
5.1Basic principle and characteristics of photo sources and photo detector, Photo resisters, photo diodes, photo transistors, photo electric cells, LCDs, LEDs and photo-couplers 5.2LED- Material, Construction, Working, Power & Efficiency, Characteristics and modulation BW. Laser, Semiconductor Laser. 5.3Photo Detectors - Optical detection Principles, P-N photodiode, Avalanche Photodiode 5.4Electro-Optic Effect- Integrated optical Devices, Magneto- Optic Effect, Acousto-Optic Effect 5.5Sensors & Display Devices - Optical Fiber Sensors, Display Devices, LCD display, Numeric Display. (Only Brief description of above) Project Based Learning: Designing a working module using optoelectronics devices.

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Suggested Reading

1.H. Rashid-" Power Electronics Circuits, Devices & Application"- P.H.I

- 2. C. S. Ranjan- "Instrumentation Devices & Systems"- Tata McGraw Hill.

3. Singh Jasprit - " Optoelectronics An Introduction to Materials and Devices" - McGraw-Hill

Name of The Course	INDUSTRIAL ELECTRONICS AND TRANSDUCERS LAB			
Course Code	DPCO3020			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives:

1. Use tools/test equipment to analyze electronic components.
2. Design basic electronic circuits.

Course Outcomes

CO1	Describe modern electronic devices available in industry e.g. thyristers, Inverters etc
CO2	Explain single and three phase devices
CO3	Examine sensing devices (sensors & Transducers)

CO4	Illustrate basic concepts of Opto-electronic devices.

Ex.1
Identification of various types of packages and terminals of various low and high power thyristors (SCR and Triac).
Ex.2
To determine and plot firing characteristics of SCR :- (a) By varying the anode to cathode voltage. (b) By varying the gate current.
Ex.3
To observe that logic low and logic high of logic gate.
Ex.4
Observation of waveshapes at relevant points of the circuit of a single phase controlled rectifier using SCR and UJT relaxation oscillator Observation of waveshapes at relevant points of the circuit of a single phase controlled rectifier using SCR and UJT relaxation oscillator
Ex.5
To determine the firing characteristics of Triac in different mode i.e. Mode-I (plus), Mode-I (minus), Mode-III (plus), Mode-III (minus).
Ex.6
Observe the waveshapes and measure a.c. and d.c voltage at various points of a three phase bridge rectifier circuit
Ex.7
Test an a.c. phase control circuit using triac and observe waveshapes and voltages at relevant points in circuit (while using for lamp intensity control and/or a.c. fan speed control).
Ex.8
To study the working of a single phase SCR/ transistor inverter circuit by observing waveshapes at input and output.
Ex.9
To measure force and pressure by using strain gauge transducer.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	Microelectronics-I				
Course Code	DPCO3004				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	T	P	C
		3	0	0	3

Course Objectives

1. Outline the progress made in the history of microelectronics.

2. Describe the evolution of microelectronics from point-to-point wiring through high element

3. Identify printed circuit boards, diodes, transistors, and the various types of integrated circuits.

Course Outcomes

CO1	Describe the properties of semiconductor and semiconductor devices.(k2)
CO2	Illustrate theoretical and practical aspects of IC fabrication technology.(k3)
CO3	Analyze several fabrication steps such as epitaxiEs, oxidation, chemical vapor deposition, etching, ion implantation, metallization, lithography etc.(k4)
CO4	Explain the manufacturing methods and their underlying scientific principles in the context of technologies used in VLSI chip fabrication.(k2)
CO5	Describe typical packaging levels presently used for microelectronic systems.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: INTRODUCTION 2 Hours
Importance of micro-electronics in modern technology.
Unit II:CRYSTAL PROPERTIES AND GROWTH OF SEMICONDUCTORS BULK 8 Hours

2.1 Crystal Lattice 2.2 Periodic structures 2.3 Planes and directions 2.4 diamond and zinc-blende lattice. 2.5 Crystal Growth from Melt. 2.6 Zone Refining. 2.7 Wafer shaping, Cleaning and polishing.
Unit III: REVIEW OF SEMI-CONDUCTOR PROPERTIES **10 Hours**
3.1 Nature of intrinsic Silicon 3.2 Doping 3.3 Electrical conductivity 3.4 p-n junction at zero reverse and formal bias 3.5 the diode equation 3.6 capacitance of p-n junction 3.7 electric field and break down voltage of p-n junctions. 3.8 Energy band diagram of ideal MOS, Schottky barriers, Threshold voltage, Non-ideal effects.
Unit IV: EPITAXIAL GROWTH **10 Hours**
4.1 Lattice matching 4.2 Need for epitaxy 4.3 Vapor phase epitaxy 4.4 Liquid phase epitaxy 4.5 Molecular-Beam epitaxy 4.6 Silicon on insulators.
Unit V: OXIDATION & POLYSILICON FILM DEPOSITION **8 Hours**
5.1 Thermal oxidation 5.2 Dietectric and Polysilicon deposition 5.3 Metallization 5.4 Basic processes of vacuum evaporation Patterning techniques 5.5 Metallization Application.

Suggested Reading

1. S. M Sze, Semiconductor Devices Physics and Technology, John Wiley & Son, Inc. 2nd edition, 2002
2 . Donald A. Neamen, Semiconductor Physics and Devices Basic Principles, McGraw Hill, 3rd edition, 2003.

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Name of The Course	Bio Medical Electronics				
Course Code	DPCO3005				
Prerequisite	None				
Co-requisite					
Anti-requisite					
		L	T	P	C
		3	0	0	3

Course Objectives

1.Outline the diagonstic techniqes in biomedical electronics

2. Describe the patient care and monitoring techniques

3. Identify the biotelemetry sytems in biomedical instrumentation systems.

4. Respiratory system

Course Outcomes

CO1	Describe the classification of the transducers
CO2	Illustrate the sources of bio-electric potential
CO3	Analyze the cardiovascular measurement
CO4	Explain the respiratory system for biomedical instrumentation
CO5	Prosthetic devices
CO6	Modern biomedical electronics

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

Unit-I INTRODUCTION:TRANSDUCER &ELECTRODES 8Hours 1.1 The age of biomedical and transducers principles. 1.2 Active& Passive transducers. 1.3 Electrodes : Electrode theory, Biopotential Electrodes. 1.4 Biochemical transducers, Reference Electrodes,PH electrodes. 1.5 Electrodes : Electrode theory, Biopotential Electrodes. 1.6 Blood Gas Electrodes.
Unit II: BIOELECTRIC POTENTIALS CARDIOVASCULAR MEASUREMENT **8 Hours**

2.1 Resting and action potentials 2.2The bioelectric potential-ECG,EEG 2.3 Electrocardiography - ECG amplifiers, Electrodes and leads, ECG recorder 2.4 EGC system for stress testing, Continous ECG recording . 2.5 Blood flow measurement 2.6 Heart sound measurements
Unit III: Respiratory System Diagnostic Techniques 8 Hours
3.1 Physiology of respiratory system, Measurement of breathing mechanics 3.2 Spirometer, Respiratory Teraphy equipments : Inhalators ventilators and respirators, 3.3 Humidifiers, Nebulizers and Aspirators 3.4 Ultrasonic Diagnosis ECo - Cardiography, ECo, Encephalography 3.5 Emission Computerised Tomeography, MRI. 3.6 Opthalmic Scans, X-Ray and Radio-isotope instrumentation, CAT Scan
Unit IV: Patient Care Monitoring & Bio Telemme 4 Hours
4.1Elements of Intesive Care Monitoring Patient Monitoring 4.2 Diagnosis, Pacemakers, Difibrallators 4.3 Telemetry for ECG measurement during exercise, For emergancy patient monitoring 4.4 Current Safety of Medical Electronic Equipments
Unit V:Other Prosthetic Devices 5 Hours
5.1 Prosthetic devices 5.2Special aspects-Safety of Medical Electronic Equipments 5.3Shok hazards from Electrical equipment 5.4Hearing Aid, Myoelectric Arm
Unit VI : MODERN BIOMEDICAL ELECTRONICS 4Hours
6.1 Biomedical design and deverlopment 6.2 Surgical instrumentation 6.3 biomedical application Project Based Learning: Biomedical application in chart paper

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Suggested Reading

- Cornwell- Biomedical Instrumentation and Measurements-Prentice Hall (India)
- Biomedical Instrumentation and Measurements Paperback – 2015 by Cromwell (Author)
- Introduction to Biomedical Technology by J. J. Karr & J. M. Brown, Pearson Publication.

Name of The Course	Field Visit and Presentation			
Course Code	DPCO3009			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	4	2

Course Objectives:

1. Industry visits sensitize students to the practical challenges that organizations face in the technical world .
2. It gives greater clarity about various technical concepts for students as they can practically see how these concepts are put into action.

Course Outcomes

CO1	discpver the practical exposure to different testing facilities available in the Industries.(K4)
CO2	Test for Core concepts related with Automation.(K4)
CO3	Adapt the importance of working safety.(K6)
CO4	Identify the Current industry needs.(K3)
CO5	Make use of effective Communication both orally and in writing.(K3)

Text Book (s):1. Electronics Engineering Books

Ex.1
Introduction
Ex.2
About the process
Ex.3
Safety
Ex.4
Operation unit 1

Ex.5
Report Writing

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50		50	100

Name of The Course	PROJECT-II				
Course Code	DPCO9999				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		0	0	32	16

Course Objectives:1.This course will Increase practical knowledge of student.

Course Outcomes

CO1	Create a own data or implementation on previous data project.
CO2	Create model to exhibit project.
CO3	Understand basic concept of electronics & communication engineering from live project.
CO4	Describe presentation on project.
CO5	Explain their project.

Text Book (s):1. Electronics Engineering Books

Ex.1
planing the project
Ex.2
creating the group to work on
Ex.3
prepare plan of project include report,Circuit Design,drawing,ppt
Ex.4
creating model of project
Ex.5
final project report

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50		50	100

SCHOOL OF POLYTECHNIC

GALGOTIAS UNIVERSITY

(Established under Galgotias University Uttar Pradesh Act No. 14 of 2011)

Program: **Diploma in Civil Engineering**

Scheme: 2020-2021

Vision: To be known globally for value-based education, research, creativity and innovation.

Mission:

- **To provide students with comprehensive knowledge of engineering and technology with a multi-disciplinary approach that is challenging.**
- **To create an environment for research and industries and society.**
- **To involve the students in societal programs to identify concerns and sustainable ethical solution.**
- **To encourage students for life-long learning and team based problems solving.**

Program Educational Objectives:

After Five years after completion of program student will become
1. Successful engineer with vast experience.
2. Have large opportunities and knowledge for growth in carrier.
3. Function successfully in a professional environment by utilizing and enhancing their problem-solving and communication skills.

Program Specific Objectives:

After completing diploma student will have:
PSO1- Skill to perform various tests to select good quality materials by using modern techniques and equipment.
PSO2- Knowledge and ability to Run various computer based programs to solve field problems.

Program Outcomes:
Diploma in Civil engineering students will be able to:
PO1 Basic knowledge: An ability to apply knowledge of basic mathematics, science and engineering to solve the engineering problems.
PO2 Discipline knowledge: An ability to apply discipline - specific knowledge to solve core and/or applied engineering problems.
PO3 Experiments and practice: An ability to plan and perform experiments and practices and to use the results to solve engineering problems.
PO4 Engineering tools: Apply appropriate technologies and tools with an understanding of the limitations.
PO5 The engineer and society: Demonstrate knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.
PO6 Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO7 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO8 Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO9 Communication: An ability to communicate effectively.
PO10 Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the context of technological changes.

Curriculum

Sl. No	Course Code	Name of the Course	L	T	P	C	IA	MTE	ETE
Semester 1									
Sl. No	**Course Code**	**Name of the Course**					**Assessment Pattern**		
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**
1	PHYE1001	APPLIED PHYSICS-I	3	2	0	4	20	50	100
2	MATD1002	APPLIED MATHEMATICS-I	4	0	0	4	20	50	100
3	SLPC1003	PROFESSIONAL COMUNICATION-I	2	0	0	2	20	50	100
4	DPCS1004	COMPUTER FUNDAMENTALS	3	0	0	3	20	50	100
5	CHEM1005	BASIC CHEMISTRY	3	2	0	4	20	50	100
6	PHYE1006	APPLIED PHYSICS-I LAB	0	0	2	1	50		50
7	SLPC1007	PROFESSIONAL COMUNICATION-I LAB	0	0	4	2	50		50
8	DPCS1008	COMPUTER FUNDAMENTALS LAB	0	0	2	1	50		50
9	CHEM1009	BASIC CHEMISTRY LAB	0	0	4	2	50		50
		Total	15	4	12	23			
Semester II									
Sl No	**Course Code**	**Name of the Course**					**Assessment Pattern**		
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**
1	PHYE1010	APPLIED PHYSICS-II	3	2	0	4	20	50	100
2	MATD1011	APPLIED MATHEMATICS-II	4	2	0	5	20	50	100
3	SLPC1012	PROFESSIONAL COMUNICATION-II	3	0	0	3	20	50	100
4	DPME1014	ENGINEERING GRAPHICS	0	0	6	3	20	50	100
5	DPCE1013	BUILDING MATERIALS	3	0	0	3	20	50	100
6	PHYE1015	APPLIED PHYSICS-II LAB	0	0	2	1	50		50
7	SLPC1016	PROFESSIONAL COMUNICATION-II LAB	0	0	4	2	50		50
8	DPME1017	WORKSHOP PRACTICE	0	0	6	3	50		50
9	DPCE1018	BUILDING MATERIALS LAB	0	0	2	1	50		50
		Total	13	4	20	25			
Semester III									
Sl No	**Course Code**	**Name of the Course**					**Assessment Pattern**		
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**
1	DPME2001	APPLIED MECHANICS	3	2	0	4	20	50	100
2	DPCE2002	PUBLIC HEALTH ENGINEERING.	3	0	0	3	20	50	100
3	DPCE2003	SURVEYING I	2	0	0	2	20	50	100
4	DPCE2004	ELEMENTRY ELECTRICAL & MECHANICAL ENGINEERING.	3	0	0	3	20	50	100
5	DPCE2009	BUILDING CONSTRUCTION AND MAINTAINANCE ENGINEERING	3	0	0	3	20	50	100

6	DPCE2015	TRANSPORTATION ENGINEERING-I	3	0	0	3	20	50	100
7	DPME2006	APPLIED MECHANICS LAB	0	0	2	1	50		50
8	DPCE2007	PUBLIC HEALTH ENGINEERING. LAB	0	0	2	1	50		50
9	DPCE2008	SURVEYING-I LAB	0	0	4	2	50		50
10	DPCE2016	TRANSPORTATION ENGINEERING LAB	0	0	2	1	50		50
11	EEDM2001	ENVIRONMENT EDUCATION & DISASTER MANAGEMENT	3	0	0	0	20	50	100
		Total	20	2	10	23			

Semester IV

Sl No	Course Code	Name of the Course	L	T	P	C	Assessment Pattern IA	MTE	ETE
1	DPCE2023	SOIL MECHANICS AND FOUNDATION ENGINEERING	3	0	0	3	20	50	100
2	DPME2024	HYDRAULICS	3	0	0	3	20	50	100
3	DPCE2006	SURVEYING-II	2	0	0	2	20	50	100
4	DPME2020	STRENGTH OF MATERIAL	3	2	0	4	20	50	100
5	DPCE2017	ESTIMATION AND COSTING	3	0	0	3	20	50	100
6	DPCE2018	TRANSPORTATION ENGINEERING-II	2	0	0	2	20	50	100
7	DPCE2012	SOIL MECHANICS AND FOUNDATION ENGINEERING LAB	0	0	2	1	50		50
8	DPME2021	HYDRAULIC LAB	0	0	2	1	50		50
9	DPCE2013	SURVEYING-II LAB	0	0	4	2	50		50
10	DPME2022	STRENGTH OF MATERIAL LAB	0	0	2	1	50		50
11	DPCE9001	DISUPTIVE TECHNOLOGY	0	0	2	1	50		50
		Total	16	2	12	23			

Semester V

Sl No	Course Code	Name of the Course	L	T	P	C	Assessment Pattern IA	MTE	ETE
1	IMED3001	INDUSTRIAL MANAGEMENT AND ENTERPRENURSHIP DEVELOPMENT	3	0	0	3	20	50	100
2	DPCE3002	DESIGN OF REINFORCED CEMENT CONCRETE STRUCTURE	3	2	0	4	20	50	100
3	DPCE3003	CONCRETE TECHNOLOGY	3	0	0	3	20	50	100
4	DPCE3004	IRRIGATION ENGINEERING	3	0	0	3	20	50	100
5	DPCE3006	EARTHQUAKE ENGINEERING	2	0	0	2	20	50	100
6	DPCE3007	DESIGN OF STEEL STRUCTURE	3	0	0	3	20	50	100
7	DPCE3015	CAD LAB	0	0	4	2	50		50

8	PDSS3008	PERSONALITY DEVELOPMENT & SOFT SKILLS	0	0	4	2	50		50
9	DPCE3008	CONCRETE TECHNOLOGY LAB	0	0	2	1	50		50
10	DPCE9998	PROJECT-I	0	0	4	2	50		50
		Total	17	2	14	25			

Semester VI

Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**
1	DPCE3009	FIELD VISIT AND PRESENTATION	0	0	4	2	50		50
2	DPCE9999	PROJECT-II	0	0	12	6	50		50
		Total	0	0	16	8			

Name of The Course	Building Materials				
Course Code	DPCE1013				
Prerequisite	CHEM1005				
Co-requisite	DPCE1018				
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

1. To study about the basic building materials, properties and their applications.

2. To know the smart building materials, external paints and their uses.

3. To understand different types of masonries and their applications

Course Outcomes

CO1	Describe the different types of a building material. (k2)
CO2	Analyze the quality of building material. (k4)
CO3	Practice on different testing machine. (k3)
CO4	Compare different types of building Material. (k5)
CO5	Describe the types of insulating materials.(k2)
CO6	Describe new materials and their properties(k2)

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I:Building Stones 08 Hours

Classification of rocks: Geological and physical classification; Common rock forming minerals; of stones for specific gravity, water Testing absorption, durability, weathering, hardness by Moh's scale, identification of rocks. Quarrying: Terminology used in quarrying; basic principles involved, methods of quarrying .Blasting: where used, principles of blasting, line of least resistance, drilling of holes(manually and mechanically), charging, tamping, firing ,fuses and detonators safety precautions, common explosives only names, their uses and storage. Wedging: where used, tools required and operation of wedging. Stone crushing: process &equipment used, crushers, grinding mills like hammer mill, ball mill & screens. Availability, characteristics and uses of the following stones: Granite, sandstone, limestone, dolomite, slate, basalt, trap, quartzite and marble. Availability of different stones in state.

Unit II:Bricks and Clay Products 08 Hours

Raw materials for brick manufacture, properties of good brick making earth, field testing of brick clay. Manufacture of bricks: Preparation of clay-manually/mechanically. Molding: hand molding and machine molding. Drying of bricks. Burning of bricks Clamps. Types of kilns, details of Bull's trench kiln and Hoffman's Kiln, process of burning, size of standard bricks. IS Classification of bricks as per 1077 and, efflorescence test; refractory. Bricks: wall, ceiling, roofing and flooring tiles, their properties, and uses. Other clay products: earthenware and stoneware, their properties and uses.

Unit III: Lime,Cement 10 Hours

Natural sources of lime. Definitions of quick lime, fat lime, hydraulic lime, hydrated lime, lump lime, calcinations, slaking, manufacture of lime. Process of setting and hardening action of lime. Field tests of lime as per IS 1624. Pozzolonic materials. Types, properties and uses. Natural and artificial cement ,raw materials, manufacture of ordinary portland cement , flow diagrams for dry and wet process. setting and hardening of cement, types of cement, properties of cement.

Unit IV: Timber and wood based Products 10 Hours

Classification of trees. Cross-section of an exogenous tree and explanation of terms. Market forms of converted timber as per IS. Seasoning of timber: purpose, types of sea- soning. air seasoning, water seasoning, kiln seasoning, chemical seasoning, Solar seasoning kiln. Defects in timber. Decay in timber. Preservation of timber and methods of treatment. Properties of good timber. Common structural timbers in India, their availability, and uses. Plywood, veneers; manufacture of plywood, uses of plywood. Other wood based product their brief description, manufacture and uses. Laminated boards :block boards, fiber boards, resistant board, hardboard ,plastic coated finishes, water and fire resistant ply wood, PVC boards.

Unit V: Paints ,Insulating Materials 06 Hours
Various types of paints. Constituents of oil paints, their functions and properties. Cement paints, their properties and uses, Varnish and polish: types, properties and uses. Lacquars and enamels: their properties and uses. Trade names of different products Insulating Materials Properties, uses and requirements of heat and sound insulating materials. Properties and uses of :cork, rock wool, glass wool, concrete, aluminium foil, asbestos sheets for ceiling, commercial names of different insulating materials. Glass Types of glasses and their properties: Sheet glass, plate glass ,frosted glass, wired glass, fiber glass bullet resisting glass, colored glass and glass wool glass ,plate Commercial sizes, forms and. their uses.
Unit VI: Plastics, Water proofing materials. **06 Hours**
Plastics Methods of moulding and types, properties and uses of plastics. Important commercial product, uses of plastic in Civil Engineering: plastic pipes, taps, valves, plastic coated paper, polythene sheets thermocole, Bakelite, PVC, rexine and linoleum. Water proofing materials. List of water proofing materials, suitable for use in D.P.C., Basement floor and walls, Toilet, Kitchen, Roof Terraces, Water tanks, etc. Properties & commercial trade names. Exposure to non conventional & waste by product Fly ash, Stone Cladding and other finishing materials.

Suggested Reading

1. .Duggal, S. K. (2009), Building Materials, New Age International Publications, New Delhi.

2. Mehta, P.K., Mehta, P.K., and Monteiro, P.J.M. (2006), Concrete: Microstructure, Properties, and Materials,

3. Varghese, P.C. (2005), Building Materials, PHI Publications, New Delhi.

4. NIIT, Chandigarh – Civil Engineers Material

5. National Building Code of India, 2006.

Name of The Course	Building Materials Lab			
Course Code	DPCE1018			
Prerequisite	CHEM1005			
Co-requisite	DPCE1013			
Anti-requisite				
	L	**T**	**P**	**C**
	0	0	2	1

Specific Instructional Objectives

1. Describe the different types of a building material.

2. Compare different types of building Material.

3. Describe the different grades of cement.

Course Outcomes

CO1	identify different types of stones and aggregates visually.
CO2	Identify timbers: teak, sal, chir,shisum, siras, deodar, kail and mango visually.
CO3	Determine water absorption of bricks
CO4	Identify hydraulic & fat lime.
CO5	Conduct different field tests on cement.

Continuous Assessment Pattern

Practical Internal Assessment (IA)	Mid Term Exam (MTE)	Practical End Term Exam (ETE)	Total Marks
50	00	50	100

Course Content:

List of Experiments
Identification of different types of stones and aggregates (visual identification).
Identification of timbers: teak, sal, chir,shisum, siras, deodar, kail and mango. (Visual identification)
To conduct field tests of cement.
To determine normal consistency of cement.
To determine setting time (initial and final) of cement.
To determine fineness of given sample of cement.

To determine compressive strength of bricks.
To determine water absorption of bricks
To determine soundness of cement.
To identify hydraulic & fat lime.

Suggested Reading

1. .Duggal, S. K. (2009), Building Materials, New Age International Publications, New Delhi.

2. Mehta, P.K., Mehta, P.K., and Monteiro, P.J.M. (2006), Concrete: Microstructure, Properties, and Materials,

3. Varghese, P.C. (2005), Building Materials, PHI Publications, New Delhi.

4. NIIT, Chandigarh – Civil Engineers Material

5. National Building Code of India, 2006.

Name of The Course	Public Health Engg				
Course Code	DPCE2002				
Prerequisite	CHEM1005				
Co-requisite	DPCE2007				
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

1. To make the students conversant with sources and its demand of water
2. To understand the basic characteristics of water and its determination
3. To provide adequate knowledge about the water treatment processes and its design

Course Outcomes

CO1	**1. Interpret the water supply procedure**
CO2	**2. Interpret the waste water treatment process.**
CO3	**3. Categorize different types of joints .**
CO4	**4. Recognize the sanitation**
CO5	**5. Relate sanitation with health**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I:Water supply Engineering & Sources of water Hours 6
Introduction-Necessity and brief description of water supply system. Water requirement: Per capita consumption for domestic, industrial, public and firefighting uses as per IS standards. Consumption, demand and its variation ,Surface water sources :Rivers, canal, inponding reservoir and lakes, their quality of water and Suitability.

Unit II: Water Treatment	8 Hours
Suspended, colloidal and dissolved impurities. Physical, chemical and bacteriological tests and their significance. Minimum standards required for drinking water, Principles of Sedimentation, Coagulation, Flocculation, Filtrations , Disinfection (Chlorination) including Jar Test, Break point chlorination, Residual chlorine. Flow diagram of different treatment units. Function, constructional details, working and operation of (i) Airation fountain (ii) Mixer (iii) Flocculator (iv) Clarifier (v) Slow and rapid sand filter (vii) Chlorination chamber (viii) Water softening (ix) Removal of Iron and Magnese. Chemicals required for water treatment, their uses ,and feeding devices. Simple design of sedimentation tank,	
Unit III: Water Distribution	Hours 12
(i)Pipes: Different types of Pipes: Cast iron, steel,plastic, (PVC,LDPE,HDPE), asbestos cement, concrete, plastic, GI and lead pipes. Details of their sizes, joints and uses. (ii) Appurtenances: Sluice (Gate and spindle), air, reflux, scour and safety valves, fire hydrants, their working and Uses . (iii) Distribution system: Requirements of distribution :Minimum head and rate. Types of lay out-dead end, grid, radial and ring systems. System of water supply-intermittent and continuous. Service reservoirs-types, Waste: Dry, semi liquid, liquid, Necessity of systematic collection and disposal of waste. Brief description of sewage disposal system. Conservancy and water carriage system, their advantages and disadvantages.	
Unit IV: Laying of Pipes,Building Water Supply,Maintenance:	Hours 14
Setting out alignment of pipe line. Excavation in different types of soils and precautions taken. Precautions taken for traffic control, bedding for pipe line. Handling, lowering, laying and jointing of pipes, testing of pipe lines and back filling. Use of boning rods. (i) General layout of water supply arrangement for a building (single and multistoried) as per IS Code of practice. Water supply fixtures and their installation. Tapping of water mains. (ii) Hot and Cold Water supply in buildings. Use of Solar water heaters. (iii) Rural water supply :Sources, treatment and distribution Leakage detection and prevention. Replacement of damaged pipe. Maintenance of domestic plumbing fixtures..	
Unit V: Sewerage Systems,Sewage Treatment	Hours 10
i) Types of sewerage systems separate, combined and partially separate. (ii) Sewers : Stone ware, cast iron, concrete and masonry sewers their sizes and joints. (iii) Appurtenances: (Location, function and construction) manholes, drop manhole, lamp hole catch basin, inverted syphon, flushing tanks, ventilating shafts and storm water flows. (iv)Laying of sewers: Setting out alignment of sewer Excavation, checking the gradient with the help of boning rods, preparation of bedding, handling, lowering, laying and jointing, testing and backfilling. (v) Construction of surface drains and different sections required. (i) Meaning and principle of primary and secondary treatment, constructional details of screening chamber, grit chamber, clarifier, trikling filters, secondary clarifiers/airation tank. (ii) Sludge treatment, sludge digestion, sludge drying; sludge disposal. (iii) Oxidation ponds.	

Suggested Reading

1. "Punmia B.C, Ashok Jain & Arun Jain, Water Supply Engineering, Laxmi Publications, Pvt. Ltd.,

New Delhi, 2004. "

2.Peavy, Rowe & Tchobanoglous “Environmental Engineering”, Mc. Graw Hill, New Delhi.

3.Duggal, K.N. Elements of Environmental Engineering, S.Chand & Co, 2002

Name of The Course	**Surveying - I**				
Course Code	**DPCE2003**				
Prerequisite					
Co-requisite	DPCE2008				
Anti-requisite					
		L	**T**	**P**	**C**
		2	0	0	2

Course Objectives

1. To study the basics of linear/angular measurement methods like chain surveying, compass surveying
2. To study the significance of plane table surveying in plan making
3. To know the basics of levelling and theodolite survey in elevation and angular measurements

Course Outcomes

CO1	**To identify various surveying instruments.**
CO2	**To be aware of various survey work.**
CO3	**To perform leveling of plane**
CO4	**To perform bearing of different planes**
CO5	**To run minor instruments**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
30	20	50	100

Course Content:

Unit I: Introduction **Hours 5**

Concept of surveying, purpose of surveying, Measurements linear and angular, units of measurement, instruments used for taking these measurements. Classification of survey based on instruments. Basic principles of surveying.

Unit II: Chain Surveying

Hours 8

Purpose of chain surveying, Principles of chain surveying. Equipment used in chain surveying Viz. chains, tapes ,ranging rods, arrows, pegs, cross staffs, Indian optical square their construction and uses. Different operations in chain surveying:Ranging(direct/indirect),offset(perpendicular/ oblique), chaining (flat and sloping ground),conducting chain survey over an area. Recording the field data, plotting the chain survey, conventional sign. Obstacles in chain surveying.
(a) Errors in chain surveying.
(b) Correction for erroneous length of chain, simple problems. Testing and adjustment of chain.

Unit III: Compass Surveying Hours 18

Purpose of compass surveying. Construction and working of prismatic compass. Use of prismatic Compass, Method. of setting and taking observations. Concept of following:
(a) Meridian - Magnetic, true and arbitrary.
(b) Bearing- Magnetic, true and arbitrary.
(c) Whole circle bearing and reduced Bearing,
(d) Fore and back bearing.
(e) Magnetic dip and declination
Local attraction-causes, detection, errors and correction. Problems on local attraction, magnetic declination and calculation of included angles in a compass traverse. Concept of a traverse-Open and closed traverse. Traversing with a prismatic compass. Checks for an open and closed traverse. Plotting of a traverse - By included and deflection angles. Concept of closing error. Adjustment of traverse graphically by proportionate method. Errors in compass surveying. Testing and adjustment of a prismatic compass. Use of surveyors compass and its construction details, comparison with prismatic compass.

Unit IV: Leveling Hours 16

Purpose of leveling, concept of a level surface, horizontal surface, vertical surface, datum ,reduced level and bench marks. Principle and construction of dumpy, I.O.P. (tilting)levels. Concepts of line of collimation, axis of the bubble tube, axis of the telescope and vertical axis. Leveling staff (i) single piece
(ii) folding (iii) sop with (iv) invar precision staff. Temporary adjustment: setting up and leveling, adjusting for parallax of Dumpy and I.O.P. level. Differential

leveling, concept of back sight, fore sight, intermediate sight, station, change point, height of instrument. Level book and reduction of levels by (a) Height of collimation method and (b) Rise and fall method. Arithmetical checks. Problem on reduction of levels. Fly leveling, check leveling and profile leveling (L-section and X-section) Errors in leveling, and precautions to minimize them and permissible limits. Reciprocal leveling. Difficulties in leveling. Concept of curvature and refraction. Testing and adjustment of dumpy and IOP level. Numerical problems.
Unit V: Minor Instruments: Hours 5
Principle construction and uses of the following minor instruments: (a) Abney's level (b) Tangent clinometers (c) Ceylone Ghat Tracer (d) Pantograph (e) Planimeter

Suggested Reading

1. • Duggal, S.K. (2009), Surveying, Vol. 1 and 2, Tata McGraw Hill Education Private Limited, Noida.

2• Punmia, B.C., Jain, A.K., and Jain, A.K. (2005), Surveying and Levelling, Vol. 1 and 2, Standard Publishers,New Delhi.

3• Subramanian, R. (2007), Surveying and Levelling, Oxford University Press, New Delhi.

Name of The Course	ELEMENTRY ELECTRICAL AND MECHANICAL ENGINEERING				
Course Code	DPCE2004				
Prerequisite	PHYE1010				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

1. To develop a strong knowledge base of electrical engineering

2. To provide knowledge of basic concepets of mechanical engineering

3. To increase the analytical qualities of student

Course Outcomes

CO1	Describe the elements of Mechanical engineering
CO2	Illustrate different types of gears, lathes, jacks etc.
CO3	Describe the elements of Electrical engineering.
CO4	Illustrate different types of Electrical engineering.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I:Elements of Mechanical Engineering Hours 20
1. Construction and working of I.C. Engines, their classifications (2 stroke and 4 stroke), details of 4 stroke I.C. Engines. 2. Types of compressors and their uses 3. Different type of gears and their applications. 4. Conveyers, hoists and other material handling equipments-their functioning and uses. 5. Different kinds of lathes, milling machines and drilling machines.

6. Different kinds of Jacks & Hammers and their uses.
Unit II:Elements of Electrical Engineering Hours 20
1. A.C. Machines (a) Transformers (b) Alternators (c) Induction Motor - their types, uses and Physical & Electrical specification. 2. General idea of electrical measuring instruments like Ammeter, Voltmeter, Wattmeter and Megger and their uses. 3. Different types of lamps like incandescent lamps, sodium vapour lamps, florescent tube. Halogen lamps - CFL, their merits, demerits and use. 4. Bye laws pertaining to electrical installations, Fans and AC's different types of artificial lighting systems, Lighting systems for residential buildings, public building, schools, colleges, hotels, hospital, exhibition hall,

Suggested Reading

1."D.C. Kulshrestha, "Electrical Enginerring", Tata McGraw Hill.

"

2.Raghuwanshi RS, "Workshop Technology", Dhanpat Rai and Sons, New Delhi.

Name of The Course	**Transportation Engineering I**				
Course Code	**DPCE2015**				
Prerequisite	DPCE1013				
Co-requisite	DPCE2016				
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

1. "To have an overall knowledge of the traffic components and assess the traffic characteristics and related problems.

2."To develop a strong knowledge base of traffic planning and its management in any transportation area. "

3."To provide knowledge of traffic control devices and its techniques in transportation interaction"

4."To increase the analytical qualities of student."

Course Outcomes

CO1	**Describe the functions of transportation and road geometrics**
CO2	**Illustrate the traffic engineering.**
CO3	**Illustrate the different types of road materials**
CO4	**Illustrate the construction procedure of road**
CO5	Describe the maintenance process of roads.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Exam (MTE)**	**End Term Exam (ETE)**	**Total Marks**
30	20	50	100

Course Content:

Unit I: Introduction , Road geometrics Hours 7
Importance of Highway transportation., Functions of IRC. IRC classification of roads. , Organization of state highways department , Glossary of terms used in geometrics and their importance; Right of way, formation width, road margin, road shoulder, carriage way, side slopes, kerbs, formation levels, camber and gradient. Design and average running speed, stopping and passing sight distances. Curves necessity, horizontal and vertical curves including transition curves and superelevation, Methods of providing superelevation
Unit II: Traffic Engineering Hours 8
(i) Traffic studies , Methods of collection and presentation of volume count data. (ii) Traffic control devices - Signs, markings and signals, their effectiveness and location, installation of signs, IRC standards. (iii) Segregation of traffic. (iv) Types of intersections and choice of each. (v) Accidents: Types, causes and remedies.

Unit III: Road Materials Hours 12
(i) Different types of road materials in use; soil, aggregates binders. (ii) Function of soil as Highway sub grade. (iii) C.B.R; Method of finding. CBR value and its significance. (iv) Testing aggregates: Abrasion test, impact test, crushing strength test, water absorption test and soundness test. (v) Aggregates: Availability of road aggregates in India, requirements of road aggregates as per IS specifications. (vi) Binders: Common binders; cement, bitumen and Tar, properties as per IS specifications, penetration and viscosity test , procedures and significance. cut back and emulsion and their uses.
Unit IV: Road Pavements And Their Construction Hours 14
(i) Road pavement: Flexible and rigid pavement, their merits and demerits, typical cross-sections, functions of various components. (ii) Sub-grade preparation - Setting out alignment of road, setting out bench marks, control pegs for embankment and cutting, borrow pits, (iii) Flexible pavements: sub base necessity and purpose. Stabilized sub base; purpose of stabilization. Types of Stabilization: (a) Mechanical stabilization. (b) Lime stabilization. (c) Cement stabilization. (d) Fly ash stabilization. (e) Grannular sub base (iv) Base course: (a) Brick soling. (b) Stone soling. (c) Metalling: water bound macadam and bituminous macadam. Methods of construction as per Ministry of Shipping and transport (Government of India). (v) Surfacing: Types of surfacing; (a) Surface dressing. (b) (i) Premix carpet. (ii) Semi dense carpet (S.D.C) (c) Asphalt concrete. (d) Grouting. Methods of constructions as per Ministry of Surface and Transport, Government of India, specifications and quality control; equipment used . (vi) Rigid pavements Construction of concrete roads as per IRC specifications: Form laying, mixing and placing the concrete, compacting and finishing, curing, joints in concrete pavement, equipment used.

Unit V:Road Maintenance Hours 10
(i) Common types of road failures-their causes and remedies. (ii) Maintenance of bituminous roads such as patch work and resurfacing. Maintenance of concrete roads-filling cracks, repairing joints, maintenance of shoulders (berms),maintenance of traffic control devices.

Suggested Reading

1. "Khanna S.K., Arora M.G., Jain S.S., Airport Planning & Design, Nemchand Bros.,

Roorkee "

2.Saxena S.C., Railway Engineering, Dhanpat Rai & Sons, 1995.

3. "Vukan R. Vuchic, Urban Transit : Operations, Planning and Economics, Wiley Sons

Publishers. "

4.Bindra S.P., Docks & Harbour Engineering, Dhanpat Rai Publications,

Name of The Course	Public Health Engineering Lab				
Course Code	DPCE2007				
Prerequisite	CHEM1009				
Co-requisite	DPCE1018				
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Specific Instructional Objectives

1. To discuss the basic characteristics of water and its determination.

2. To describe water treatment process.

3. To make the students conversant with sources and its demand of water

Course Outcomes

CO1	Determine physical and chemical characteristics of water.
CO2	Conduct chlorine demand test
CO3	Determine available chlorine in bleaching powder
CO4	Determine dissolved and suspended solids in water.
CO5	Investigate intermediate pollution in drinking water by OT test.

Continuous Assessment Pattern

Practical Internal Assessment (IA)	**Mid Term Exam (MTE)**	**Practical End Term Exam (ETE)**	**Total Marks**
50	00	50	100

Course Content:

List of Experiments
To determine dissolved and suspended solids in water.
To determine pH value of water sample.
To determine turbidity of water
To calculate: i. Oxygen Demand (OD) ii. Biological Oxygen Demand (BOD) iii. Chemical Oxygen Demand (COD)
To perform Jar Test for Coagulants
To perform chlorine demand test
To determine hardness of water.
To determine available chlorine in bleaching powder
To perform field test for the detection of intermediate pollution in drinking water by OT test.

Suggested Reading

1. "Punmia B.C, Ashok Jain & Arun Jain, Water Supply Engineering, Laxmi Publications, Pvt. Ltd.,

New Delhi, 2004. "

2.Peavy, Rowe & Tchobanoglous "Environmental Engineering", Mc. Graw Hill, New Delhi.

3.Duggal, K.N. Elements of Environmental Engineering, S.Chand & Co, 2002

Name of The Course	SURVEYING-I Lab				
Course Code	DPCE2008				
Prerequisite					
Co-requisite	DPCE2003				
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	4	2

Specific Instructional Objectives

1. To demonstrate various surveying instruments.

2. To make students understand various survey work.

3. To describe various minor instruments.

4. To define the basics of levelling and theodolite survey in elevation and angular measurements.

Course Outcomes

CO1	To measure using chain and ranging rod
CO2	To practice chain surveying
CO3	To practice traversing
CO4	To use compass
CO5	To compare reduce levels at different poins using levelling.

Continuous Assessment Pattern

Practical Internal Assessment (IA)	Mid Term Exam (MTE)	Practical End Term Exam (ETE)	Total Marks
50	00	50	100

Course Content:

List of Experiments
Chain Surveying: (a)Ranging a line. (b) Chaining a line and recording in the field book. (c)Testing and adjustment of chain.
(a) Chaining of a line involving reciprocal ranging. (b) Taking offsets and setting out right angles with cross staff and Indian optical square.
Chain survey of a small area. Plate I
Chaining a line involving obstacles in ranging. Compass Survey
(a) Setting the compass and taking observations. (b) Measuring angles between the lines meeting at a point by prismatic compass.
Traversing with the prismatic compass and chain of a closed traverse. (recording and plotting by included angles) Plate II Setting a regular Pentagon of given side & be- aring Plate III
Traversing with the Prismatic compass and chain of a closed and open traverse (Recording and plotting by deflection angles) Plate IV
Determination of local attraction at a station by taking fore and back bearing
To find true bearing of a line at a place.
To find the difference of level between two distant points by taking staff readings on different stations from the single setting.
To find the difference of level between two points by taking at least four change points.
(a)Longitudinal sectioning of a road. (b)Cross-sectioning of a road.
Setting a gradeint by IOP level.
Minor instruments a) Setting and checking grades with Abney's level. Setting and checking grades with Ceylone Ghat Tracer b) Finding heights by Indian Pattern Clinometer (Tangent Clinometer) c) Use of planimeter for computing areas.

Suggested Reading

1. • Duggal, S.K. (2009), Surveying, Vol. 1 and 2, Tata McGraw Hill Education Private Limited, Noida.

2• Punmia, B.C., Jain, A.K., and Jain, A.K. (2005), Surveying and Levelling, Vol. 1 and 2, Standard Publishers,New Delhi.

3• Subramanian, R. (2007), Surveying and Levelling, Oxford University Press, New Delhi.

Name of The Course	Transportation Engineering Lab				
Course Code	DPCE2016				
Prerequisite	CHEM1018				
Co-requisite	DPCE2015				
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Specific Instructional Objectives

1. Examine the quality of building stones.

2. Describe the quality of soil.

3. Describe the quality of bitumen

Course Outcomes

CO1	Handle equipment Used for testing of bitumen.
CO2	Handle equipment Used for testing of aggregate.
CO3	Display different tests of transportation material.
CO4	Display different tests of soil .

CO5	Describe the uses of tests

Continuous Assessment Pattern

Practical Internal Assessment (IA)	Mid Term Exam (MTE)	Practical End Term Exam (ETE)	Total Marks
50	00	50	100

Course Content:

List of Experiments
Determination of resistance to abrasion of aggregates by Los Angel's Abrasion Testing Machine.
Determination of Aggregate impact value by aggregate impact tester.
Determination of C.B.R. Value of sub grade soil.
Determination of Aggregate crushing value by aggregate crushing test apparatus.
Determination of Penetration Value of bitumen.
Determination of softening point of bitumen.
Determination of ductility of bitumen.
Determination of flash and fire point of bitumen.
Field Visits of atleast 1 of the following (in different fields): 1. Railway yard and station, points and crossing, rack, communication, control and panel Board 2. Railway Museum for the development of Railways, Rails Mono Rails, Sleepers-- i. R.D.S.O. Lucknow & Rail Bhawan Delhi 3. Bridges under construction. 4. Grade separator. 5. Factory for construction of prestressed sleepers or other fixtures. 6. P.W.D.Research Lab at Lucknow/C.B.R.I. Roorkee. 7. Hume Pipe Factory.

Suggested Reading

1. "Khanna S.K., Arora M.G., Jain S.S., Airport Planning & Design, Nemchand Bros.,

Roorkee "

2.Saxena S.C., Railway Engineering, Dhanpat Rai & Sons, 1995.

3. "Vukan R. Vuchic, Urban Transit : Operations, Planning and Economics, Wiley Sons

Publishers. "

4.Bindra S.P., Docks & Harbour Engineering, Dhanpat Rai Publications,

Name of The Course	SOIL MECHANICS AND FOUNDATION ENGG				
Course Code	DPCE2023				
Prerequisite	DPCE1013				
Co-requisite	DPCE2012				
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

1. To provide a coherent development to the students for the courses in sector of Engineering like Geotechnical Engineering & Soil Improvement Techniques etc.

2.To present the foundations of many basic Engineering tools and concepts related Geotechnical Engineering.

3.To give an experience in the implementation of Engineering concepts which are applied in field of Geotechnical Engineering

4.To involve the application of scientific and technological principles of planning, analysis, design of foundation

Course Outcomes

CO1	Identify and classify soils with reference to their characteristics. (K1)
CO2	Describe the behavior and effect of water in soils.(K2)
CO3	Examine modes of soil behavior. (K4)

CO4	Calculate and plot soil strength parameters
CO5	Describe methods of improving soil stability including reference to compaction plant. (K2)

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
30	20	50	100

Course Content:

Unit I: Introduction **Hours 15**

• Definition of soil Mechanics and foundation engineering.
• Soil formation - different kinds of soils and soil structures
• Graphical representation of soils as a three phase system.
• Definitions of moisture content unit weight of soil mass such as bulk density, saturated density, submerged density and dry density, specific gravity, mass gravity, void ratio, porosity and degree of saturation, percentage air voids and their content, density index
• Relationships between various terms stated above.
• Consistency limits Liquid limit, Plastic limit, Shrinkage limit, Plasticity index, Consistency index. Grain size analysis - Sieve and Hydrometer analysis, C.C. and C.U.
• Textural classification chart, brief description of plasticity chart.
• Particle size classification of soils & I.S. classification of soil.

Unit II: Permeability of Soils

Hours 8

• Definition of permeability.
• Interpretation of Darcy's law, definition of discharge, velocity and seepage velocity and coefficient of percolation.
• Factors affecting permeability.
• Laboratory methods of falling head and constant head, field methods of pumping-out tests and pumping-in tests.

• site clearance, preparing job layout, layout for load bearing structure and framed structure by center line and face line method, precautions while marking layout on ground .

2.2 Earthwork
• excavation for foundation, timbering and strutting earthwork for embankment material for plinth filling. tools and plants used for excavation and earthwork.
2.3 Foundation
• types of foundation – open foundations, shallow foundation, stepped foundation, isolated and combined column footing, raft foundation, deep foundation and pile foundation.
• pumping method of dewatering, cofferdams.
• bearing capacity of foundation soil, under reamed pile foundation.

Unit III:Compaction & Consolidation **Hours 15**

• Definition of Compaction.
• Standard & modified Proctor compaction test.
• Different methods of compaction
• Factors affecting compaction.
• Brief description of field compaction methods.
• Compacting equipments and field control.
• Indian Standards.
• Definition of consolidation and its importance on foundation settlement.
• Difference between consolidation and compaction.

Unit IV: Shear Strength
Hours 10

• Definition of shear strength.
• Definition of Cohesive & non cohesive soil. With reference to c and O (phy) soil.
• Coulomb's equation
• Coulomb's equation.
• Shear box and unconfined compression tests.
• Earth pressure: Definition of earth pressure, active and passive earth pressures, terms and symbols relating to a retaining wall, Relation between movement of wall and earth pressure, simple earth pressure calculations without surcharge.

Unit V: Site Investigation And Sub Soil Exploration

Hours 5

• Necessity of site investigation & sub-soil exploration.
• Types of exploration – general , detailed.

• Method of site exploration open excavation & boring • Criteria for deciding the location and number of test pits and bores • Disturbed & undisturbed soil samples for lab testing. • Field identification of soil – dry strength test, dilitancy test & toughness test • Empirical correlation between soil properties and SPT values.
Unit VI Shallow and Deep Foundations Hours 5
• Definitions of shallow and deep foundations • Application of Terzaghi's bearing capacity formulae for different types of foundations. • Factors affecting depth of shallow foundations. • Plate load test for shallow foundations

Suggested Reading

1.B.C. Punamia; Soil Mechanics & Foundation Engineering; Laxmi Pub. Pvt. Ltd., Delhi.

2Gopal Ranjan, Rao A.S.R.; Basic and applied soil mechanics; New age int. (p) ltd

3 Arora K.R.; Soil Mechanics & Foundation Engineering; Standard Pub., Delhi

Name of The Course	**HYDRAULICS**				
Course Code	**DPME2024**				
Prerequisite	**DPME2001**				
Co-requisite	DPME2021				
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

1 To understand the properties of fluids and fluid statics

2 To derive the equation of conservation of mass and its application

3 To solve kinematic problems such as finding particle paths and stream lines

4"To use important concepts of continuity equation, Bernoulli's equation and turbulence, and apply the same to problems

"

Course Outcomes

CO1	**To understand fluid mechanics fundamentals, including concepts of mass and momentum conservation. (K2)**
CO2	**To apply the Bernoulli equation to solve problems in fluid mechanics and use potential flow theory to solve problems in fluid mechanics.(K3)**
CO3	**To understand working of hydraulic machines. (K2)**
CO4	**To measure fluid pressure with manometer. (K5)**
CO5	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
30	20	50	100

Course Content:

Unit I: Introduction and Properties of fluid Hours 8
Fluid : Real fluid, ideal fluid. 1.2 Fluid Mechanics, Hydraulics, Hydrostatics, Hydro kinematics and Hydro dynamics Mass density, specific weight, specific gravity, cohesion, adhesion, viscosity, surface tension, capillarity, vapour pressure and compressibility

Unit II:Hydrostatic Pressure and measurement of pressure Hours 10	
Pressure, intensity of pressure, pressure head, Pascal's law and its applications. Total pressure, resultant pressure, and centre of pressure. Total pressure and centre of pressure on vertical and inclined plane surfaces: Rectangular Triangular Trapezoidal Circular Atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure. Piezometers, simple manometer, differential manometer and mechanical gauges. Measurement of pressure by manometers and pressure gauges.	
Unit III: Fundamental of Fluid Flow and Orifice Hours 10	
Types of Flow: Steady and unsteady flow Laminar and turbulent flow Uniform and non-uniform flow. Discharge and continuity equation (flow equation) Types of hydraulic energy. Potential energy Kinetic energy Pressure energy Bernoulli's theorem; statement and description (without proof of theorems). 5.5 Venturimeter (horizontal and inclined) and Orifice Plate meter. Definition of Orifice, and types of Orifices, Hydraulic Coefficients. Large vertical orifices. Free, drowned and partially drowned orifice. Time of emptying a rectangular/circular tanks with flat bottom.	
Unit IV: Flow Measurements Hours 10	
Measurement of velocity by (i) Pitot tube (iii) Surface Float (ii) Current-meter (iv) Velocity rods. Measurement of Discharge by a Notch Difference between notches and orifices. Discharge formulae for rectangular notch, triangular Notch, trapezoidal notch, and conditions for their use. (with derivation) Measurement of discharge by weirs. Difference between notch,weir and barrage. Discharge formula for free, drowned, and broad crested weir with and without end contractions ; velocity of approach and condition of their use. Venturi flumes to measure flow. Measurement of Discharge by velocity area-method	
Unit V: HYDRAULIC MACHINE Hours 4	
Reciprocating pumps Centrifugal pumps Impulse Turbines Reaction Turbines Sketching and description of principles of working of above	

Suggested Reading

1. HYDRAULICS, FLUID MECHANICS AND HYDRAULICS MACHINES, BY R.S KHURMI, S CHAND PUBLICATION

2. FLUID MECHANICS AND HYDRAULICS, BY R.K BANSAL, LAXMI PUBLICATION

3 HYDRAULICS, KARMVEER, KRISHNA PUBLICATION

Name of The Course	Surveying - II				
Course Code	DPCE2006				
Prerequisite	DPCE2003				
Co-requisite	DPCE2013				
Anti-requisite					
		L	**T**	**P**	**C**
		2	0	0	2

Course Objectives

1. Every civil engineering activity takes place on the surface of earth and starts with availing and measuring the land, with the subject surveying students will pursue the engineering approach about surveying.

2. The subject involves surveying activities of taking various measurements on ground that promote habit of working in groups, neatness and care in documentation

Course Outcomes

CO1	Illustrate plane table surveying. (K3)
CO2	Illustrate theodolite surveying. (K3)
CO3	Illustrate the contouring.(K3)
CO4	Identify various types of curve.(K1)
CO5	Interpret the use of total station. (K3)

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
30	20	50	100

Course Content:

Unit I: Plane Table surveying **Hours 10**

(i) Purpose of plane table surveying. Equipment used in plane table survey (a) Plane table, (b) Alidade (Plain and Telescopic),(c) accessories.
(ii) Method of plane tabling :(a) centering (b) leveling (c) Orientation.
(iii) Methods of plane table surveying: (a) Radiation, (b) Intersection, (c) Traversing (d) Resection.
(iv) Two point problem.
(v) Three point problem by
(a) Mechanical Method (Tracing paper) (b) Bessel's Graphical Method. (c) Trial and error method.
Errors in plane table survey and precautions to control them. Testing and adjustment of plane table and alidade.

Unit II: Contouring: Hours 8

Concept of contour: Purpose of contouring;Contour interval and horizontal equivalent;Factors affecting contour interval; characteristics of contour;Methods of contouring direct and indirect, use of stadia measurements in contour survey. Interpolation of contours; Use of contour map; Drawing cross section from a contour map;Marking alignment of a road, railway and a canal on a contour map; Computation of earthwork and reservoir capacity from a contour map.

Unit III: Theodolite Surveying Hours 12

Working of a transit vernier theodolite, Fundamental axes of a theodolite and their relation;Temporary adjustments of a transit theodolite; least count and concept of transiting, swinging, face left, face right and changing face;Measurement of horizontal and vertical angles. Prolonging a line(forward and backward) Measurement of bearing of a line; Traversing by included angles and deflection angle method;traversing by stadia measurement; Theodolite triangulation and plotting a traverse; concept of coordinate and solution of omitted measurements (one side affected); Errors in theodolite survey and precautions taken to minimizethem; Limits of precision in theodolite traversing. Principle and working of a micro-optic theodolite. Brief introduction to tachometry. Principle and working digital theodolite and its practice.

Unit IV: Curves Simple circular curves Hours 12

(i) Need and definition of a simple circular curve; Elements of simple circular curve, Degree of the curve, radius of the curve, tangent length, point of intersection (Apex point), tangent point, length of curve, long chord,deflection angle, apex distance and mid-ordinate. Setting out of simple circular curve:
(a) By linear measurements only: - Offsets from the tangents. - Successive bisection of arcs. Offsets from the chord produced.
(b) By Tangential angles using a theodolite.

(ii) Transition Curves: Need (centrifugal force and super elevation) and definition of transition curve;requirements of transition curves;length of transition curves for roads by cubic parabola;calculation of offsets for a transition curve;setting out of a transition curve by tangential offsets only.

(iii) Vertical curves Setting out of a vertical curve.

Unit V:Total Station & Auto Level ,G.P.S. Surveying

Hours 8

Working and application of total station and auto level. Various uses of total station in preparing drawings like drafting of elevation/vertical plane measurement of building. , Brief Introduction of G.P.S. surveying for making drawing of Site Plan, Contoured Plan, Digital Mapping, etc. and its practices

Suggested Reading

1. • Duggal, S.K. (2009), Surveying, Vol. 1 and 2, Tata McGraw Hill Education Private Limited, Noida.

2• Punmia, B.C., Jain, A.K., and Jain, A.K. (2005), Surveying and Levelling, Vol. 1 and 2, Standard Publishers,New Delhi.

3• Subramanian, R. (2007), Surveying and Levelling, Oxford University Press, New Delhi.

Name of The Course	STRENGTH OF MATERIAL				
Course Code	DPME2020				
Prerequisite	DPME2001				
Co-requisite	DPME2022				
Anti-requisite					
		L	**T**	**P**	**C**
		3	2	0	4

Course Objectives

1.To make student to understand basic of material strength concept

2 To make student fesible to calculate the critical conditions

3 increase the choosing capability of student for material

Course Outcomes

CO1	Determine principal stress and principal plane under various loading condition(k4)
CO2	Draw shear force and bending moment diagram(k4)
CO3	Relate different loading conditions with actual cases(k3)
CO4	Calculate slope and deflection of beams(k4)
CO5	Measure buckling and deflection in column and struts(k5)

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
30	20	50	100

Course Content:

Unit I: Principal Stress and Principal Plan Hours 03
Principal stress and principal plane under direct and shear stress. Graphical determination by Mohr's circle method
Unit II: Bending Moment and Shear Force **6 Hours**
Concept of a beam, and supports (Hinged, Roller and Fixed). Types of Beams: Simply supported, cantilever, fixed, overhang and continuous beams. Types of loads (distributed, point and varying). Concept of Bending Moment & Shear Force. Sign conventions. Bending moment and shear force diagrams for cantilever, simply supported and overhanging beams subjected to uniformly distributed, concentrated and uniformly varying loads. Relationship between load, shear force and bending

moment. Point of maximum B.M. and contra flexure, concept of fixed and continuous beams. 3. Bending and Shear Stresses Assumption of theory of simple bending. Derivation of the equation. M/I=F/Y=E/R. Concept of centroid and second moment of area, Radius of gyration, Theorems of parallel and perpendicular axes, Second Moment of area for sections: rectangle, triangle ,circle, trapezium ,angle, Tee, I, Channel and compound sections. Moment of resistance, section modulus and permissible bending stresses, Bending stresses in circular rectangular, I , T and L section. Comparison of strength of the above sections. Concept of shear stresses in beams, Shear stress distribution in rectangular, I and T section.
Unit III: Combined Direct & Bending stresses: Hours 10
Concentric and eccentric loads, eccentricity, effect of eccentric load on the section, middle third rule; stresses due to eccentric loads. Examples in the case of short columns, chimneys and dams.
Unit IV: Slopes and Deflections of Beams Hours 10
Definition of slope and deflection, sign convention.Circular bending. Calculation of maximum slope and deflection for the following standard cases by double integration or moment area method. (1) Cantilever having point load at the free end. Cantelever having point load at any point of the span. Cantitilever with uniformly distributed load over the entire span Cantilever having U.D.L. over part of the span from free end Cantelever having U.D.L. over a part of span from fixed end (2) Simply supported beam with point load at centre of the span. Simply supported beam with U.D. load over entire span. NOTE: All examples will be for constant moment of inertia without derivation of formula.
Unit V: Columns & Struts **Hours 6**
Definition of long column, short column and strut, slenderness ratio, equivalent length, critical load, collaps Load, End conditions of column. Application of Eular's and Rankine's formula (no derivation), simple numerical problems based on Euler's and Rankine's formulae.

Suggested Reading

1. "Strength of Materials" by Ramamrutham, S ; Dhanpat Rai and Sons., New Delhi

2"Applied Mechanics and Strength of Materials" by Ram Chandra; Standard Publishers. Delhi:

3"Strength of Materials" by Punmia, BC ; Standard Publishers, Delhi,

4"Strengths of Materials" by Sadhu Singh; Standard Publishers, New Delhi

Name of The Course	Estimation and Costing				
Course Code	DPCE2017				
Prerequisite	DPCE2009				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

1. Determination of quantities of items and labour requirement of civil engineering works.

2 .Preparation of estimate of the civil engineering works.

3.Preparation of specification of construction items.

Course Outcomes

CO1	Measure the estimate of a building. (K5)
CO2	Name the general items of work. (K1)

CO3	Define analysis of rates, work charged establishment. (K1)
CO4	Explain working of PWD at different levels.(K2)
CO5	Calculate the standard rent for a building. (K4)

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
30	20	50	100

Course Content:

Unit I: Estimation: **Hours 12**
Importance of Estimation, Different Types of Estimates, Methods of estimation short wall & long wall and center line method ,Specifications General and Detailed.
Unit II:Methods of Estimation **8 Hours**
General Items of Work for Estimates Units and Measurement, Method of Accounting for the Deduction of Openings Etc., Detailed Estimates of A Single Room and A Two Room Residential Building.
Unit III: Analysis of Rates **Hours 10**
Definition of Analysis of Rates, Prime Cost, Work Charged Establishment, Quantity of Materials Per Unit of Work for Major Civil Engineering Items, Resource Planning Through Analysis of Rates, Market Rates
Unit IV: Public Work Organization **Hours 10**
Public Works Organization: PWD Scheduled and Cost Indices for Building Material and Labour, MES Organization, Indian Railway Organization, Concept of Organizational Set Up for Public Work Execution, Duties, and Responsibilities of the officers.
Unit V: Valuation **Hours** **10**
1. Purpose of valuation, principles of valuation. 2. Definition of terms such as depreciation, sinking fund, salvages and scraps value. 3. Valuation of a building property by replacement cost method and rental return method. 4. Method of calculation of standard rent-Concept of capitalized value and years purchase

Suggested Reading

1. B. N. Dutta, Estimating and Costing In Civil Engineering, Ubs Publishers Distributors Ltd.

2.Amarjit Aggarwal A.K. Upadhyay,Civil Estimating and Costing, S. K. Kataria & Sons, 2009

3.P.W.D. Hand Book Is Code

Name of The Course	Transportation Engineering II				
Course Code	DPCE2018				
Prerequisite	DPCE2015				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		2	0	0	2

Course Objectives

1. To have an overall knowledge of the railway components

2 . To have an overall knowledge of the track laying.

3. Preparation of specification of construction items.

Course Outcomes

CO1	Describe the functions of transportation.
CO2	Describe the members of track
CO3	Evaluate track geometry
CO4	Illustrate track laying.
CO5	Describe track geometry.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
30	20	50	100

Course Content:

Unit I: Introduction: Hours 7

Introduction: Railways - An important system of communication Permanent Ways: Definition of a permanent way; components of a permanent way, subgrade, ballast, sleepers, rails, fixtures and fastenings. Concept of gauge and different gauges prevalent in India. Suitability of these gauges under different conditions.

Unit II:Track Material 8 Hours

(i) RAILS: Function of rails. Different types of rail sections-double headed, bull headed and flat footed their standard length, weights and comparison. Welded rails-appropriate length of welded rails and advantages of welded rails. Creep: Its definition, causes,effects and prevention. Wear of rails: its causes and effects.
(ii) SLEEPERS: Function of sleepers;Different types of sleepers:wooden,steel,cast iron(pot type),concrete and pre-stressed concrete, their sizes, shapes, characteristics and spacing.
(iii) BALLAST: Function, materials used for making ballast stone, brick, slag and cinder, their characteristics.
(iv) FIXTURES AND FASTENINGS: (a) Connections of rail to rail-Fishplate and fish bolts. (b) Connection of Rail to sleepers: Sketches of connection between flat footed rails with various types sleepers with details of fixtures and fasteners used.

Unit III: Geometrics for Broad Gauge Hours 10

Typical Cross-sections of single and double broad gauge railway tracks in cutting and embankment. Permanent and temporary land width. Gradients- ruling, maximum, minimum for drainage. Gradients in station yards. Curves ;Limiting radius of a curve for broad gauge. Transition length to be provided for railway curves as per railway code. Super-elevation-its necessity and limiting value. Definition of equilibrium cant and cant deficiency, widening of gauage on curves

Unit IV: Points and Crossing Hours 10

Points and Crossings: Necessity and details of arrangement; sketch of a turnout definition of stock rail, tongue rail, check rail, lead rail, wing rail, point rail, splice rail, stretcher bar, throw of switch, heel of switch, nose of crossing, angle of crossing, overall length of turnout, facing and trailing points, diamond crossing, cross over, triangle.

Track Laying:
Preparation of subgrade. Collection of materials setting up of material depot and carrying out initial operations such as adzing of sleepers, bending of rails and assembling of crossings. Definitions of base and rail head. Transportation by material trollies, rail carriers and material trains. Method of track laying
(parallel,telescopic and American methods). Organisation of layout at rail head. Ballasting of the track.

Unit V: Maintenance of Track, Airpot Hours 10

(i) Routine maintenance of formation and side slopes, rails, fixtures and drainage.
(ii) Special maintenance - Replacement of defective sleepers and rails.
(iii) Tools used for the above operations. Basic Element, Runway and Taxi Way.

Suggested Reading

1. Kadiyali, L.R., Traffic Engineering and Transport Planning, Khanna publishers

2. IRC-SP41: Guidelines for the Design of At-Grade Intersections in Rural & Urban Areas

3. Saxena S.C., Railway Engineering, Dhanpat Rai & Sons, 1995.

Name of The Course	Hydraulic Lab				
Course Code	DPME2021				
Prerequisite	CHEM1009				
Co-requisite	DPME2024				
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Specific Instructional Objectives

1. To study the fluid uder static position

2. To study the fluid under flowing condition.

3. To determine the various co-efficient related to it

4. To verify various theorem

Course Outcomes

CO1	Grasp compare the results of analytical models introduced in lecture to the actual behavior of real fluid flows.
CO2	Perform standard measurement techniques of fluid mechanics and their applications.
CO3	Operate different hydraulic machines and measure different parameters.
CO4	Determine Darcy's coefficient of friction for flow through pipes.
CO5	Determine coefficient of discharge of a rectangular notch/triangular notch.

Continuous Assessment Pattern

Practical Internal Assessment (IA)	Mid Term Exam (MTE)	Practical End Term Exam (ETE)	Total Marks
50	00	50	100

Course Content:

List of Experiments
To verify Bernoullis Theorem.
To find out venturimeter coefficient
To determine Coef. of velocity (Cv), Coef. of discharge (Cd) Coef. of contraction (Cc) and verify the relation between them
To perform Reynold's Experiment.
To determine Darcy's coefficient of friction for flow through pipes.
To verify loss of head due to: (a) Sudden enlargement (b) Sudden Contraction.
TO determine velocity of flow of an open channel by using a current meter.
To determine coefficient of discharge of a rectangular notch/triangular notch.
Study of the following:(i) Reciprocating Pumps or Centrifugal Pumps. (ii) Impulse turbine or Reaction turbine (iii)Pressure Gauge/water meter/mechanical flow meter.

Suggested Reading

1. HYDRAULICS, FLUID MECHANICS AND HYDRAULICS MACHINES, BY R.S KHURMI, S CHAND PUBLICATION

2. FLUID MECHANICS AND HYDRAULICS, BY R.K BANSAL, LAXMI PUBLICATION

3 HYDRAULICS, KARMVEER, KRISHNA PUBLICATION

Name of The Course	SOIL MECHANICS AND FOUNDATION ENGG LAB				
Course Code	DPCE2012				
Prerequisite	DPCE1018				
Co-requisite	DPME2018				
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Specific Instructional Objectives

1. To describe the properties of soil and their significance

2. To state the difference in compaction and consolidation of soil.

3. To define shear strength parameters and methods to calculate them.

Course Outcomes

CO1	To determine properties of soil essential for construction purpose like water content, specific gravity, partical size, liquid limit and plastic limit.
CO2	To calculate permeability of soil.
CO3	To perform standard proctor compression test.
CO4	To determine the moisture content of fine aggregates
CO5	To assess the silt content of soil.

Continuous Assessment Pattern

Practical Internal Assessment (IA)	Mid Term Exam (MTE)	Practical End Term Exam (ETE)	Total Marks
50	00	50	100

Course Content:

List of Experiments
Determination of moisture content by oven drying method
Determination of specific gravity of soil particles by specific gravity bottle/pycnometer
Determination of soil particles size distribution by sieving
Determination of liquid limit and plastic limit of soil
Determination of permeability by constant Head Permeameter and falling head permeameter.
Shear strength of sand by Direct Shear test.
Unconfined compression test
Standard Proctor compaction text.
Determiation of field density of soil by sand replacementand core cutter methods.
Check the silt content of soil.

Suggested Reading

1.B.C. Punamia; Soil Mechanics & Foundation Engineering; Laxmi Pub. Pvt. Ltd., Delhi.

2Gopal Ranjan, Rao A.S.R.; Basic and applied soil mechanics; New age int. (p) ltd

3 Arora K.R.; Soil Mechanics & Foundation Engineering; Standard Pub., Delhi

Name of The Course	Strength of material lab				
Course Code	DPME2022				
Prerequisite	DPME2006				
Co-requisite	DPME2020				
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Specific Instructional Objectives

1. To discuss the types of loading.

2. To describe the the type of stresses.

3. To explain the properties of metal such as hardness, ductility, flexibility, stiffness etc.

4. To describe the spring action under axial loading.

Course Outcomes

CO1	To analyze shear force at different sections on a simply supported beam under points loads.
CO2	To calculate yield stress, ultimate stress, percentage elongation, plot the stress strain

	diagram and compute the value of Young's Modulus of mild steel.
CO3	To determine maximum deflection and Young's Modulus of elasticity by deflection apparatus
CO4	To analyze stiffness/deflection of a helical spring
CO5	To calculate hardness of a metal plate

Continuous Assessment Pattern

Practical Internal Assessment (IA)	Mid Term Exam (MTE)	Practical End Term Exam (ETE)	Total Marks
50	00	50	100

Course Content:

List of Experiments
Determination of shear force at different sections on a simply supported beam under points loads.
Determination of bending moment at different sections on a simply supported beam under different types of loading
Determination of yield stress, ultimate stress, percentage elongation, plot the stress strain diagram and compute the value of Young's Modulus of mild steel.
Determination of the maximum deflection and Young's Modulus of elasticity by deflection apparatus
Determination of modulus of rigidity of material by Torsion apparatus
Determination of stiffness/deflection of a helical spring
Determination of hardness of a metal plate by Rock Well Brinell hardness testing machine
To perform impact test on Izod Impact testing machine

Suggested Reading

1. "Strength of Materials" by Ramamrutham, S ; Dhanpat Rai and Sons., New Delhi

2"Applied Mechanics and Strength of Materials" by Ram Chandra; Standard Publishers. Delhi:

3"Strength of Materials" by Punmia, BC ; Standard Publishers, Delhi,

4"Strengths of Materials" by Sadhu Singh; Standard Publishers, New Delhi

Name of The Course	SURVEYING II LAB				
Course Code	DPCE2013				
Prerequisite	DPCE2008				
Co-requisite	DPME2006				
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	4	2

Specific Instructional Objectives

1. To explain working of theodolite.

2. To show the working of all the components of plane table surveying

3. To explain the concept of contours

4. To explain the different types of curves.

Course Outcomes

CO1	Illustrate plane table surveying
CO2	Illustrate theodolite surveying. (K3)
CO3	Illustrate the contouring
CO4	Identify various types of curve.
CO5	Interpret the use of total station

Continuous Assessment Pattern

Practical Internal Assessment (IA)	Mid Term Exam (MTE)	Practical End Term Exam (ETE)	Total Marks
50	00	50	100

Course Content:

List of Experiments
(i) (a) Setting the plane table (b) Marking the North direction. (c) Plotting a few points by radiation method
(a) Orientation by Trough compass, back sighting. (b) Plotting a few points by intersection method.
Traversing an area with a plane table (at least five lines)
(a) Two point problem.

(b) Three point problem by Tracing paper method, Bessel's graphical method, Trail and error method.
Preparing a contour plan by radial line method by the use of a Tangent clinometers/Tachometer.
Preparing a contour plan by method of squares.
Drill for taking out the theodolite mounting on the tripod and placing it back in the box.
Reading the vernier and working out the least count, measurement of horizontal angles by repetition and reiteration methods
Traversing an area with a theodolite (at least five lines) and Plotting the traverse by calculating Latitude and Departure
Measurement of vertical angles by the use of theodolite
(a)Measurement of Magnetic bearing of a line. (b)prolonging a line.
Running a closed traverse with a theodolite (at least five sides) and its plotting.
Setting out of a simple circular curve with given data by the following methods: (a) Offsets from main chord. (b) Offsets from the chords produced. (c) One theodolite method. (d) Setting out a circular curve with transition length by linear measurements
Demonstration of Total Station & Auto level

Suggested Reading

1. • Duggal, S.K. (2009), Surveying, Vol. 1 and 2, Tata McGraw Hill Education Private Limited, Noida.

2• Punmia, B.C., Jain, A.K., and Jain, A.K. (2005), Surveying and Levelling, Vol. 1 and 2, Standard Publishers,New Delhi.

3• Subramanian, R. (2007), Surveying and Levelling, Oxford University Press, New Delhi.

Name of The Course	Design of Reinforced Cement Concrete Structurre				
Course Code	DPCE3002				
Prerequisite	DPCE 3003				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	2	0	4

Course Objectives

1. To provide a coherent development to the students for the courses in sector of Reinforced Concrete Designing

2. To present the foundations of many basic engineering concepts related designing of structures

3. To give an experience in the implementation of designing concepts which are applied in field of structural engineering

4 To involve the application of scientific and technological principles of design of buildings according to limit state method of design

Course Outcomes

CO1	To understand the basic principles of design of R.C.C. sections.
CO2	To analyze the section by LSM
CO3	To design singly reinforced, Doubly reinforced and flanged section of beams
CO4	To design axially loaded columns by LSM.
CO5	To describe the use of pre-stressed concrete.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
30	20	50	100

Course Content:

Unit I: Working Stress Method Hours 10

• Introduction to reinforced concrete, R.C. Sections their behavior, grades of concrete steel. Permissible stresses, Assumptions in W.S.M.
• Equivalent bending stress distribution diagram for singly reinforced section,

Unit II:Limit State Method 8 Hours

• Definition, types of limit states, partial safety factors for materials strength, characteristic strength, characteristic load, design load. Loading on structure as per I.S. 875.
• I.S. Specification regarding spacing of reinforcement in slab, cover to reinforcement in slab, beam column & footing, minimum reinforcement in slab, beam & column, lapping, anchoring effective span for beam, & slab.

Unit III: Analysis and Design of Beams (LSM) Hours 10

3.1 Analysis and Design of Singly Reinforced beams
• Limit State of collapse (Flexure), Assumptions stress. Strain relationship for concrete and steel neutral axis, Stress block diagram and Strain diagram for singly reinforced section.
• Concept of under- reinforced, over-reinforced and balanced section, neutral axis co-efficient, limiting value of moment of resistance and limiting percentage of steel required for balanced singly R.C. Section.
• Simple numerical problems on determining design constants, moment of resistance and area of steel.
3.2 Analysis and Design of Doubly Reinforced Sections
• General features, necessity of providing doubly reinforced section reinforcement limitations.
• Analysis of doubly reinforced section, strain diagram stress diagram, depth of neutral axis, moment of resistance of the section.
• Simple numerical problems on finding moment of resistance and design of beam sections.
3.3 Analysis and Design of T-Beam (LSM)
• General features, advantages, effective width of flange as per IS : 456-2000 code provisions.
• Analysis of singly reinforced T-Beam, strain diagram & stress diagram, depth of neutral axis, moment of resistance of T-beam Section with neutral axis lying within the flange
• Design of T-beam for moment and shear for Neutral axis within or up to flange bottom.
• Simple numerical problems on deciding effective flange width. (Problems only on finding moment of resistance of T-beam section with N. A. lies within or upto the bottom of flange shall be asked in written examination.)

Unit IV: Design of Axially Loaded Column (LSM) Hours 10

• Assumptions in limit state of collapse – compression
• Definition and classification of columns, effective length of column. Specification for minimum reinforcement; cover, maximum reinforcement, number of bars in rectangular, square and circular sections, diameter and spacing of lateral ties.
• Analysis and design of axially loaded short, square, rectangular and circular columns with lateral ties only; check for short column and check for minimum eccentricity may be applied.

Unit V: Pre-Stressed Concrete Hours 6

i. Concept of prestressing.
ii. Situations where prestressed concrete is used.
iii. Materials used in prestressed concrete and their specifications as per IS.
iv. Post-tensioning and pre-tensioning.
v. Systems of prestressing

Suggested Reading

1. Dr. B.C.Punamia, A.K. Jain; RCC Designs; Laxmi Publication

2.Shah and Kurvey; Limit State theory & Design of Reinforced Concrete

3.IS: 456

4.S.N.Sinha ; Reinforced Concrete Design, Tata McGrawhill

A.K.Jain; Design of Concrete Structures, Nemchand Publication					
Name of The Course	Concrete Technology				
Course Code	DPCE3003				
Prerequisite	DPCE1013				
Co-requisite	DPCE3008				
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

1. To define and understand concepts related Concrete technology which involves types and property of concrete and different adhesive materials and its vital use for safe, economic development for the buildings.

2 To present the foundations of many basic Engineering tools and concepts related to Concrete technology and Civil Engineering.

3 To give an experience in the implementation of Engineering concepts which are applied in field of Civil Engineering.

4 To understand special concrete and their use

Course Outcomes

CO1	Describe concrete and the materials from which it is made.(K2)
CO2	Describe the materials used to make concrete; including their sources, production and properties.(K2)
CO3	Explain how good concrete is produced.(K2)
CO4	Diagnose the correct procedure quality control.(K2)
CO5	Differentiate between different concrete operations.(K4)

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Exam (MTE)**	**End Term Exam (ETE)**	**Total Marks**
30	20	50	100

Course Content:

Unit I: Properties of Cement: **Hours**	**10**
1.1 Physical properties of Ordinary Portland cement (OPC), determination and test on OPC ,Hydration of cement, physical properties of cement – fineness, standard consistency, initial & final setting times, compressive strength & soundness, different grades of opc 33, 43 , 53 & their specification of physical properties as per relevant I. S. codes. Adulteration of cement (field test), storing cement at site, effect of storage of cement on properties of cement / concrete. 1.2 Types of Cement Physical properties, specifications as per relevant IS codes & fieldapplication of the following types of cement i) Rapid hardening cement Ii) Low heat cement Iii) Pozzolana Portland cement Iv) Sulphate resisting cement Vi) Blast furnace slag cement Vii) White cement	
Unit II: Properties of Aggregate **Hours**	**10**
2.1 Properties of fine aggregates : Concept of size, shape, surface texture, strength, specific gravity, bulk density , water absorption, surface moisture, soundness, bulking impurities 2.2 Determination of fineness modulus & grading zone of sand by sieve analysis, determination of silt content in sand & their specification as per IS 383 2.3 Bulking of sand, phenomenon of bulking, its effect on concrete mix proportion. 2.4 Properties of coarse aggregates : Concept of size, shape, surface texture, water absorption, soundness, specific gravity & bulk density 2.5 Determination of fineness modulus of coarse aggregate by sieve analysis, grading of Coarse Aggregates	

2.6 Determination of crushing value, impact value & abrasion value
of coarse aggregate, flakiness index & elongation index of coarse
aggregate and their specification.

Unit III: Properties of Concrete:

Hours 6

3.1 Introduction to concrete -
Definition of concrete, necessity of supervision for concreting
operation, different grades of concrete (ordinary concrete, standard concrete & high strength concrete as per provisions of
IS 456- 2000), minimum grade of concrete for different exposure
conditions, minimum grade of concrete for R.C.C., water retaining
structure & in sea water construction, durability of concrete.
3.2 Water cement ratio
Definition of w/c ratio, Duff Abraham w/c law, significance of
w/c ratio, selection of w/c ratio for different grades of concrete
prepared from different grades of OPC as per graphs specified in
IS 10262 -1982, maximum w/c ratio for different grades of
concrete for different exposure conditions.
3.3 Properties of fresh concrete
Definition of workability, factors affecting workability of concrete. Determination of workability of concrete by slump
cone test, compaction factor test, vee bee consistometer & flow
table tests. Range values of workability requirement for different
types of concrete works, cohesiveness, segregation, harshness,
bleeding.
3.4 Properties of hardened concrete
Definition of compressive strength, durability, impermeability, elastic properties of concrete, modulus of elasticity of concrete.
Creep, factors affecting creep, shrinkage, factors affecting
shrinkage

Unit IV: Quality Control of Concrete:

Hours 15

4.1 Batching, Different Types of Mixers & Vibrators
Volume & weight batching, volume batching for nominal mixes &
weight batching for design mix concrete, types of mixers (tilting
& non-tilting type) Different types of vibrators - needle vibrator,
surface vibrator, table vibrator, principle & application of each
type of vibrator
4.2 Formwork : formwork for concreting, different types of
formworks for different works such as beams, slabs, columns,
well foundation, materials used for formwork, requirement of
good formwork, stripping time for the removal of formwork as
per I.S. 456- 2000 provisions for different structural members.
4.3 Transportation, placing, compaction & finishing of concrete:
Modes of transportation of concrete , precautions to be taken
during transportation and placing of concrete in formwork
compaction of concrete, methods of compaction, care to be taken
during compaction, purpose of finishing, types of finishing &
methods of application (surface treatment, expose aggregate
finish, applied finish, coloured finish), requirement of good
finish.
4.4 Curing of concrete : definition of curing, necessity of curing,
different methods of curing and their application (spraying
water, membrane curing, steam curing, curing by infra red
radiations, curing by wet gunny bags, ponding methods).
4.5 Waterproofing of concrete & joints in concrete construction: Importance & need of waterproofing, methods of waterproofing &
materials used for waterproofing, types of joints, joining old &

new concrete, methods of joining, materials used for filling joints.
Unit V: Extreme weather concreting & chemical Admixture in concrete : **Hours 10**
5.1Extreme weather concreting Effect of cold weather on concrete, effect of hot weather on concrete, precautions to be taken while concreting in hot & cold weather condition. 5.2 Chemical admixture in concrete Properties & application for different types of admixture such as accelerating admixtures, retarding admixtures, water reducing admixture, air entraining admixture & super plasticizers. Properties of Special Concrete: Properties, Advantages & Limitation of the following types of Special concrete i) Ready mix Concrete ii) Reinforced Concrete iii) Prestressed Concrete iv) Fiber Reinforced Concrete v) Precast Concrete vi) High performance Concrete

Suggested Reading

1. M S Shetty; Concrete Technology , S.Chand Publication New Delhi

2 P Kumar Mehta, Monteiro; Concrete Technology, Indian Concrete Institute

3 IS 456-2000

4.A R Santhakumar; Concrete Technology , Oxford University Press

Name of The Course	Irrigation Engineering				
Course Code	DPCE3004				
Prerequisite	DPME2019				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

1.To take up the basic concepts of irrigation and construction of various hydraulic structures.

2.To introduce students to basic concepts of water, plants, their interactions, as well as irrigation and drainage systems design, planning and management.

3.The structures involved the elementary hydraulic design of different structures and the concepts of maintenance shall also form part.

4.To develop analytical skills relevant to the areas mentioned above, particularly the design of irrigation and drainage projects.

Course Outcomes

CO1	Understand water supply system
CO2	Use of water for irrigation
CO3	Calculation of runoff
CO4	Canal work and its importance
CO5	Understand Dams,Water Logging And Drainage,Ground Water Recharge

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: Introduction and . Rain Fall & Run – Off: **Hours 8**

1.1 Definition of irrigation. 1.2 Necessity of irrigation 1.3 History of development of irrigation in India 1.4 Types of irrigation 1.5 Sources of irrigation water ,1.6 Definition of rainfall & run-off, catchment area, Dickens's & Ryve's formulae 1.7 Types of rain gauges - Automatic & Non - automatic 1.8 Stream gauging
Unit II: Water Requirement of Crops and Lift Irrigation 10 Hours
2.1 Definition of crop season 2.2 Duty, Delta and Base Period, their relationship 2.3 Gross command area, culturable command area Intensity of Irrigation, Irrigable area 2.4 Water requirement of different crops-Kharif and Rabi. 2.5 Types of Wells - shallow & deep well, aquifer types , ground water flow, construction of open wells and tube wells . 2.6 Yield of an open/tube well and problems 2.7Methods of lifting water - manual and mechanical devices, use of wind mills.
Unit III: Flow Irrigation, 8 Hours
3.1 Irrigation canals 3.2 Perennial Irrigation 3.3 Different Parts of irrigation canals and their functions 3.4 Sketches of different canal cross-sections 3.5 Classification of canals according to their alignment 3.6 Design of irrigation canals - Chezy's formula, Mannings formula, Kennedy's and Lacey's silt theory sand equations, comparison of above two silt theories. Equations, critical velocity ratio. 3.7 Use of Garrets and Lacey's charts 3.8 Various types of canal lining - Advantages & disadvantages.
Unit IV: Canal Head Work,Regulatory Works, Cross Drainage Works Hours 15
4.1Definition, object, general layout, functions of different parts 4.2 Difference between Weir and Barrage 7.1 Functions and explanation of terms used Cross and Head regulators

4.3 Falls 4.4 Energy dissipaters 4.5Outlets-Different types 4.6 Escapes 4.7 Functions and necessity of the following types:- Aqueduct, Syphon, Super passage , Level crossing, inlet and outlet. 4.8 Constructional details of the above
Unit V: Dams,Water Logging And Drainage,Ground Water Recharge Hours 10
5.1 Earthen dams-types, causes of failure 5.2 Classification into masonry & concrete dams 5.3 Labeled cross-section of gravity dam. 5.4 Spillways 5.5 Definition, causes and effects , detection, prevention and remedies 5.6 Surface and sub-surface drains and their layout 5.7Ground Water Recharge: Aim ,method and advantage

Suggested Reading

1. Garg, S.K., Irrigation Engineering and Hydraulic Structures, Khanna Publishers, New Delhi.

2."Modi, P.N., Irrigation Water Resources and Water Power Engineering, Standard Book House, New Delhi"

3"Punmia, B.C., and B.B. Pande, "Irrigation and Water Power Engineering", Laxmi Publication

Pvt. Ltd., New Delhi"

4."Sharma, R.K., Text book of Irrigation Engineering and Hydraulic Structures, Oxford and

IBK Publishing House, New Delhi. "

Name of The Course	Earthquake Engineering				
Course Code	DPCE3006				
Prerequisite	DPCE2009				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		2	0	0	2

Course Objectives

1. To provide a coherent development to the students for the courses in sector of earthquake engineering ,

2.To give an experience in the implementation of engineering concepts which are applied in field of earthquake engineering
3.To present the foundations of many basic engineering concepts related earthquake Engineering

Course Outcomes

CO1	Judge the magnitude and intensity of earthquake
CO2	Compare the performance of structure in past earthquakes
CO3	Explain the effect of soil and liquefaction.
CO4	Practice seismic construction of masonry building
CO5	Apply the code IS:13920 in detailing of RC buildings. Practice disaster management technique

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
30	20	50	100

Course Content:

Unit I: Introduction 5 Hours
intensity and energy release, Basic terminology, Characteristics of earthquakes, Seismic hazard, vulnerability and risk, Seismic Zoning
Unit II: Past Theories: 5 Hours
Earthquakes performance of structures in past earthquakes
Unit III: Earthquake Philosophy Hours 16
Philosophy of earthquake resistant design and concept of ductility, Short and long period structures, Concept of spectrum, Static force Soil : Effect of soils and liquefaction, Remedial measures, Construction of earth structures Architectural Consideration:Building simplicity, symmetry. Irregularities, Continuity and Uniformity
Unit IV: Masonry building Hours 14
Seismic construction of masonry buildings, procisions of IS:4326 R.C. Building : Seismic construction of RC buildings detailing, provisions of IS: 13920. Retrofitting: Retrofitting of masonry and reinforced concrete buildings.
Unit V: Disaster Management Hours 8
DISASTER MANAGEMENT : Definition of disaster - Natural and Manmade, Type of disaster management, How disaster forms, Destructive power, Causes and Hazards, Case study of Tsunami Disaster, National policy- Its objective and main features, National Environment Policy, Need for central intervention, State Disaster Authority- Duties and powers, Case studies of various Disaster in the country, Meaning and benifit of

vulnerability reduction, Factor promoting vulnerability reduction and mitigation, Emergency support function plan. Main feature and function of National Disaster Management Frame Work, Disaster mitigation and prevention, Legal Policy Frame Work, Early warning system, Human Resource Development and Function, Information dissemination and communication

Suggested Reading

1. Earthquake Resistant Design of Structures By Pankaj Agarwal & Manish Shrikhande, PHI Publications

2.Manish Shrikhande & Pankaj Agrawal; Earthquake Resistant Design of Structures, PHI

Publication, New Delhi

3.. S. K. Duggal; Earthquake Resistance Design of Structures; Oxford University Press, New

Delhi

Name of The Course	Design of Steel Structure				
Course Code	DPCE3007				
Prerequisite	DPME2020				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

1 To provide a coherent development to the students for the courses in sector of Designing of the Steel Structures.

2.To present the Engineering concepts related Design of Steel Structures

3.To give an experience in the implementation of Engineering concepts which are applied in field of Steel Structures.

4.To involve the application of scientific and technological principles of planning, analysis, design of buildings.

Course Outcomes

CO1	Understand general Consideration of structural steel and section
CO2	Illustrate Structural Steel Connection.
CO3	Design tension member.
CO4	Design of compression member
CO5	Design beam section
CO6	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
30	20	50	100

Course Content:

Unit I: General Considerations Structural Steel and Sections **8 Hours**
Introduction, Advantages of Steel as a Structural. Material, Disadvantages of Steel as a Structural Material, Structural Steel, Stress-Strain Curve for Mild Steel, Rolled Steel Sections, Loads, Dead Load, Live Loads, Environmental Loads, Seismic Forces, Snow and Rain Loads, Erection Loads, Basis for Design, Design Philosophies (i) Properties of structural steel as per IS: 226 and IS: 1977. (ii) Designation of structural steel sections as per IS Handbook and IS: 800.
Unit II:Structural Steel Conections: **10 Hours**
(i) Riveted connections - types of rivets, permissible stresses in rivets. Types of riveted joints, Failure of riveted joints, Assumptions made in the design of riveted joints. Specification for riveted joints. Design of riveted joints for axially loaded members. (ii) Welded Connections Comparison between riveted and welded joints, types of welds, permissible stresses in welds, types of welded connections, strength of welded joint, Design of welded joints for axially loaded members.
Unit III: Tension Members **8 Hours**
Tension Members Forms of common sections. Permissible Stresses in tension for steel. Strength of a tension member. Design of tension members (flats, angles & Tee Sections only). Tension splice and their design
Unit IV: Compression Member **10 Hours**
Compression Members Design of struts and columns as per IS:800. Effective length, slenderness ratio and permissible stresses, simple and built up sections, concept of lacings in built up columns.

Unit V:Beams: 10 Hours
Beams Design criteria, allowable stresses, Design of laterally restrained beams including simple built-up sections. Checks for web bulking, web crippling and deflection.

Suggested Reading

1 .S.K Duggal ; Steel Structures, TMH

2.B.C.Punamia; Steel Structures, Laxmi Publication

3.K. S. Sai Ram; Design of Steel Structures, Pearson

4.IS: 800 - 2007, Code of Practice for General Construction in Steel, BIS, New Delhi.

Name of The Course	CAD LAB				
Course Code	DPCE3015				
Prerequisite	DPME1014				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	4	2

Specific Instructional Objectives

1. Describe the different techniques of drawing line

2. Describe different symbols

3. Describe the different types of structure

Course Outcomes

CO1	Create drawing of building structure.
CO2	Create drawing of 1 bhk and 2 bhk flat.

CO3	Understand basic commands.
CO4	Draw drawing on software according to details.
CO5	Draw basic symboles

Continuous Assessment Pattern

Practical Internal Assessment (IA)	Mid Term Exam (MTE)	Practical End Term Exam (ETE)	Total Marks
50	00	50	100

Course Content:

List of Experiments
To draw plan, section and elevation of buildings.
To draw line diagram, representation of doors, windows, ventilators and built in features.
To prepare drawing of 1bhk flat.
To prepare drawing of 2bhk flat.
To prepare drawing of plan for multistory building

Name of The Course	Concrete Technology Lab				
Course Code	DPCE3008				
Prerequisite	DPCE1018				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Specific Instructional Objectives

1. To develop understanding about concrete

2. To analyze properties of aggregate

3. To analyze quality of concrete

4. To determine quality of concrete

Course Outcomes

CO1	Determine flakiness index and elongation index of course aggregates.
CO2	Calculate workability of concrete.
CO3	Analyze fineness modulus of sand.
CO4	Calculate slump of concrete.
CO5	Determine of bulk density and voids of aggregates

Continuous Assessment Pattern

Practical Internal Assessment (IA)	Mid Term Exam (MTE)	Practical End Term Exam (ETE)	Total Marks
50	00	50	100

Course Content:

List of Experiments
To determine flakiness index and elongation index of coarse aggregate (ISI: 2386-pt.1-1963)
Field method to determine fine silt in aggregate.
Determination of specific gravity and water absorption of aggregates (IS: 2386 Part-III-1963) (for aggregates 40mm to 10mm)
Determination of bulk density and voids of aggregates (IS: 2386-Part-III-1963)
Determination of surface moisture in fine aggregate by displacement method (IS: 2383-Part-III-1963)
To determine necessary adjustment for bulking of fine aggregate by field method (IS: 2383-Part-III-1983)
Test for workability (slump test); (a) To verify the effect of water, fine aggregate/coarse aggregate ratio and aggregate/cement ratio on slump. (b) To test cube strength of concrete with varying water cement ratio
Compacting factor test for workability (IS:1199-1959)
Workability of concrete by Vee-Bee consistometer.
Fineness modulus of sand.

Suggested Reading

1. M S Shetty; Concrete Technology , S.Chand Publication New Delhi

2 P Kumar Mehta, Monteiro; Concrete Technology, Indian Concrete Institute

3 IS 456-2000

4.A R Santhakumar; Concrete Technology , Oxford University Press

Name of The Course	PROJECT-I				
Course Code	DPCE9998				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	4	2

Specific Instructional Objectives

1. Overcome the gap between planning and exicution

2. Increase the presentation skill

3. Describe the different types of structure

Course Outcomes

CO1	Create a own data or implementation on previous data project.
CO2	Create model to exhibit project
CO3	Understand basic concept of civil engineering from live project.
CO4	Describe presentation on project.
CO5	Explain their project.

Continuous Assessment Pattern

Practical Internal Assessment (IA)	Mid Term Exam (MTE)	Practical End Term Exam (ETE)	Total Marks
50	00	50	100

Course Content:

List of Experiments
Planning the project
creating the group to work on
Prepare plan of project include repor,drawing,ppt
Creating model of project
Final project report

Name of The Course	Field Visit and Presentation				
Course Code	DPCE3009				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	4	2

Specific Instructional Objectives

1. To make student familiar with industry.

2. To develop skills of machine handling.

3. To develop skills of labour handling.

Course Outcomes

CO1	Recognize the process units
CO2	Identify input and output for the process.
CO3	Experience the importance of working safety.
CO4	Understand how to take work from labour.
CO5	Communicate effectively both orally and in writing.

Continuous Assessment Pattern

Practical Internal Assessment (IA)	Mid Term Exam (MTE)	Practical End Term Exam (ETE)	Total Marks
50	00	50	100

Course Content:

List of Experiments
Introduction
About the Project
Safety precautions
Behavior with seniors
Labour handeling
Importance of shedule

Application writing
understanding of drawing
Execution of plan
Report Writing
Prepare plan of project include repor,drawing,ppt
Creating model of project
Final project report

Name of The Course	PROJECT-II				
Course Code	DPCE9999				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	12	6

Specific Instructional Objectives

1. Overcome the gap between planning and exicution

2. Increase the presentation skill

3. Describe the different types of structure

Course Outcomes

CO1	Create a own data or implementation on previous data project.
CO2	Create model to exhibit project
CO3	Understand basic concept of civil engineering from live project.
CO4	Describe presentation on project.
CO5	Explain their project.

Continuous Assessment Pattern

Practical Internal Assessment (IA)	Mid Term Exam (MTE)	Practical End Term Exam (ETE)	Total Marks
50	00	50	100

Course Content:

List of Experiments
Planning the project
creating the group to work on

SCHOOL OF POLYTECHNIC

GALGOTIAS UNIVERSITY

(Established under Galgotias University Uttar Pradesh Act No. 14 of 2011)

Program: Diploma In Electrical Engineering

Scheme: 2020-2021

Vision

To provide excellence knowledge and enrich the problem-solving skills of the students in the field of Electrical Engineering with a focus to prepare the students for industry need, recognized as innovative leader, responsible citizen and improve the environment

Mission

M1	Prepare the student with strong fundamental concepts, analytical capabilities and skills
M2	Create ambience education through faculty training, self-learning, sound academic practices
M3	Provide opportunities to promote organizational leadership and skills of students through various extracurricular activities and events.
M4	To make the students as far as possible industry ready to enhance their employ ability in the Industries.
M5	Imbibe social awareness and responsibility in students to serve the society and protect environment

Program Educational Objectives

PEO1	To engage in Design of Systems, tools and applications in the field of electrical Engineering and allied engineering Industries.
PEO2	To apply the knowledge of electrical engineering to solve problems of social relevance and/or pursue higher education
PEO3	To work effectively as individuals and as team members in multidisciplinary projects by exhibit leadership capability, triggering social and economic commitment and inculcate community services and protect environment
PEO4	Engage in lifelong learning, career enhancement and adopt to changing professional and societal need

Program Specific Objectives

DEE_PSO1	Apply principles of engineering and laboratory skills for building, testing, operation and maintenance of electrical systems, such as electrical machines, power and energy systems.
DEE_PSO2	Model and analyze, design and realize physical systems, components or processes related to electrical engineering systems
DEE_PSO3	Work professionally in power systems engineering, Electrical machinery and electrical circuits.

Program Outcomes

DEE_PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

DEE_PO2	Problem analysis: Identify, formulate, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
DEE_PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
DEE_PO4	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
DEE_PO5	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
DEE_PO6	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
DEE_PO7	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
DEE_PO8	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
DEE_PO9	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
DEE_PO10	Life-long learning: Recognize the need for, and have the preparation and ability to engage independent and life-long learning in the broadest context of technological change.

Curriculum

Semester 1									
Sl No	**Course Code**	**Name of the Course**					**Assessment Pattern**		
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**
1	PHYE-1001	APPLIED PHYSICS-I	3	2	0	4	20	50	100
2	MATD-1002	APPLIED MATHEMATICS-I	4	0	0	4	20	50	100
3	SLPC-1003	PROFESSIONAL COMUNICATION-I	2	0	0	2	20	50	100
4	DPCS-1004	COMPUTER FUNDAMENTALS	3	0	0	3	20	50	100
5	DPME-1005	ENGINEERING GRAPHICS	0	0	6	3	20	50	100
6	PHYE-1006	APPLIED PHYSICS-I LAB	0	0	2	1	50	-	50
7	SLPC-1007	PROFESSIONAL COMUNICATION-I LAB	0	0	4	2	50	-	50
8	DPCS-1008	COMPUTER FUNDAMENTALS LAB	0	0	2	1	50	-	50
9	DPME-1009	WORKSHOP PRACTICE	0	0	6	3	50	-	50
		Total Credits				**23**			

Semester II									
Sl No	**Course Code**	**Name of the Course**					**Assessment Pattern**		
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**
1	PHYE-1010	APPLIED PHYSICS-II	3	2	0	4	20	50	100
2	MATD-1011	APPLIED MATHEMATICS-II	4	2	0	5	20	50	100
3	SLPC-1012	PROFESSIONAL COMUNICATION-II	3	0	0	3	20	50	100
4	DPEE-1013	BASIC ELECTRICAL ENGG.	3	2	0	4	20	50	100
5	CHEM-1014	BASIC CHEMISTRY	4	2	0	5	20	50	100
6	PHYE-1015	APPLIED PHYSICS-II LAB	0	0	2	1	50	-	50
7	SLPC-1016	PROFESSIONAL COMUNICATION-II LAB	0	0	4	2	50	-	50
8	CHEM-1017	BASIC CHEMISTRY LAB	0	0	4	2	50	-	50
9	DPEE-1018	BASIC ELECTRICAL ENGG.LAB	0	0	2	1	50	-	50
		Total Credits				**27**			

Semester III									
Sl No	**Course Code**	**Name of the Course**					**Assessment Pattern**		
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**
1	MATD-2001	APPLIED MATHEMATICS-III	4	0	0	4	20	50	100
2	DPEE-2014	ELECTRICAL & ELECTRONICS ENGG. MATERIALS	3	0	0	3	20	50	100
3	DPEE-2002	ELECTRICAL MACHINE-I	4	0	0	4	20	50	100
4	DPEE-2001	ELECTRICAL MEASUREMENTS AND MEASURING INSTRUMENTS	3	0	0	3	20	50	100
5	DPCO-2014	ELECTRONICS ENGG.-I	3	0	0	3	20	50	100
6	DPME-2023	ELEMENTARY MECHANICAL AND CIVIL ENGINEERING	3	0	0	3	20	50	100
7	EEDM-2001	ENVIRONMENTAL EDUCATION AND DISASTER MANAGEMENT	3	0	0	2	20	50	100
8	DPEE-2004	ELECTRICAL MACHINE-I LAB	0	0	4	2	50	-	50
9	DPEE-2003	ELECTRICAL MEASUREMENTS AND MEASURING INSTRUMENTS LAB	0	0	2	1	50	-	50
10	DPCO-2015	ELECTRONICS ENGG.-I LAB	0	0	2	1	50	-	50
11	DPME-2024	ELEMENTARY MECHANICAL AND CIVIL ENGINEERING LAB	0	0	2	1	50	-	50
		Total Credits				**27**			

Semester IV									
Sl No	**Course Code**	**Name of the Course**					**Assessment Pattern**		
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**
1	DPEE-2006	TRANSMISSION AND DISTRIBUTION OF ELECTRICITY	4	0	0	4	20	50	100
2	DPEE-2007	POWER ELECTRONICS	3	0	0	3	20	50	100
3	DPEE-2008	ELECTRICAL & ELECTRONICS INSTRUMENTATION	3	0	0	3	20	50	100
4	DPEE-2009	ELECTRICAL DESIGN, DRAWING AND ESTIMATION-I	3	0	0	3	20	50	100
5	DPCO-2016	ELECTRONICS ENGG.-II	3	2	0	4	20	50	100
6	IMED-2001	INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT	3	0	0	3	20	50	100
7	DPEE-2010	POWER ELECTRONICS LAB	0	0	4	2	50	-	50
8	DPEE-2011	ELECTRICAL & ELECTRONICS INSTRUMENTATION LAB.	0	0	2	1	50	-	50
9	DPEE-2012	ELECTRICAL DESIGN, DRAWING AND ESTIMATION-I LAB	0	0	4	2	50	-	50
10	DPCO-2017	ELECTRONICS ENGG.-II LAB	0	0	4	2	50	-	50
11	DPEE-9001	DISRUPTIVE TECHNOLOGY	0	0	2	1			
		Total Credits				**28**			
Semester V									
Sl No	**Course Code**	**Name of the Course**					**Assessment Pattern**		
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**
1	DPEE-3001	SWITCHGEAR AND PROTECTION	3	0	0	3	20	50	100
2	DPEE-3002	ELECTRICAL MACHINES-II	3	0	0	3	20	50	100
3	DPEE-3003	CONTROL SYSTEM	3	0	0	3	20	50	100
4	DPEE-3004	ELECTRICAL DESIGN, DRAWING AND ESTIMATION-II	3	0	0	3	20	50	100
5	DPEE-3010	INSTALLATION ,MAINTENANCE AND REPAIR OF ELECTRICAL MACHINES	2	0	0	2	20	50	100
6	DPEE-3008	ELECTIVE-I (RENEWABLE SOURCE OF ENERGY)	3	0	0	3	20	50	100
	DPEE-3009	ELECTIVE-II (UTILIZATION OF ELECTRICAL ENERGY)							
7	DPEE-3005	ELECTRICAL MACHINES-II LAB	0	0	4	2	50	-	50
8	DPEE-3007	CONTROL SYSTEM LAB	0	0	2	1	50	-	50
9	DPEE-3006	ELECTRICAL DESIGN, DRAWING AND ESTIMATION-II LAB	0	0	4	2	50	-	50
10	PDSS3008	PERSONALITY DEVELOPMENT & SOFT SKILLS	0	0	4	2	50	-	50
11	DPEE-3011	INSTALLATION, MAINTENANCE AND REPAIR OF ELECTRICAL MACHINES LAB	0	0	4	2	50	-	50
		Total Credits				**26**			
Semester VI									
Sl No	**Course Code**	**Name of the Course**					**Assessment Pattern**		

			L	T	P	C	IA	MTE	ETE
1	DPEE-3012	FIELD VISIT AND PRESENTATION	0	0	6	3	50	-	50
2	DPEE-9999	PROJECT	0	0	14	7	50	-	50
		Total Credits				**10**			

List of Electives

Elective-1

Sl No	Course Code	Name of the Electives					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	DPEE-3008	ELECTIVE-I (RENEWABLE SOURCE OF ENERGY)	3	0	0	3	20	50	100
		Total Credits				**3**			

Elective-2

Sl No	Course Code	Name of the Elective					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	DPEE-3009	ELECTIVE-II (UTILIZATION OF ELECTRICAL ENERGY)	3	0	0	3	20	50	100
		Total Credits				**3**			

Name of The Course	**BASIC ELECTRICAL ENGG.**				
Course Code	**DPEE1013**				
Prerequisite	**None**				
Corequisite					
Antirequisite					
		L	**T**	**P**	**C**
		3	**2**	**0**	**4**

Course Objectives

1 To develop solid foundation for further study of electrical and electronics courses

2. To develop the analytical skills for solving the electrical and electronics circuits

Course Outcomes

CO1	**Practice the basic electrical theoretical concept & laws in electric ckt.**
CO2	**Understand the basic concept of magnetism.**
CO3	**Generalized the AC theory and their different electrical parameter.**
CO4	**Evaluate the different filters and resonance ckt.**
CO5	**Correlate the different two port network and analyse the transient LTI system.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: D.C. Circuits 10 Hours
Ohm's law - resistivity - effect of temperature on resistances - heating effect of electric current - conversion of mechanical units into electrical units - Kirchhoff's laws - application of Kirchhoff's laws to solve simple d.c. circuits - Thevenins theorem - maximum power transfer theorem - Norton's theorem and super position theorem - simple numerical problems. .
Unit II: Electro Magnetism 8 Hours
Concept of mmf, flux, reluctance and permeability - Energy stored in a magnetic field and an inductor - Solution of problems on magnetic circuits - Faraday's laws of electromagnetic induction - Lenz's law - Physical explanation of self and mutual inductance - B-H curve - Hysteresis - Eddy currents elementary ideas and significance. Growth and decay of current in an inductive circuit - Force between two parallel current carrying conductors and its significance - Current carrying conductor in a magnetic field and its significance
Unit III: A.C. Theory 8 Hours
Concept of alternating voltage and current- difference between A.C and D.C.Generation of alternating voltage - equation of sinusoidal waveform - Definition and concept of cycle - frequency - Time period - amplitude - instantaneous value - average value - RMS value, peak value - form factor, Peak factor - Phase and phase difference - representation of alternating quantities by pharos - addition and subtraction of alternating quantities.
Unit IV: Filters, Resonance & Two port Network 8 Hours
High pass - Band pass - Band elimination - Prototype filter design - Resonance-series and parallel (R-L-C) Circuits - Q-factor, Bandwidth - Two port networks - Z, Y, ABCD, h, g, inverse ABCD parameters their inter conversio - interconnection of two 2-port networks - concept of transform impedance
Unit V: Signals and Transient Analysis 6 Hours
Introduction to continuous and discrete signals- their classification and types - periodic waveforms and signal synthesis - LTI systems and their properties - system modeling in terms of differential equations and transient response of R, L, C circuits for impulse, step, ramp, sinusoidal and exponential signals - Laplace Transform: Review of properties - applications of Laplace transform of complex waveform - transient response of R, L, C series, parallel, series-parallel circuits for all kinds of excitations

Suggested Reading

1. 1. Basic Electrical Engineering by Pradeep Kumar Khanna Publication

2. A Text book of Electrical Technology by B.L Thereja
3. 1I. D. C. Kulshreshtha,‖Basic Electrical Engineering‖, Tata McGraw Hill, 2009.
4. J. Edminister and M. Nahvi , ―Electric Circuits‖, 3rd Edition, Tata McGraw-Hill, New Delhi, 2002.
5. Jacob Millman, Christos C. Halkias, Satyabrata Jit, ―Electronics Devices and Circuits‖, 3rd Edition, Tata McGraw Hill, 2008

Name of The Course	**BASIC ELECTRICAL ENGG. LAB**				
Course Code	**DPEE1018**				
Prerequisite	None				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives

1. 1 To develop solid foundation for further study of electrical and electronics courses

2. To develop the analytical skills for solving the electrical and electronics circuits

Course Outcomes

CO1	Practice the basic electrical theoretical concept & laws in electric ckt.
CO2	Understand the basic concept of magnetism.
CO3	Generalized the AC theory and their different electrical parameter.
CO4	Evaluate the different filters and resonance ckt.
CO5	Correlate the different two port network and analyse the transient LTI system.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	**-**	**50**	**100**

Course Content:

1.Ohm's law verification. 2.To verify the laws of series and parallel connections of resistances i.e. to verify: - The total resistance in series connections. RT=R1+R2+R3....... , where RT is the total resistance and R1, R2, R3 etc. are the resistances connected in series. 3.To verify the laws of parallel connections of resistances i.e. to verify: - The total resistance in parallel connections. 1/RT=1/R1 + 1/R2 + 1/R3...... , where RT is the total resistance and R1, R2, R3 etc. are the resistances connected in parallel. Also to conclude that the total resistance value of a parallel circuit is less than the any individual resistance. 4.To verify Kirchhoff's KCL laws:-The algebraic sum of the currents at a junction is zero. 5.To verify Kirchhoff's KVL following laws:-The algebraic sum of the e.m.f. in any closed circuit is equal to the algebraic sum of IR products (drops) 6. To verify the Thevenin's theorem. 7. To verify the Norton theorem. 8. To verify the maximum power transfer theorems. 9. To verify the superposition theorem. 10. Study of series and parallel resonance.

Diploma In Electrical Engineering (School of Polytechnic)Suggested Reading

1. 1. Basic Electrical Engineering by Pradeep Kumar Khanna Publication
2. A Text book of Electrical Technology by B.L Thereja
3. 1I. D. C. Kulshreshtha,‖Basic Electrical Engineering‖, Tata McGraw Hill, 2009.
4. J. Edminister and M. Nahvi , ―Electric Circuits‖, 3rd Edition, Tata McGraw-Hill, New Delhi, 2002.
5. Jacob Millman, Christos C. Halkias, Satyabrata Jit, ―Electronics Devices and Circuits‖, 3rd Edition, Tata McGraw Hill, 20081.

Name of The Course	**ELECTRICAL & ELECTRONICS ENGG. MATERIALS**				
Course Code	**DPEE2014**				
Prerequisite	**None**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

1. Familiarize the students with the basic materials concepts and semiconductor materials.

2. To understand the concepts of conducting materials, insulating material and magnetic materials.

Course Outcomes

CO1	Understand basic structure and properties of engineering materials.
CO2	Recognize electrical property of conducting material.
CO3	Recognize electrical, mechanical & chemical property of insulating material.
CO4	Analyze magnetic material.
CO5	Generalized semiconductor material used for electronics material.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: Classification materials 2 Hours
Classification of materials into conducting - semiconducting and insulating materials with reference to their atomic structure.
Unit II:Conducting Materials 10 Hours
Resistivity and factors affecting resistivity, such as temperature, alloying and mechanical stressing. - Super conductivity and super conducting material. - Low resistivity materials e.g. copper, aluminium and steel, their general properties as conductor e.g. resistivity, temperature co-efficient, mechanical properties, corrosion, solar ability, contact resistance and practical application. Uses of mercury as conducting material - Comparison of copper, aluminium and steel for various applications as electrical conductor - Low resistivity copper alloys: brass, bronze (cadmium and beryllium), their practical application. - High resistivity materials: manganin, constantan nichrome, carbon, tungsten, their practical applications. - Electric lamp materials. - Brush contact materials. - Soldering materials. - Thermocouple materials - Fuse materials.
Unit III: Insulating Material 12 Hours
Introduction. - Properties of insulating material.- Electrical properties: Volume resistivity - Surface resistivity - Dielectric Loss - Dielectric Constant - Dielectric – Strength - Mechanical properties: Mechanical strength a) Physical properties: - Hygrscoopcity tensile and compressive strength - Abrasive resistance brittleness. b) Thermal properties: Heat resistance - Classification according to high permissible temperature rise - Effect of over loading on the life of an electrical appliances - Increase in rating with the use of insulating materials having higher thermal stability, Thermal conductivity - Chemical properties : Solubility - Chemical resistance - Weather ability - Insulating materials and their application: a) Definition and classification b) Thermo setting materials e.g. Phenol Formaldehyde - Resins (i.e. Bakelite) - Amino resins (Ureca formaldehyde and Malamine formaldehyde) - Epoxy resins their properties, Applications and Commercials names. c) Thermo Plastic materials e.g. Polyvinyl Chloride (P.V.C.) - Poly Ethylene Silicons their properties application and commercial names. Brief description of extrusion and moulding process of using plastic materials in electrical engineering d) Natural Insulating Materials: Mica and Mica products- Asbestos and Asbestos products, Ceramic materials (Porcelain and Stealite) - Glass and glass products - Cotton, Silk, Jute, Paper (Dry and impregnated), Rubber Bitumen - Mineral and insulating oil for transformer - switch gear, capacitors, high voltage cables, insulating varnishes for coating and impregnation - Enamels for winding wires, Glass fiber sleeves, their practical application.
Unit IV: Magnetic Materials 8 Hours
Classification of magnetic materials into soft and hard magnetic materials - Soft magnetic materials - high silicon alloy steel for transformers and low silicon alloy steel, for electric rotating machine cold rolled grain oriented and non-oriented steel, Nickel iron alloy, soft ferrites, their properties and uses.- Hard magnetic materials - tungsten steel, chrome steel, cobalt steel, alnico, hard ferrites, their properties and applications
Unit V:Semiconductor 8 Hours
Semiconductor Materials Introduction, semiconductor and their applications - Different semiconductor materials used in manufacturing various semiconductor (Si & Ge) - Material used for electronic components like resister, capacitor, diode - transistors and inductors.

Suggested Reading

1. Electrical and Electronics Engg. Materials by K.B.Raina, S.K. Kataria & Sons publication.
2. A.J. Dekker,"Electrical Engineering Materials" Prentice Hall of India
3. S.O.Kasap, 'Principles of Electronic Material & Devices', McGraw Hill Publications
4. G.P. Chhalotra& B.K. Bhat, "Electrical Engineering Materials" Khanna Publishers

5. Ian P. Hones," Material Science for Electrical and Electronic Engineering," Oxford University Press

Name of The Course	**ELECTRICAL MACHINE-I**				
Course Code	**DPEE2002**				
Prerequisite	**None**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		4	0	0	**4**

Course Objectives

1. To prepare students to know about the generation of DC and AC
2. To prepare students to know about applications of Faraday's laws.
3. To prepare students to know about Operation of AC Machines to conduct experiments on it to find the characteristics.
4. To prepare students to know about the speed of electrical machines by different methods

Course Outcomes

CO1	Identify significance the generation of DC and AC.
CO2	Understand the applications of Faraday's laws.
CO3	Operate Ac Machines to conduct experiments on it to find the characteristics.
CO4	Judge to Test the speed of electrical machines by different methods.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	**30**	**50**	**100**

Course Content:

Unit I: Introduction to Computers and Algorithms 10 Hours
Definitions of motor and generator - Torque due to alignment of two magnetic fields and - concept of torque angle - Elementary concept of generator and motor - Classification of main types of electrical machines and their generalized treatments in respect of their Working (only d.c. machine to be dealt with).- Common features of rotating electrical machines
Unit II:D.C. Machines 10 Hours
Construction of d.c. machines - E.M.F. equation - Electromagnetic torque (torque equation) - Principle of generating and motoring action.- Speed and torque equation - Armature reaction and commutation in d.c. m/cs.- Factors controlling speed of d.c. motor. - Speed control methods and starters for d.c. m/cs.- Characteristics and application of D.C. generators and motors.
Unit III: Transformer 10 Hours
Classification, construction, principle and working of 1 ph. and 3 ph. transformer. - E.M.F. equation. - Phasor diagram on no load and load.- Transformer connections.- Losses and efficiency. - Voltage drops and regulation.- Connections for parallel operation.- Cooling - Special transformer - current transformer, potential transformer uses of C.T. and P.T., auto transformer, rectifier transformer, dry type transformer, furnace transformer earthing transformer, traction transformer and its use.- Welding transformer: constructional detail, comparison between power and welding transformer.
Unit IV: A. C. Generator (Alternator) 10 Hours
Working principle, construction- Full pitch and short pitch winding - pitch factor or coil span factor - distribution or winding factor- E.M.F. equation -rating of alternators - armature reaction,voltage drops in alternator,- vector diagram of loaded alternator, voltage regulation and its determination - Efficiency of alternator - conditions for parallel operation - Methods of parallel operation - operation of alternators when connected to infinite bus bar - Voltage regulator like Terrill and brown bowery type.

Suggested Reading

1. Electrical Machine-1 by U.A. Bakshi, First edition, 2009, Technical publication Pune.
2. A.J. Dekker,"Electrical Engineering Materials" Prentice Hall of India
3. Electrical Machines by Ashfaq Hussain, Third edition, Dhanpat Rai & Co. publication.
4. Electrical Machines by Ashfaq Hussain, Third edition, Dhanpat Rai & Co. publication.

Name of The Course	**ELECTRICAL MACHINE-I LAB**				
Course Code	**DPEE-2004**				
Prerequisite	**Basic concepts related to electrical machine-i lab**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	4	2

Course Objectives

1. Familiarize the students with the basic analog measurement concepts and instrumenttransformers.
2. To understand the concepts ofdifferent AC & DC bridges in measurement system.Course Outcomes

CO1	Understand the basics of induced emf and magnetizing current
CO2	Understand the magnetization curvean alternator
CO3	Understand the relationship between terminal voltage and load current of an alternator
CO4	Understand thedetermination of regulation and efficiency of an alternator

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

1. Measurement of induced emf and magnetizing current under open circuit condition in D.C. generators.
2. To measure the variation in no load speed of a separately excited d.c. motor for the variation in Armature circuit resistance
3. To measure the variation in no load speed of a separately excited d.c. motor for the variation in Field circuit resistance.
4. Measurement of the speed of a d.c. series motor as a function of the load torque.
5. Determination of the magnetization curve of an alternator at no-load rated speed
6. Determination of the magnetization curve of an alternator at no load half rated speed
7. Determination of the magnetization curve of an alternator at full non-inductive load and rated speed.
8. Determination of the relationship between terminal voltage and load current of an alternator keeping excitation and speed constant.

9. Determination of regulation and efficiency of an alternator from open circuit and short circuit tests.

10. Parallel operation of polyphase alternators and load sharing.

Suggested Reading

1.Electrical Machine-1 by U.A. Bakshi, First edition, 2009, Technical publication Pune.
2. Electrical Machines by Ashfaq Hussain, Third edition, Dhanpat Rai & Co. publication.
3. Electrical Machines by V.A. Bakshi, Third edition, Dhanpat Rai & Co. publication.

Name of The Course	**ELECTRICAL MEASUREMENTS AND MEASURING INSTRUMENTS**				
Course Code	**DPEE2001**				
Prerequisite	None				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives

1. Familiarize the students with the basic analog measurement concepts and instrumenttransformers.
2. To understand the concepts ofdifferent AC & DC bridges in measurement system.Course Outcomes

CO1	Understand the basic of instrumentation.
CO2	Analyze the different meter or measurement of electrical quantity.
CO3	Apply and design the transformer for high current & voltage measurement.
CO4	Evaluate the different AC & DC bridges in measurement system.
CO5	Understand the magnetic measurement.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I:Introduction 8 Hours
Philosophy of Measurement - Methods of Measurement - Measurement System - Classification of instrument system- Characteristics of instruments & measurement system- Errors in measurement & its analysis - Standards.
Unit II:Analog Measurement of Electrical Quantities 8Hours
Electrodynamic, Thermocouple, Electrostatic & Rectifier type Ammeters & Voltmeters. Electrodynamic Wattmeter, Three Phase Wattmeter, and Power in three phase system- Construction, working principle, merits and demerits of single-phase and three phase energy meters. - Testing of energy meters for calibration. Errors and compensation. Simple problems - Digital Energy meter (Single Phase/Three Phase) Construction working and application.
Unit III: Measurement : Instrument Transformer 8 Hours
Instrument Transformer and their applications in the extension of instrument range- Introduction to measurement of speed, frequency and power factor - Strain gauge.
Unit IV: Measurement of Parameters 8 Hours
Different methods of measuring low, medium and high resistances -Measurement of inductance & capacitance with the help of AC Bridges (Maxwell, Hay's, Anderson, Owen, Heaviside, Campbell, Schering, Wien bridges). - Wagner earthing device, Q Meter. Wheatstone, Kelvin. - The construction, working principle and application of: ohm-meter, Meggar, earth tester, multi-meter, frequency meter (reed-type), single phase power factor meter (Electrodynamometer), power factor meter.
Unit V:AC Potentiometer & Magnetic Measurement 8Hours
Polar type & Co-ordinate type AC potentiometers - Application of AC Potentiometers in electrical measurement - Ballistic Galvanometer, flux meter, determination of hysteresis loop, measurement of iron losses.

Suggested Reading

1 .Electrical and Electronic Measurement and InstrumentationBy-A. K. Sawhney
2. Electronic Instrumentation By-H. S. Kalsi
3. ELECTRONIC MEASUREMENTS & INSTRUMENTATIO by OLIVER and BERNARD, McGraw Hill

Name of The Course	**ELECTRICAL MEASUREMENTS AND MEASURING INSTRUMENTS LAB**				
Course Code	**DPEE2003**				
Prerequisite	None				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives

1. Familiarize the students with the basic analog measurement concepts and instrumenttransformers.
2. To understand the concepts ofdifferent AC & DC bridges in measurement system.

Course Outcomes

CO1	Understand the basic of instrumentation.
CO2	Analyze the different meter or measurement of electrical quantity.
CO3	Apply and design the transformer for high current & voltage measurement.
CO4	Evaluate the different AC & DC bridges in measurement system.
CO5	Understand the magnetic measurement.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

1. Measurement of power using CT & PT. 2. To calibrate single-phase energy meter by direct loading method. 3. Measurement of power and power factor of a 3-phase balanced load by 2-wattmeter method. 4. Measurement of load using strain gauge based load cell. 5. Measurement of resistance using Kelvin Bridge. 6. Measurement of Inductance using Maxwell's Bridge. 7. Measurement of Inductance using Maxwell inductance & Capacitance Bridge. 8. To measure capacitance by Schering bridge. 9. To measure capacitance by De Sauty's bridge. 10. Measurement of Frequency using Wien's Bridge.

Suggested Reading

1. Electrical and Electronic Measurement and InstrumentationBy-A. K. Sawhney
2. Electronic Instrumentation By-H. S. Kalsi
3. ELECTRONIC MEASUREMENTS & INSTRUMENTATIO by OLIVER and BERNARD, McGraw Hill

Name of The Course	**ELECTRONICS ENGG.-I**				
Course Code	**DPCO2014**				
Prerequisite	**None**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

1. Develop the concepts of amplifiers
2. Analyze the results of feedback amplifiers and oscillators

Course Outcomes

CO1	To acquire knowledge of the Single stage amplifier.
CO2	To study multistage power amplifier.
CO3	Understanding of feedback in amplifier.
CO4	To know about regulated power supply
CO5	Understanding the working of oscillator.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: Single Stage Amplifier 8 hours
1.1 Single stage CE amplifier with proper biasing circuit 1.2 Working of single stage amplifier. 1.3 AC load line and DC load line 1.4 Explanation of phase reversal of the output voltage with respect to input voltage. 1.5 Introduction to tuned voltage amplifier.
Unit II:Multistage Power Amplifiers 8 Hours
2.1 Need of multistage amplifier, 2.2 Different coupling schemes and their working, brief mention of application of each of the type of coupling. 2.3 Working of R.C. coupled and transformer coupled multistage amplifier, 2.4 Approximate calculation of voltage gain and frequency response for a two stage R-C coupled amplifier. 2.5 Working principles of push pull amplifier circuits its advantages over single ended power amplifier.
Unit III: Feedback in Amplifiers 8 Hours
3.1 Basic principles and types of feedback 3.2 Derive an expression for the gain of an amplifier employing feedback. 3.3 Effect of negative feedback on gain, Stability, distortion, and band width.(only physical explanation) typical feedback circuits: (a) RC coupled amplifiers with emitter by-pass capacitor removed. (b) Emitter follower, complementary symmetry power amplifier and its applications.
Unit IV: Regulated Power Supply 8 Hours
4.1 Concept of voltage regulation. 4.2 Basic regulator circuits (using zener diode). 4.3 Concept of series and shunt regulator circuits. 4.4 Three terminal voltage regulator Ics (positive negative and variable) application. 4.5 Block diagram, Pin configuration and working of popular regulator IC.
Unit V: OSCILLATORS 8 Hours

5.1 Application of oscillators. 5.2 Use of positive feedback/negative resistance for generation of oscillation, barkhawn's criterion for oscillations. 5.3 Tuned collector oscillator, Hartley oscillator,Colpitts oscillator 5.4 R-C phase shift oscillator,Wein bridge oscillator,Crystal oscillator

Suggested Reading

1.“Basic Electronics and linear systems b”, “NN bhargava”, McGraw Hill Publication
2. "Basic electronics and devices","S Salivahanan", McGraw Hill Publication
3. "Electronic Devices and Circuits "," J.B. Gupta",Katson educational series.

Name of The Course	**ELECTRONICS ENGG.-I LAB**				
Course Code	**DPCO2015**				
Prerequisite	**None**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives

1. Develop the concepts of amplifiers
2. Analyze the results of feedback amplifiers and oscillators

Course Outcomes

CO1	To acquire knowledge of the Single stage amplifier.
CO2	To study multistage power amplifier.
CO3	Understanding of feedback in amplifier.
CO4	To know about regulated power supply
CO5	Understanding the working of oscillator.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

1. Semiconductor diode: identification of types of packages, terminals and noting different ratings using data books for various types of semiconductor diodes (germanium, point contact, silicon low power and high power and switching diode).
2. Rectifier circuits using semiconductor diode measurement of input and output voltage and plotting of input and output waveshapes: i)Half wave rectifier ii) Full wave rectifier (centre tapped and bridge rectifier circuits).
3. Plot the waveshapes of a full wave rectifier with shunt capacitor, series inductor, and filter circuit
4. Single stage common emitter amplifier circuit i) Measurement of voltage gain at 1 KHZ for differentload resistances. ii) Plotting of frequency response of a single stage amplifier circuit. iii) Measurement of input and output impedance of the amplifier circuit.
5. To measure the overall gain of two stage R.C coupled amplifier at 1 KHZ and note the effect of loading of second stage on the first stage.
6. (a)To plot the load Vs output power characteristic to determine the maximum signal input for undistorted signal output. (b) The above experiment is to be performed with single ended power amplifier, transistorized push pull amplifier. Complementary symmetry power amplifier.
7. To observe the effect of a bye-pass capacitor by measuring voltage gain and plotting frequency response for a single stage amplifier.
8. To measure input and output impedance of a feedback amplifier with and without by-pass capacitor.
9. Measurement of voltage gain, input and output impedance and plotting of frequency response of an emitter follower circuit.
10. Plot the FET characteristics and determination of its parameters from these characteristics.

Suggested Reading

1.“Basic Electronics and linear systems b”, “NN bhargava”, McGraw Hill Publication
2. "Basic electronics and devices","S Salivahanan", McGraw Hill Publication
3. "Electronic Devices and Circuits "," J.B. Gupta",Katson educational series.

Name of The Course	**ELEMENTARY MECHANICAL & CIVIL ENGG.**				
Course Code	**DPME2023**				
Prerequisite	**None**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	3	3

Course Objectives

1. to impart some necessary knowledge and skill about civil and mechanical nature.
2. To determine mechanical advantage, velocity ratio, efficiency and effort loss due to friction in screw jack.
3.To operate a diesel engine (starting, running and shutting down) and to study lubricating and cooling system of the engine.

Course Outcomes

CO1	Draw and calculate shear force and bending moment diagrams of beam under given loading
CO2	Explain the stress and strain in different materials.
CO3	Explain the working of IC engine.
CO4	Understand different construction materials and their quality.
CO5	Understand the use of foundation and surveying in electrical engineering.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: Applied mechanics	**8 hours**
i.General condition of equilibrium of a rigid body under coplanar forces. Shear force and bending moment diagram of simply supported beam and cantilever for point load. ii.Concept of friction. iii.Mechanical advantage, velocity ratio, mechanical efficiency of simple machines: Lifting machines much as pulley, differential pulley, wheel and axle, simple screw jack, worm and worm wheel.	
Unit II:Strength of material & power transmission	**8 hours**
i.Stress, strain, elastic constraints. ii.Gear trains - simple and compound, fly wheel. Rope and belts - velocity ratio, length, size of belt and power transmitted.	
Unit III: Heat engines	**8 hours**
External & internal combustion engines, working of diesel and petrol engine, horse power of IC engines, steam generator, construction and working of Bobcock & Wilcox boiler, Cochran boiler, condenser, steam turbine classification and principle of operation, gas turbine	
Unit IV: Unit-4 Civil engineering materials	**8 hours**
General idea of raw materials, manufacturing process, properties and uses of Bricks, lime, cement and Timber.	
Unit V:Foundation & Surveying	**16 hours**
i. Bearing capacity of soil and its importance, need of foundation for electrical machines. ii. Foundations for heavy, light and vibrating machines. iii. Concrete proportion, mixing w/c ratio, workability RCC and its use. iv. Basics of chaining and leveling v. Description of Instruments used	

Suggested Reading

1.Basic Mechanical Engineering
2. Basic Civil and Mechanical Engineering by S. Shanmugasundaram K. Mylsamy
3. Surveying and Levelling by Jerry A. Nathanson M.S. P.E.
4.Applied. Mechanics by R. S. Khurmi. S. Chand Limited,
5.Thermal Engineering: by. R.S. Khurmi (Author)
6.Strength of Material by. R.S. Khurmi (Author)

Name of The Course	**ELEMENTARY MECHANICAL & CIVIL ENGG. LAB**

Course Code	**DPME2024**				
Prerequisite	**None**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives

1. to impart some necessary knowledge and skill about civil and mechanical nature.
2. To determine mechanical advantage, velocity ratio, efficiency and effort loss due to friction in screw jack.
3.To operate a diesel engine (starting, running and shutting down) and to study lubricating and cooling system of the engine.

Course Outcomes

CO1	Draw and calculate shear force and bending moment diagrams of beam under given loading
CO2	Explain the stress and strain in different materials.
CO3	Explain the working of IC engine.
CO4	Understand different construction materials and their quality.
CO5	Understand the use of foundation and surveying in electrical engineering.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

1. To operate a diesel engine (starting, running and shutting down) and to study lubricating and cooling system of the engine.
2. To determine BHP of diesel or petrol engine and show that BHP is directly proportional to revolution per minute of engine shaft.
3. To determine mechanical advantage, velocity ratio, efficiency and effort loss due to friction in screw jack.
4. To perform tensile test on mild steel and aluminium wire specimen and compare the result.
5. To do alignment and coupling of a motor generator set.
6. Chain survey of a small area
(a) Ranging a line
(b) Chaining a line
(c) Taking offset on the chain line and recording the field book.
7. Leveling
(a) To find the difference in level between several points by single setting by the use of dumpy level.
(b) To find the difference in level between two distant points by
(i) Rise & Fall method,
(ii) Line of collimation method.
8. Models:
1. Cut section models of turbine, pumps.
2. Cut section models boilers, condensers.
3. Cut section models of diesel and petrol engines.
4. Models showing power transmission by, rope, belt, chain and gears.
5. Models of clutch and brakes, shaft coupling.

Suggested Reading

1.Basic Mechanical Engineering
2. Basic Civil and Mechanical Engineering by S. Shanmugasundaram K. Mylsamy
3. Surveying and Levelling by Jerry A. Nathanson M.S. P.E.
4.Applied. Mechanics by R. S. Khurmi. S. Chand Limited,
5.Thermal Engineering: by. R.S. Khurmi (Author)
6.Strength of Material by. R.S. Khurmi (Author)

Name of The Course	**TRANSMISSION AND DISTRIBUTION OF ELECTRICITY**				
Course Code	**DPEE-2006**				
Prerequisite	**None**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		4	0	0	4

Course Objectives

1. Apply power system fundamentals to the design of a system that meet specific needs.
2. Design a power system solution based on the problem requirements and realistic Constraints.

Course Outcomes

CO1	Identify significance of DC and AC transmission system

CO2	Calculate the economic size of conductor
CO3	Understand the distribution system planning
CO4	Explain the design considerations of sub transmission lines.
CO5	Explain the design considerations of primary and secondary systems.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: Electrical design &Constructional features of transmission lines 10 Hours
Layout of different transmission and distribution systems, advantages of high voltage transmission, HV Dconvertor transformer, concept of short medium and long lines, parameters of lines, performance of short lines(Regulation, efficiency, vector diagrams), corona formation and its effects on performance of Lines. Effect of provision of protection and demand side management on reduction of T & D logic - Constructional features of transmission lines, types of supports, types of conductors, types of insulators, their properties, selection and testing, voltage distribution of string insulators, equalization of potential, Vibration dampers.
Unit II:Economic principle & Mechanical design of transmission 4 Hours
Kelvin's law, limitations of Kelvin's law, Modification in Kelvin's law.Sag: Sag measurement, use of sag templateIndian Electricity Rules pertaining to clearance, stringing of lines.
Unit III: Distribution systems & Construction of distribution lines 10 Hours
Feeders, distributors and service mains, radial and ring main distributors, A.C. distributors fed from one end and both ends, Simple problems on size of feeders and distributors. Construction of distribution lines i.e. erection of pole, fixing of insulators on conductors, testing, operation and maintenance of lines.
Unit IV: Power factor improvement 4 Hours
Effect of low power factor, causes of low powerfactor, necessity for improvement of power factor,methods for improving power factor, Advantages ofimproved power factor by installing capacitors a consumer end.
Unit V: Underground cables & Carrier communication 10 Hours
Power cable construction, comparison of over headlines and underground cables, laying of cables, cable jointing, using of apoxy resin kits. Fault location, Murray loop test, testing of cables, specifications. Principle of carrier communication over Power Lines, purposes, equipment, difference between radio,Transmission and carrier communication, block diagrams, Voltage control.

Suggested Reading

1. Transmission and Distribution of Electrical Power by K.B. Raina by McGraw-Hill publication.
2. Electrical Power Systems by C.L. Wadhwa by New Age International Publication. ines By- Madhvi Gupta
3. Transmission and Distribution Electrical Engineering. Book • 4th Edition • 2011. Authors: C.R. Bayliss and B.J. Hardy.

Name of The Course	**POWER ELECTRONICS**				
Course Code	**DPEE-2007**				
Prerequisite	**None**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

1. To prepare students to know for different types of power electronic converter.
2. To prepare students to know for power semiconductor diode and transistors.

Course Outcomes

CO1	Identify the different types of power electronic converter
CO2	Discuss the power semiconductor diode and transistors
CO3	An ability to analyse the operation of thyristors
CO4	Understand phase control rectifiers

CO5	Understand the operation of choppers, inverters and cycloconvertor.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: Introduction	**6 Hours**
Concept of power electronics – application of power electronics – advantages and disadvantages of power electronic converters - power electronic systems – power semiconductor devices – types of power electronic converters – power electronic modules	
Unit II:Power Semiconductor Diodes and transistors	**7 Hours**
p-n junction – basic structure of power diodes – characteristics of power diodes – types of power diodes – power transistors (Bipolar Junction Transistor) – power mosfets	
Unit III: Thyristors	**10 Hours**
Terminal characteritics of thyristors – thyristor turn-on methods – Switching characteristics of thyristors – thyristor gate characteristics – thyristor ratings – thyristor protection – heating ,cooling and mounting of thyristors – series and parallel operation of thyristors – firing circuits for thyristors – triac firing circuits – Thyristor commutation techniques (Class A commutation ,Class B commutation , Class C commutation , Class D commutation , Class E commutation ,Class F commutation)	
Unit IV: Phase Controlled rectifiers	**10Hours**
Principle of phase control (1-phase half wave circuit with RL load, RL load and freewheeling diode, RLE Load) – Full wave controlled converters – 1-phase full wave controlled converters – 1-phase full wave bridge converters (B-2 connection ,semi converter) – 3-phase thyristor converters – performance parameters of 3-phase full convertors – effect of source impedance on the performance of converters	
Unit V:Choppers, Inverters & cycloconverters	**7 Hours**
Principle of chopper opertion– control strategies– step up choppers– types of chopper circuits – thyristor chopper circuits –1-phase voltage source inverter(operating principle) – principle of phase control of ac voltage controllers- principle of cycloconverter operation	

Suggested Reading

1. Power Electronics (Converters, Applications and Design) by Ned Mohan, Tore M. Undeland and William P. Robbins, 3rd edition, Published by Willey
2. Power Electronics (Circuits, Devices and Applications) by Muhammad H. Rashid, Published by Pearson Education
3. Power Electronics by P. S. Bimbhra, Published by Khanna Publishers

Name of The Course	**POWER ELECTRONICS LAB**				
Course Code	**DPEE-2016**				
Prerequisite	**None**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	4	2

Course Objectives

1. To prepare students to know for different types of power electronic converter.
2. To prepare students to know for power semiconductor diode and transistors.

Course Outcomes

CO1	Identify the different types of power electronic converter
CO2	Discuss the power semiconductor diode and transistors
CO3	An ability to analyze the operation of thyristors
CO4	Understand phase control rectifiers
CO5	Understand the operation of choppers, inverters and cycloconvertor.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

1.	**To find the holding current, latching current and V-I characteristics of SCR**
2.	**Study of R-C firing circuit of SCR.**
3.	**Study of UJT firing circuit of SCR.**
4.	**Study of Power Transistor as a switch.**
5.	**Study of SCR as a switch.**
6.	**Power control using Diac and Triac.**
7.	**Fabrication and testing of Half Controlled Bridge Rectifier circuit..**
8.	**Fabrication and testing of SCR Chopper Circuit.**
9.	**Design of Buck converter**

Suggested Reading

1. Power Electronics (Converters, Applications and Design) by Ned Mohan, Tore M. Undeland and William P. Robbins, 3rd edition, Published by Willey
2. Power Electronics (Circuits, Devices and Applications) by Muhammad H. Rashid, Published by Pearson Education
3. Power Electronics by P. S. Bimbhra, Published by Khanna Publishers

Name of The Course	**ELECTRICAL & ELECTRONICS INSTRUMENTATION**				
Course Code	**DPEE-2008**				
Prerequisite	**None**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

1. To prepare students to know for different types sensor and transducers
2. To prepare students to know for measurement of physical quantity.

Course Outcomes

CO1	Understand the use of Sensor & Transducers.
CO2	Apply various transducers for measurement of physical quantity.
CO3	Analysis temperature & pressure measurement.
CO4	Practice the flow & level measurement.
CO5	Understand the use of display device.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: Sensor & Transducers **8 Hours**

I. Introduction to sensor & Transducer.
II. Classification of transducer.
a) Basic requirement of transducer.
b) Transducer sensitivity.
c) Specification for transducer.
III. Advantage and disadvantage of electrical transducer.
IV. Resistance transducer
V. Variable inductance transducer
VI. Capacitive transducer
VII. Piezoelectric transducer
VIII. Hall effect transducer
IX. Photoelectric transducer
X. Strain gauge
XI. Load cell
XII. Proximity sensor
XIII. Digital transducer.

Unit II:Miscellaneous measurement **8 Hours**

I. Measurement of linear velocity
a) Electro-magnetic transducer.
b) Seismic type transducer.
c) Digital transducer & Doppler Effect.
II. Measurement of angular velocity.
a) DC & AC tachometer generator.
b) Photo electric tachometer generator.
c) Stroboscope & stroboscopic method.
d) Shaft encoders.
III. Vibration and shock measurement.
IV. Strain Measurement: Concept of strain measurement, strain gauges.

Unit III: Temperature and pressure measurement **8 Hours**

I. Introduction to temperature and pressure measurement.
II. Classification of temperature measuring device.
III. Liquid in glass thermometer
a) Liquid filled system
b) Gas filled system

c) Liquid vapor system IV. Bimetallic thermometer V. RTD, thermocouple, Thermistor & pyrometer. VI. Types of pressure measurement device VII. Manometer & barometer VIII. Elastic pressure elements IX. Electromechanically pressure transducer X. Measurement of high, low & medium pressure.
Unit IV: Flow and level measurement 8 Hours
I. Introduction to flow & level measurement. II. Flow characteristics. III. Different flow measurement method. IV. Turbine flow meter. V. Hot wire anemometers. VI. Rotameter, Electromagnetic flow meter. VII. Ultrasonic flow meter. VIII. Classification of liquid level detector. IX. Force & pressure operated method for level detector. X. Electrical method of level detector.
Unit V: Recorders and Display Devices 8 **Hours** **Hours**
I. Necessity of recorders II. Basic requirements of a recording system III. Classification of recorders IV. Introduction to Strip chart and X-Y recorders, Ultra violet recorder, Magnetic tape recorder. V. Classification of display devices VI. Working principle and typical use of various display devices like: VII. Light Emitting Diode VIII. Liquid crystal displays IX. Gas discharge plasma display X. Electro luminescent displays. XI. Segmental display-Seven & fourteen segment display. XII. Dot matrices. XIII. Cathode ray oscilloscope & Cathode ray tube. XIV. Measurement of current, voltage, phase & frequency by CRO. XV. Dual trace and dual beam oscilloscope.

Suggested Reading

1. E.W. Golding & F.C. Widdis, "Electrical Measurement &Measuring Instrument", A.W.Wheeler& Co. Pvt. Ltd. India.
2. Electronic Instrumentation By-H. S. Kalsi.
3. M.B. Stout, "Basic Electrical Measurement" Prentice hall of India.
4. W.D.Cooper," Electronic Instrument & Measurement Technique "Prentice Hall International.

Name of The Course	**ELECTRICAL & ELECTRONICS INSTRUMENTATION LAB**				
Course Code	**DPEE-2015**				
Prerequisite	**None**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives

1. To prepare students to know for different types sensor and transducers
2. To prepare students to know for measurement of physical quantity.

Course Outcomes

CO1	Understand the use of Sensor & Transducers.
CO2	Apply various transducers for measurement of physical quantity.
CO3	Analysis temperature & pressure measurement.
CO4	Practice the flow & level measurement.
CO5	Understand the use of display device.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

1. Measurement of temperature by thermocouple such as Iron Constantan.
2. Measurement of temperature by Resistance temperature detector (Pt-100) thermometer.
3. Calibration of digital temperature indicator using Ice and Boiling Water.
4. To measure the Force by strain gauge.
5. To measure the pressure by strain gauge
6. To measure the strain by strain gauge trainer.

7.	Measurement of speed of a Motor/Fan by electronic Stroboscope method/Electronic Tachometer/Digital Indicator/Hand Tachometer
8.	To measure liquid level by Float method and Air bubbler method.
9.	Measurement of flow by rotameter.
10.	To study the construction and operation of electromagnetic flow meter.

Suggested Reading

1. E.W. Golding & F.C. Widdis, "Electrical Measurement &Measuring Instrument", A.W.Wheeler& Co. Pvt. Ltd. India.
2. Electronic Instrumentation By-H. S. Kalsi.
3. M.B. Stout, "Basic Electrical Measurement" Prentice hall of India.
4. W.D.Cooper," Electronic Instrument & Measurement Technique "Prentice Hall International.

Name of The Course	**ELECTRICAL DESIGN, DRAWING AND ESTIMATION-I**
Course Code	**DPEE-2009**
Prerequisite	**None**
Co-requisite	
Anti-requisite	

	L	T	P	C
	3	0	0	3

Course Objectives

1. To prepare students to know for different electrical symbols.
2. To prepare students to know for different wiring materials and accessories.
3. To prepare students to know for different light and fan connections.
4. To prepare students to know for different types of alarm connections
5. To prepare students to know for different rules used in wiring and cost estimation.

Course Outcomes

CO1	Identify the electrical symbols and different diagrams.
CO2	Choose different wires and hardwares like switches,etc.
CO3	Understand different light and fan circuits
CO4	Understand different alarm circuits.
CO5	Identify and Calculate the costing of home wiring projects.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Electrical Symbols and Diagrams 6 hours
Need of symbols –List of electrical symbols as per I.S. (electrical machines & equipments, instruments & meters, domestic electrical appliances & fittings, switch & relay , resistor, capacitor & inductor symbols) –Type of diagrams - Wiring diagrams (multiple and single line representation) and schematic(circuit) diagrams as per I.S.
Unit-2 Wiring materials and accessories 10 hours
Choice of cables – types of cables used for internal wiring – cable identification and coding – types of wiring (cleat wiring, casing and capping wiring, batten wiring, metal sheathed wiring, conduit wiring) – factors affecting the choice of wiring system – description of lighting accessories (switches ,distribution board, fuse holder, ceiling roses, socket outlet, lamp holders, neutral link, plugs)
Unit-3 Light and Fan Circuits 10 hours
Understanding series and parallel connection – joint box and looping in system of wiring – Schematic and wiring diagrams (multiline and single line both) using joint boxes and looping systems for the following types of circuits: - 1. (i) Light and fan controlled by necessary switches and regulators. 2. (ii) Stair case wiring. 3. (iii) Corridor lighting 4. (iv) One lamp controlled by three or more switches.
Unit-4 Signal and Alarm Circuits 7 hours

Reading, designing and drawing schematic and wiring diagrams (multiline and single line) of following circuits: - (i) Circuits meant to convey information by means of bell signals only. (One bell controlled by one push button switch, one bell controlled by two push buttons, Bell responds circuits using one bell and relay, Bell and light responds circuits of an office or three rooms) (ii) Circuits meant to convey information by means of bell and light both for call signals. (iii) Circuits meant to convey information by means of bell and light to give 'stop' and 'go' signals. (iv) Traffic control light system for 2 road crossing (v) A light circuit with gets automatically connected to DC supply in case of power failure.
Unit-5 Estimation of Domestic and Commercial Buildings electrical wiring 10 hours
Fundamental principles of electric installation (general , coordination, distance from electric lines, lighting and ventilation, heat insulation, lifts and escalators, location and space for electrical equipment) – guidelines for design of electrical installation (general, protection for saftey, other important factors of design, selection of correct type of wiring and methods of installation, installation of protective equipment, emergency control and disconnection of devices) – general steps and procedure of electrical installation (marking and fixing of conductors path, dimensioning of conductor cross sections, installation of lines) – general rules for taking apprpriate locations and ratings of electrical equipment and accessories – calculation of total load – deciding no of sub-circuits on basis of total load – calculation of length of batten and wire used – estimation (total cost of material ,total labour cost, contingencies)

Suggested Reading

1. Electrical Engg. Drawing, vol.1 by Surjit Singh, Publishes by S. K. Kataria and sons,1st Edition,2017
2. Electrical Engg. Drawing, vol.2 by Surjit Singh, Publishes by S. K. Kataria and sons,1st Edition,2017
3. Electrical Design ; Estimating and Costing ,Publishes by New Age International (P) Ltd. (2010) by K.B.Raina

Name of The Course	**ELECTRICAL DESIGN, DRAWING AND ESTIMATION-I LAB**
Course Code	**DPEE-2012**

Prerequisite	**None**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	0	4	2

Course Objectives

1. To prepare students to know for different electrical symbols.
2. To prepare students to know for different wiring materials and accessories.
3. To prepare students to know for different light and fan connections.
4. To prepare students to know for different types of alarm connections
5. To prepare students to know for different rules used in wiring and cost estimation.

Course Outcomes

CO1	Identify the electrical symbols and different diagrams.
CO2	Choose different wires and hardwares like switches,etc.
CO3	Understand different light and fan circuits
CO4	Understand different alarm circuits.
CO5	Identify and Calculate the costing of home wiring projects.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

Unit-1 Electrical Symbols and Diagrams 6 hours
1. To prepare a folder/display board of accessories used in domestic wiring with complete specifications.
2. To prepare a display board of tools used in wiring and fabrication shop.
3. Batten wiring containing light, ceiling fan, socket points
4. Staircase wiring using two way switches

5.	Connection of a fluorescent tube using starter, choke and single way switch and its fault detection.
6.	Practice of domestic conduit wiring.
7.	Testing of wiring installation by meggar.
8.	Connection of mercury lamp along with accessories.
9.	Making of an extension board containing two 5 A and 15 Amp plug points controlled by individual switches using MCB/ELCB (Earth Leakage Circuit Breaker).

Suggested Reading

1. Electrical Engg. Drawing, vol.1 by Surjit Singh, Publishes by S. K. Kataria and sons,1st Edition,2017
2. Electrical Engg. Drawing, vol.2 by Surjit Singh, Publishes by S. K. Kataria and sons,1st Edition,2017
3. Electrical Design ; Estimating and Costing ,Publishes by New Age International (P) Ltd. (2010) by K.B.Raina

Name of The Course	DISRUPTIVE TECHNOLOGY			
Course Code	DPEE-9001			
Prerequisite	None			
Co-requisite				
Anti-requisite				
	L	T	P	C
	0	0	2	1

Course Objectives

1. To prepare students to know for different Applications of Artificial Intelligence and Internet of Things.
2. To prepare students to know for different Applications of Big Data ,Cloud Computing and Android App

Course Outcomes

CO1	Identify the applications of Artificial Intelligence
CO2	Choose different wires and hardwares like switches,etc.
CO3	Identify the applications of Big Data
CO4	Discuss the applications of Cloud Computing
CO5	Development of Android App

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

1.	Introduction to Artificial Intelligence
2.	Applications of Artificial Intelligence: Security, Transparency and Traceability
3.	Introduction to Internet of Things
4.	Applications of Internet of Things: Smart Cities, Agriculture etc
5.	Introduction to Big Data
6.	Applications of Big Data: healthcare, marketing and NIC
7.	Introduction to Cloud Computing
8.	Applications of Cloud Computing: Google App engine and iCloud
9.	Introduction to Android App Development
10.	Develop an app using Android Studio

Suggested Reading

1. S. Russell and P. Norvig. Artificial Intelligence: A Modern Approach. Prentice Hall, Second Edition (2003).
2. Francis daCosta, “Rethinking the Internet of Things:
3. Cloud Computing Bible. Barrie Sosinsky. John Wiley & Sons
4. Anand Rajaraman , "Mining of Massive Datasets", Cambridge University Press, 2012.
5. Android programming: The big nerd ranch guide. Bill Philips

Name of The Course	ELECTRONICS ENGG.-II
Course Code	DPCO-2016
Prerequisite	None

Co-requisite	
Anti-requisite	

	L	T	P	C
	3	2	0	4

Course Objectives

1. To learn about digital electronics and microprocessor
2. To understand the basics of communication engineering.

Course Outcomes

CO1	To acquire knowledge about digital electronics.
CO2	To study combinational and sequential circuits.
CO3	To learn the basics of operational amplifier.
CO4	To study and analyze the performance of 8085 microprocessor.
CO5	To study and analyze the basics of communication engineering.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Digital Electronics 8 hours
1.1 Introduction - Basic difference between analog and digital signal; Advantages of digital system and its field of applications. 1.2 Number system - Binary, Decimal, Octal and Hexadecimal and their need. 1.3 A. Logic Gates - Symbol and truth tables of AND, OR NOT, NAND, NOR and EX-OR gates. 1.4 Boolean theorems and postulates (without proof) Realization of small Boolean functions and reduction using Karnaugh's map upto 3 variables using logic gates and vice-versa.
Unit-2 Combinational and Sequential Circuits 8 hours
2.1 Half Adder and full adder circuits and their operations, Display Devices. 2.2 Encoder, Decoder, Multiplexer and Demultiplexer. 2.3 Need of Flip-Flops, Detail idea of counters and (Synchronous and Asynchronous) and resister with purpose. Idea of astable, monostable, bistable multivibrators. 2.4 A/D and D/A conversion
Unit-3 Operational Amplifiers 8 hours
3.1Specifications of ideal operational amplifier and its block diagram as an inverter, scale changer, adder, subtractor 3.2 Differential amplifier, buffer amplifier, differentiator integrator, schmitt trigger and log and antilog amplifiers. X. Measurement of high, low & medium pressure.
Unit-4 Microprocessors 8 hours
4.1 Microprocessors and its need in modern technology. 4.2 Functional block diagram of microprocessors and function of its various blocks with reference to 8085 microprocessors. Concepts of and Assembly language programming with 8085.
Unit-5 Communication Engineering 8 hours
5.1 Basic block diagram of a modern communication system and its working. 5.2 Concept of modulation/demodulation its need and types. 5.3 Concept of demodulation its need and types. 5.4 Introduction to digital and data communication. 5.5 Introduction to modern ways of communication- Brief idea and concept of optical Fiber. communication,

Suggested Reading

1. Malvino & Leach- Digital Principles & Application- Mcgraw Hill- 5th Edition
2. Simon Haykin- Communication System- John Wiley & Sons.
3. Sedra Smith, Adel S. Smith, Kenneth. C. “Micro Electronics Circuits" - Oxford University Press 5th Edtion
4."Electronic Devices and Circuits "," J.B. Gupta",Katson educational series.

Name of The Course	**ELECTRONICS ENGG.-II LAB**
Course Code	**DPCO-2017**
Prerequisite	**None**
Co-requisite	
Anti-requisite	

	L	T	P	C
	0	0	4	2

Course Objectives

1. To learn about digital electronics and microprocessor
2. To understand the basics of communication engineering.

Course Outcomes

CO1	To acquire knowledge about digital electronics.
CO2	To study combinational and sequential circuits.
CO3	To learn the basics of operational amplifier.
CO4	To study and analyze the performance of 8085 microprocessor.
CO5	To study and analyze the basics of communication engineering.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

1.	Identification of IC-Nos, pin nos, IC types.
2.	Verification of truth tables for 2 Input NOT, AND, OR NAND,NOR, XOR GATES.
3.	To construct half adder and half subtractor using XOR and NAND gates verification of their truth tables
4.	To construct a full adder circuit with XOR and NAND gates. (a) Study of 3 bit adder circuit implemented with OR and NAND gates. (b) To construct 4 bit adder and full subtractor using full adder chip 7480 and NAND GATES.
5.	Familiarization and use of different types of LEDs common anode and common cathode seven segment display Logic Gates
6.	Use of Op-Amp.(for IC 741) as inverting and non inverting amplifier, adder, comparator, buffer, scale changer
7.	Familiarization with 8085 and 8088 Trainer.
8.	Add two 8 bit numbers.
9.	a) Obtain 2's complement of 8-bit numbe b) Subtraction of two numbers using 2's complement.
10.	Extract fifth bit of a number in A and store it in another register

Suggested Reading

1. Malvino & Leach- Digital Principles & Application- Mcgraw Hill- 5th Edition
2. Simon Haykin- Communication System- John Wiley & Sons.
3. Sedra Smith, Adel S. Smith, Kenneth. C. “Micro Electronics Circuits" - Oxford University Press 5th Edtion
4."Electronic Devices and Circuits "," J.B. Gupta",Katson educational series.

Name of The Course	SWITCHGEAR AND PROTECTION				
Course Code	DPEE-3001				
Prerequisite	None				
Co-requisite					
Anti-requisite					
		L	T	P	C
		3	0	0	3

Course Objectives

1. To prepare students to know for different types of faults and switch gear
2. To prepare students to know for substations.

Course Outcomes

CO1	Understand that how we can protect a complete power system with different scheme
CO2	Explain various protection schemes of various power systems.
CO3	Design the ratings for fuses according to the requirement.
CO4	Explain the working of different types of switchgear equipment like circuit breakers and relays
CO5	Explain various methods of over voltage protection in power systems

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Faults	5 hours
Types of faults, three phase symmetrical faults, effects of faults on system reliability and stability abnormalities,	

short circuits and their effects, representation of fault conditions through single line diagrams.	
Unit-2 Switch Gear	10 hours
i. Purpose of protective gear, characteristics of a protection system. ii. Classification of fuses H.V. Fuses, application and working, grading and co-ordination L.V. fuses, selection of fuses, characteristics. iii. Isolators and switches, outdoor isolators, functions, air break switches braking capacity of switches. iv. Circuit breakers :- requirements of circuit breakers definition of terms associated with circuit-breakers, reasons for arc formation, principles of arc extinction, types of circuit-breakers, comparison with oil circuit breaker classification, rating of circuit breakers, working of different types of air and oil circuit breaker, specification of circuit breakers, maintenance schedule. SF-6 and Vacuum circuit breakers. v. Relays: Requirement of relays, operation principles induction type over current, directional over current, differential, percentage differential relays working, applications and characteristics, basic principles of static relays. Introduction of distance relay.	
Unit-3 Protective Schemes	10 hours
i. Protection of alternators, stator faults, rotor faults, mechanical conditions, external faults their reasons, effect and protections used. ii. Protection of power transformer: types of faults, its effects, types of protective schemes over current earth fault, differential protection, Buckholtz devices, winding temp. Protection. iii. Motor protection: types of faults and protection in motors, thermal relays, protection of small motors, under voltage protection. iv. Protection of feeders: radial, parallel and ring feeders protection, directional time and current graded schemes differential protection.	
Unit-4 Protection Against Over Voltages	5 hours
Causes of over voltages, travelling waves earth wire, protective zone, lightening arrestors, space-gap an electrolytic arrestor, surge absorber, location and rating of lightening arrestors. Thyrite lightening arrestor.	
Unit-5 Different Type of Sub-Stations	10 hours
i. Layout, single line diagram bus bar arrangement, equipments their functions, accessories, study of protective schemes, etc. batteries and their maintenance, operation of small sub-station. ii. Reactors: types of reactors, bus bar reactor, tuning reactor, arc-suppression reactor, connection of reactors in power stations. Uses of reactors. iii. Neutral grounding: - types of grounding solid grounding, reactance grounding, arc suppression coil grounding, choice of method of neutral earthing. Grounding of sub-station, grounding of line structure and substation equipment. iv. Concept of G.I.S. (Gas Insulated Substation).	

CO1	An ability to understand the application of different types of machines
CO2	An ability to perform the operation of an electrical machine.
CO3	An ability to operate different types of electrical machines for testing and experimental procedures.
CO4	An ability to determine performance characteristics of a polyphase induction motor

Suggested Reading

1. Jacob Millman, Christos C. Halkias, 'Electronic Devices and Circuits', 2nd Edition, Tata McGraw Hill Publishing Limited, New Delhi, 2008, ISBN 0070634637, 9780070634633

2. David A. Bell, 'Electronic Devices and Circuits', Prentice Hall of India Private Limited, New Delhi, 2003, ISBN 013253147X, 9780132531474

3. Theodre F. Boghert, 'Electronic Devices & Circuits',6th Edition, Pearson Education 2004 ISBN 8177588877, 9788177588873.

4. Ben G. Streetman and Sanjay Banerjee, 'Solid State Electronic Devices', 6th Edition, PHI 2009, ISBN 0132454793, 9780132454797

Name of The Course	ELECTRICAL MACHINES-II				
Course Code	DPEE-3002				
Prerequisite	None				
Co-requisite					
Anti-requisite					
		L	T	P	C
		3	0	0	3

Course Objectives

1. To prepare students to understand the application of different types of machines.
2. To prepare students to perform the operation of an electrical machine.
3. To prepare students to operate different types of electrical machines for testing and experimental procedures.
4. To prepare students to determine performance characteristics of a polyphase induction motor.

Course Outcomes

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Induction motor	5 hours
Rotating magnetic field for 3 ph. concept of motors and its reversing. -Construction and working of 3 ph. induction motor (squirrel cage and wound rotor motor). -Double squirrel cage induction motor. -Rotor frequency, rotor e.m.f., rotor current and rotor power factor. -Torque Equation-Torque slip characteristics. - Principle and methods of speed control-Methods of starting of induction motor. On line, auto transformer, star delta manual/automatic starters for induction motor. Starter for slip ring ind. motor. - Application of induction motor. - Testing of motor as per I.S. Performance of 3 phase induction motor with the help of circle diagram.-Losses and efficiency (simple problems only-)-Phaser diagram of induction motor.-	
Unit-2 Synchronous motor	10 hours
Construction, working principle, effect of load on synchronous motor, vector diagram of synchronous motor, effect of change in excitation on the performance of synchronous motor, V curves, torque & mechanical power developed, condition for max. mechanical power, synchronous condenser, hunting and its elimination, comparison between ind. motor and synch. motor, starting methods and uses of synch. Motor.	
Unit-3 F.H.P. motors	10 hours
Classification of F.H.P. motors-Production of rotating Magnetic field in 1 ph. motors. - Double revolving field theory. -Construction working and application of a. Capacitor motor (all types) b. Shaded pole motor c. 1 ph. synchronous motor d. 1 ph. series and universal motor e. Servo Motor	
Unit-4 Electric Drive	5 hours
Causes of over voltages, travelling waves earth wire, protective zone, lightening arrestors, space-gap an electrolytic arrestor, surge absorber, location and rating of lightening arrestors. Thyrite lightening arrestor.	

Suggested Reading

1. Electrical Machines by Ashfaq Hussain, Third edition, Dhanpat Rai & Co. publication.

2. Electrical Machine-2 by U.A. Bakshi, First edition, 2009, Technical publication Pune.

3. Electrical Machine-2 by B.L THEREJA

Name of The Course	ELECTRICAL MACHINES-II LAB			
Course Code	DPEE-3005			
Prerequisite	None			
Co-requisite				
Anti-requisite				
	L	T	P	C
	0	0	4	2

Course Objectives

1. To prepare students to understand the application of different types of machines.
2. To prepare students to perform the operation of an electrical machine.
3. To prepare students to operate different types of electrical machines for testing and experimental procedures.
4. To prepare students to determine performance characteristics of a polyphase induction motor.

Course Outcomes

CO1	An ability to understand the application of different types of machines
CO2	An ability to perform the operation of an electrical machine.
CO3	An ability to operate different types of electrical machines for testing and experimental procedures.
CO4	An ability to determine performance characteristics of a polyphase induction motor

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Course Content:

1.	To determine performance characteristics of a polyphase induction motor. (load v/s efficiency, load v/s power factor, load v/s slip)
2.	To start a 3 phase induction motor and to determine its slip at various loads.

3.	To determine V curve of a synchronous motor.
4.	To connect and start an induction motor by using star delta starter, auto transformer starter, rotor starter and to change its direction of rotation.
5.	To perform open circuit and block rotor test on a 3-ph. induction motor and to determine its efficiency.
6.	Determination of performance curve and hence the core loss of a single-phase series motor.
7.	Voltage and current ratio of metal rectifier.
8.	To perform open circuit and short circuit test on a 3-ph. synchronous machine and to determine synchronous impedance and regulation at lagging/leading power factor.
9.	Sequential operation of motors using timers.
10.	Achieving high starting torque in case of 3 phase slip ring motor by increasing external resistance in rotor circuits and determine speed regulation at different loads

Suggested Reading

1. Electrical Machines by Ashfaq Hussain, Third edition, Dhanpat Rai & Co. publication.

2. Electrical Machine-2 by U.A. Bakshi, First edition, 2009, Technical publication Pune.

3. Electrical Machine-2 by B.L THEREJA

Name of The Course	CONTROL SYSTEM				
Course Code	DPEE-3003				
Prerequisite	None				
Co-requisite					
Anti-requisite					
		L	T	P	C
		3	0	0	3

Course Objectives

1. To prepare students to understand the different types of control systems of servo motors and PLC
2. To prepare students to understand the different responses of control system.

Course Outcomes

CO1	Understanding of different types of control systems
CO2	An Ability to understand the working of various control elements like servo motor and PLC.
CO3	Analyze the problems related to control systems representation.
CO4	Apply the time response concept to control system.
CO5	Evaluate the stability of control system.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 INTRODUCTION TO CONTROL SYSTEM	6 hours
i. Introduction to control system. ii. Classification of control system iii. Concept of open loop and closed loop (Feed forward & feedback) control system. iv. Comparison of open loop vs. closed loop control system. v. Block diagram of feedback control system and its basic elements. vi. Types of control actions (Two position control [On/Off action], Proportional, Proportional plus integral, Proportional plus derivative, Proportional plus integral plus derivative action.)	
Unit-2 Synchronous motor	7 hours
Construction, working principle, effect of load on synchronous motor, vector diagram of synchronous motor, effect of change in excitation on the performance of synchronous motor, V curves, torque & mechanical power developed, condition for max. mechanical power, synchronous condenser, hunting and its elimination, comparison between ind. motor and synch. motor, starting methods and uses of synch. Motor.	
Unit-3 Control system representation	10 hours
i. Transfer function ii. Block diagram iii. Reduction of block diagram iv. Problems on block diagram v. Mason's formula signal flow graph	
Unit-4 Time Response Analysis	8 hours
i. Step, Ramp, Pulse and sinusoidal type of inputs and their Laplace Transforms. ii. Time domain response of First order and second order system with step input. iii. Definitions of Rise time, Peak overshoot, settling time, Natural frequency and Damping Ratio pertaining to second order system.	
Unit-5 Stability of Control System	4 hours
i. Definition of stability of control system.	

ii. Necessary conditions for stability. iii. Routh stability criterion. iv. Application of Routh stability criterion to liner feedback system.

Suggested Reading

1. Modern Control Engineering By- Katsuhiko Ogata

2. Network and Systems By-Ashfaque Hussain

3. John J D"Azzo and C. H. Houpis , "Linear Control System Analysis and Design Conventional and Modern", McGraw - Hill Book Company, 1988.

Name of The Course	CONTROL SYSTEM LAB				
Course Code	DPEE-3007				
Prerequisite	None				
Co-requisite					
Anti-requisite					
		L	T	P	C
		0	0	2	1

Course Objectives

1. To prepare students to understand the different types of control systems of servo motors and PLC
2. To prepare students to understand the different responses of control system.

Course Outcomes

CO1	Understanding of different types of control systems
CO2	An Ability to understand the working of various control elements like servo motor and PLC.
CO3	Analyze the problems related to control systems representation.
CO4	Apply the time response concept to control system.
CO5	Evaluate the stability of control system.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Course Content:

1.	Transfer function from zeros and poles(Maltab/Hardware)
2.	To start a 3 phase induction motor and to determine its slip at various loads.
3.	To determine V curve of a synchronous motor.
4.	To connect and start an induction motor by using star delta starter, auto transformer starter, rotor starter and to change its direction of rotation.
5.	To perform open circuit and block rotor test on a 3-ph. induction motor and to determine its efficiency.
6.	Determination of performance curve and hence the core loss of a single-phase series motor.
7.	Voltage and current ratio of metal rectifier.
8.	To perform open circuit and short circuit test on a 3-ph. synchronous machine and to determine synchronous impedance and regulation at lagging/leading power factor.
9.	Sequential operation of motors using timers.
10.	Achieving high starting torque in case of 3 phase slip ring motor by increasing external resistance in rotor circuits and determine speed regulation at different loads

Suggested Reading

1. Modern Control Engineering By- Katsuhiko Ogata

2. Network and Systems By-Ashfaque Hussain

3. John J D"Azzo and C. H. Houpis , "Linear Control System Analysis and Design Conventional and Modern", McGraw - Hill Book Company, 1988.

Name of The Course	ELECTRICAL DESIGN, DRAWING AND ESTIMATION-II				
Course Code	DPEE-3004				
Prerequisite	None				
Co-requisite					
Anti-requisite					
		L	T	P	C
		3	0	0	3

Course Objectives

1. To prepare students to know about costing and estimation.
2. To prepare students to know about earthing.
3. To prepare students to know for different rules used in wiring and cost estimation
4. To prepare students to know for power wiring

5. To prepare students to know for estimation of setting up overhead and underground cables

Course Outcomes

CO1	Calculate costing.
CO2	Identify different types of earthing.
CO3	Identify different wires and calculate cost estimation.
CO4	Detect the rating of cables and fuses for different motors.
CO5	Estimation of different capacity set up of overhead cables.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Principles of Estimation and Costing	8 hours
Purpose of estimating and costing – Essentials of estimating and costing-market survey, price list and net prices – Preparation of list of materials, calculation of material and labor cost, contingencies, overhead charges, profit and total cost	
Unit-2 Earthing	8 hours
Need for earthing of electrical installations – purpose of earthing – advantages and disadvantages of earthing –IS Specifications regarding earthing of electrical installations – rules of earthing all types of sytem – points to be earthed as per I.E. rules – different methods of earthing – points to be checked while inspecting the earthing arrangement – earthing at consumer' premises – earthing of domestic fitting and appliances – general procedure of earthing step by step – dangers of improper earthing – earthing of transmission and distribution lines-earthing of distribution line structures	
Unit-3 Estimation of Internal Wiring Installation	5 hours
General I.E rules for taking appropriate locations and ratings of electrical equipment and accessories – calculation of total load – deciding no of sub-circuits on basis of total load – calculation of length of batten and wire used – estimation (total cost of material ,total labour cost, contingencies)	
Unit-4 Estimation of Power Wiring	5 hours
I.S. specifications and I.E. rules – calculation of current for single and three phase motors – determination of rating of cables and fuses – need of starter in a motor – understanding terminals marking and connection of motors – motor name-plate reading	
Unit-5 Estimation of Overhead and Underground Distribution Lines	5 hours
Comparison between overhead and underground systems – main components of overhead lines(line supports, cross-arm, clamps, insulators, line conductors, guy and stay sets, lightening arrestors, fuses and isolating switches, continuous earth wire, guarding of overhead lines, phase plates, danger plates, anticlimbing devices, barbed wire, jumpers,tee-off, corona rings, muffs) – I.S. specifications for overhead cables – specifications for underground cables – cost of material and work for overhead and underground lines up to 11 KV only.	

Suggested Reading

1. Electrical Engg. Drawing, vol.1 by Surjit Singh, Publishes by S. K. Kataria and sons,1st Edition,2017

2. Electrical Engg. Drawing, vol.2 by Surjit Singh, Publishes by S. K. Kataria and sons,1st Edition,2017

3. Electrical Design ; Estimating and Costing ,Publishes by New Age International (P) Ltd. (2010) by K.B.Raina

Name of The Course	ELECTRICAL DESIGN, DRAWING AND ESTIMATION-II LAB				
Course Code	DPEE-3006				
Prerequisite	None				
Co-requisite					
Anti-requisite					
		L	T	P	C
		0	0	4	2

Course Objectives

1. To prepare students to know about costing and estimation.
2. To prepare students to know about earthing.
3. To prepare students to know for different rules used in wiring and cost estimation
4. To prepare students to know for power wiring
5. To prepare students to know for estimation of setting up overhead and underground cables

Course Outcomes

CO1	Calculate costing.
CO2	Identify different types of earthing.

CO3	Identify different wires and calculate cost estimation.
CO4	Detect the rating of cables and fuses for different motors.
CO5	Estimation of different capacity set up of overhead cables.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Course Content:

1. To prepare a list of materials required in wiring a laboratory and estimate the total cost.
2. To study earthing of different appliances available in laboratory.
3. To study different types of wires.
4. To determine the size of cable and rating of fuse from the name-plate of motor .
5. To draw the cross arm and clamp used in overhead lines.
6. To draw the clamps and insulators used in overhead lines.
7. To draw the guy and lighting arresters used in overhead lines.
8. To draw the danger plates and anticlimbing device used in overhead lines.
9. To draw the barbed wires and continuous earth wire used in overhead lines.
10. To draw the fuses and isolating switches used in overhead lines.

Suggested Reading

1. Electrical Engg. Drawing, vol.1 by Surjit Singh, Publishes by S. K. Kataria and sons,1st Edition,2017

2. Electrical Engg. Drawing, vol.2 by Surjit Singh, Publishes by S. K. Kataria and sons,1st Edition,2017

3. Electrical Design ; Estimating and Costing ,Publishes by New Age International (P) Ltd. (2010) by K.B.Raina

Name of The Course	INSTALLATION, MAINTENANCE AND REPAIR OF ELECTRICAL MACHINES
Course Code	DPEE-3010
Prerequisite	None
Co-requisite	
Anti-requisite	

	L	T	P	C
	2	0	0	2

Course Objectives

1. To prepare students to know about costing and estimation.
2. To prepare students to know about earthing.
3. To prepare students to know for different rules used in wiring and cost estimation
4. To prepare students to know for power wiring
5. To prepare students to know for estimation of setting up overhead and underground cables

Course Outcomes

CO1	Understand and analyse the Scope and Organization of Electrical Maintenance Department
CO2	Commission various electrical equipment/machines
CO3	Prepare maintenance schedule of different equipment and machines
CO4	Prepare trouble shooting chart for various electrical equipment, machines and domestic appliances
CO5	Carry out different types of earthing

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Scope and Organization of Electrical Maintenance Department	2 hours
i. Requirement of electrical maintenance department ii. Organization of work of electrical m/c department iii. Office work and record keeping of electrical maintenance department iv. History & plant maintenance log book & job cards.	
Unit-2 <u>Installation and commissioning</u>	6 hours
i. General guidelines for loading and unloading of heavy electrical machines equipment	

ii. List of precautions to be taken while executing such jobs. Handling & transport of electrical machine, equipment & line accessories to site iii. Installation of electrical equipment like induction motors, transformers, switch gears, transmission and distribution lines etc. iv. Alignment of the equipment, testing and commissioning of different types of electrical equipment, transmission and distribution lines etc.	
Unit-3 Preventive Maintenance of Electrical Equipment and other installations	3 hours
Meaning of preventive maintenance, advantages of programmed preventive maintenance, preparation of preventive maintenance schedule for transformers, transmission lines induction motors, circuit breakers, underground cables, storage batteries etc.	
Unit-4 Trouble Shooting	4 hours
i. Causes for failure of electrical equipment ii. Classification of faults under (i) electrical, (ii) magnetic (iii) mechanical iii. Tool and instruments used for trouble shooting and repair. iv. Use of trouble shooting charts	
Unit-5 A) Earthing Arrangements	4 hours
i. Reasons for earthing of electrical equipment ii. Earthing systems iii. Methods of improving the earth resistance iv. Measurement of earth resistance v. System earthing and equipment earthing	
B) Insulation Testing	4 hours
i. Classification of insulation as per ISS 1271/1958. ii. Insulation resistance measurement iii. Effect of temperature on resistance iv. Reasons for determination of insulation resistance v. Methods of improving insulation resistance vi. transformer oil testing and interpretation of the test results	
C) Electrical Accidents and Safety	7 hours
i. Classification of electrical accidents, statuory regulations (IS 5216-1969) ii. Treatment for electric shock, , types and use of different type of fire extinguishers iii. Dangerous currents and voltages, effect of current on human body. iv. R.C.Ds. and earth leakage circuit breakers. v. General ideas about protection against lightning vi. Explosive safety against static and current electricity vii. Important Indian electricity rules.	

Suggested Reading

1. Installation, Maintenance and Repair of Electrical Machines By- Madhvi Gupta

Name of The Course	INSTALLATION, MAINTENANCE AND REPAIR OF ELECTRICAL MACHINES LAB				
Course Code	DPEE-3011				
Prerequisite	None				
Co-requisite					
Anti-requisite					
		L	T	P	C
		0	0	4	2

Course Objectives

1. To prepare students to know about costing and estimation.
2. To prepare students to know about earthing.
3. To prepare students to know for different rules used in wiring and cost estimation
4. To prepare students to know for power wiring
5. To prepare students to know for estimation of setting up overhead and underground cables

Course Outcomes

CO1	Understand and analyse the Scope and Organization of Electrical Maintenance Department
CO2	Commission various electrical equipment/machines
CO3	Prepare maintenance schedule of different equipment and machines
CO4	Prepare trouble shooting chart for various electrical equipment, machines and domestic appliances
CO5	Carry out different types of earthing

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks

50	-	50	100

Course Content:

1.	1. Setting handling of tools and accessories for installing heavy equipment.
2.	Commissioning of electrical equipment.
3.	Measurement of earth resistance.
4.	Testing of transformer oil.
5.	Fault finding and repairing of different types of electrical wiring.
6.	Disassembling and assembling of electrical machines e.g. electric iron, washing machines geyser, submersible, pumps, coolers etc
7.	Trouble shooting and repairing of different types of domestic and industrial electrical equipment.
8.	Winding of small ac motor/transformers/chokes.
9.	Cable jointing using epoxy resin kits
10.	Repair and maintenance of circuit breakers up to 11 kv.

Suggested Reading

1. Installation, Maintenance and Repair of Electrical Machines By- Madhvi Gupta

Name of The Course	ELECTIVE-I (RENEWABLE SOURCE OF ENERGY)				
Course Code	DPEE-3008				
Prerequisite	None				
Co-requisite					
Anti-requisite					
		L	T	P	C
		3	0	0	3

Course Objectives

1. To prepare students to know for Energy resources and their utilization.
2. To prepare students to know for Solar Energy.
3. To prepare students to know for Biomass Energy.
4. To prepare students to know for Wind Energy.
5. To prepare students to know for Microhydel Energy,Tidal Energy & Geothermal Energy .

Course Outcomes

CO1	Understand the Energy resources and their utilisation.
CO2	Understand the Solar Energy.
CO3	Understand Biomass Energy.
CO4	Understand Wind Energy.
CO5	Understand Microhydel Energy, Tidal Energy & Geothermal Energy.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Energy resources and their utilization	4 hours
renewable energy sources – energy reserves of India – India's power scene - cogeneration – energy efficiency and conservation – distributed energy systems and dispersed generation	
Unit-2 Solar Energy	12 hours
solar constant – solar radiation geometry – sunrise, sunset and day length– solar radiation measurements – flat plate collector– laws of thermal radiation – solar concentrating collectors – types of concentrating collectors –solar water heating – heating of swimming pool by solar energy – solar pumping system – solar air heaters– solar cookers – photovoltaic effect– semiconductor materials of solar cells– solar photovoltaic system– Solar photovoltaics in India	
Unit-3 Biomass Energy	6 hours
biomass resources – biofuels, biogas and producer gas – liquid fuel – biomass conversion and gasification – biogas plants(floating drum type, fixed dome type, deenbandhu biogas plant – future of biomass in India	
Unit-4 Wind Energy	6 hours
classification of wind turbines – types of rotors – aerodynamic operation of wind turbines – wind energy extraction – wind characteristics – beaufort wind scale– land for wind energy – design of wind turbine rotor – design of regulating system for rotor– subsystems of horizontal axis wind turbine generator– modes of wind power generation – advantages and disadvantages of wind energy system	
Unit-5 Microhydel Energy, Tidal Energy & Geothermal Energy	7 hours
power equation – classification of small hydropower stations – classification of water turbines – impulse turbines– major components of small hydropower projects– electric generators– low-head small hyrdro projects– tidal characteristics– tidal range– tidal energy estimation– important components of tidal power plant– advantages and disadvantages of tidal energy– plate tectonic theory – geothermal resources– geothermal	

power generation – utilization and advantages of geothermal energy

Suggested Reading

1. Renewable Energy Sources and Emerging Technologies by D.P. Kothari, PHI Learning Pvt. Ltd

2. Non conventional energy resources by B.H.Khans Tata Mc Graw-Hill publication.

3. Non-Conventional Energy Sources and Utilization (Energy Engineering) Er. R. K. Rajput

Name of The Course	ELECTIVE-II (UTILIZATION OF ELECTRICAL ENERGY)				
Course Code	DPEE-3009				
Prerequisite	None				
Co-requisite					
Anti-requisite					
		L	T	P	C
		3	0	0	3

Course Objectives

1. To prepare students to know for Illumination.
2. To prepare students to know for Electric Heating & Cooling.
3. To prepare students to know for Electric Welding.
4. To prepare students to know for Electric Traction.
5. To prepare students to know for Economic Consideration.

Course Outcomes

CO1	Understand the Illumination.
CO2	Understand the Electric Heating & Cooling .
CO3	Understand to analyse the operation of Electric Welding.
CO4	Understand to operationalize the Electric Traction.
CO5	Understand to estimate Economic Consideration.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Illumination	5 hours
Introduction – terms used in illumination – laws of illumination - polar curves – photometry – integrating sphere – measurement of illumination – sources of light – arc lamps – incandescent lamps– gaseous discharge lamps– basic principles of light control – types and design of lighting scheme – flood,streer and factory lighting– methods of lighting calculation.	
Unit-2 Electric Heating & Cooling	7 hours
introduction – modes of transfer of heat – classification of electric heating methods– resistance heating – induction heating– high frequency eddy current heating– dielectric heating – terminology for cooling – refrigeration cycle– refrigerants – water cooler – desert cooler– air conditioning	
Unit-3 Electric Welding	6 hours
resistance welding – electric arc welding – electrodes – electric welding equipment – arc welding with DC and AC – comparison between resistance and arc welding	
Unit-4 Electric Traction	12 hours
systems of electric traction – systems of track electrification – comparison between DC and AC systems of railway electrification – simplified speed-time curves – mechanics of train movement – dead weight , accelerating weight and adhesive weight – general features of traction motors – starting and speed control of DC traction motors , 1-phase series motors and 3-phase induction motors – different types of braking (mechanical regenerative, hydraulic, magnetic track) – current collection system – current collectors for overhead system – overhead construction for tramways and trolley buses and railways– block diagram of an AC electric locomotive	
Unit-5 Economic Consideration	10 hours
classification of costs– cost analysis of power plants – interest and depreciation– economics of power generation– choice of size and number of generating units–tariffs– types of tariffs– types of consumer and their tariffs – power factor– disadvantages and causes of low power factor– methods of power factor improvement – economics of power factor improvement– economical comparison of the two methods of increasing the power supplied – choice of equipment	

Suggested Reading

Text Book (s)

1. Generation and Utilization of Electrical Energy By-S. Sivanagaraju, M. Balasubba Reddy &D. Srilatha

2. Utilization of electric power and electric traction by J.B. Gupta

3. Utilization of Electrical Power by Er. R. K. Rajput

GALGOTIAS UNIVERSITY

(Established under Galgotias University Uttar Pradesh Act No. 14 of 2011)

Applied Science Courses for Diploma in All Program

Scheme: 2020-2021

Curriculum

Semester 1									
S. No.	**Course Code**	**Name of the Course**					**Assessment Pattern**		
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**
1	PHYE1001	APPLIED PHYSICS-I	3	2	0	4	20	50	100
2	MATD1002	APPLIED MATHEMATICS-I	4	0	0	4	20	50	100
3	SLPC1003	PROFESSIONAL COMUNICATION-I	2	0	0	2	20	50	100
4	CHEM1005	BASIC CHEMISTRY	3	2	0	4	20	50	100
5	PHYE1006	APPLIED PHYSICS-I LAB	0	0	2	1	50	-	50
6	SLPC1007	PROFESSIONAL COMUNICATION-I LAB	0	0	4	2	50	-	50
7	CHEM1009	BASIC CHEMISTRY LAB	0	0	4	2	50	-	50
		Total Credits	12	4	10	19			
Semester II									
S No	**Course Code**	**Name of the Course**					**Assessment Pattern**		
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**
1	PHYE1010	APPLIED PHYSICS-II	3	2	0	4	20	50	100
2	MATD1011	APPLIED MATHEMATICS-II	3	2	0	4	20	50	100
3	SLPC1012	PROFESSIONAL COMUNICATION-II	3	0	0	3	20	50	100
4	CHEM1014	BASIC CHEMISTRY	4	2	0	5	20	50	100
5	PHYE1015	APPLIED PHYSICS-II LAB	0	0	2	1	50	-	50
6	SLPC1016	PROFESSIONAL COMUNICATION-II LAB	0	0	4	2	50	-	50
7	CHEM1017	BASIC CHEMISTRY LAB	0	0	4	2	50	-	50
		Total Credits	13	6	10	21			
Semester III									
S No	**Course Code**	**Name of the Course**					**Assessment Pattern**		
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**
1	MATD2001	APPLIED MATHEMATICS-III	4	0	0	4	20	50	100
		Total Credits	4	0	0	4			
Semester IV									
S No	**Course Code**	**Name of the Course**					**Assessment Pattern**		
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**
1	IMED2001	INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT	3	0	0	3	20	50	100
2	EEDM2013	ENVIRONMENT EDUCATION & DISASTER MANAGEMENT	3	0	0	3	20	50	100
		Total Credits	6	0	0	6			
Semester VI									
Sl No	**Course Code**	**Name of the Course**					**Assessment Pattern**		
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**
1	EEDM3002	ENVIRONMENT EDUCATION & DISASTER MANAGEMENT	3	0	0	3	20	50	100
2	PDSS3008	PERSONALITY DEVELOPMENT & SOFT SKILLS	0	0	4	2	20	50	100
		Total Credits	3	0	4	5			

Name of The Course	**Applied Physics-I**		
Course Code	**PHYE1001**		
Prerequisite	**None**		
Corequisite	**PHYE1006**		
Antirequisite			
	L **T**	**P**	**C**
	3 **2**	**0**	**4**

Course Objectives:

The objective of this course is to:

1. To help students to learn the basic concept of Physics.
2. To prepare students to know the usage of basic applications of Physics.

Course Outcomes

At the end of the course student will be able to:

CO1	Understand the fundamental importance of Physics as a subject as well as will able to relate it day to day examples.
CO2	Implements the postulates of Physics on applications.
CO3	Understand the importance of units and dimension at very beginning stage.
CO4	Relate the mechanics and rotational motion with their daily life examples.
CO5	Create awareness and emphasize the need of physics in daily life and related to Engineering.

Text Book (s)

1. Fundamental of Physics- D-Halliday, R.Rasnick and J.Walker.
2. Physics for class XI and XII NCERT

Reference Book (s)

1. Create awareness and emphasize the need of physics in daily life and related to Engineering.
2. Applied Physics, by R K. Gaur.
3. Physics for class XI and XII, N.K. Bajaj.

Name of The Course	**Applied Mathematics-I**	
Course Code	**MATD1002**	
Prerequisite	**None**	
Corequisite	**MATD1002**	
Antirequisite		
	L **T** **P**	**C**
	4 **0** **0**	**4**

Unit 1	Dimensions and Measurement	Number of Lecture Hours	7
	S.I. Units & Dimensions of physical quantities, dimensional formula and dimensional equation of physical quantities, checking the correctness of physical relations and derivation of relations between various physical quantities, Conversion of numerical values of physical quantities from one system into another. Significant figures, Errors in measurements, Types of errors (absolute, relative and percentage errors).		
Unit 2	Motion in a Plane	Number of Lecture Hours	10
	Scalar and Vector quantities, representation of vectors, types of vectors, Addition, subtraction, multiplication of vectors, scalar and vector products, Work, Energy: Potential Energy, kinetic energy, Conservation law of energy, Power, Force: Newton's laws of motion, linear momentum and its conservation laws, impulse, Friction, Viscosity and coefficient of viscosity.		
Unit 3	Circular and Rotational motion	Number of Lecture Hours	9
	Circular motion, Angular displacement, angular velocity and angular acceleration Centripetal force (derivation) and centrifugal force with application such as banking of roads and bending of cyclists. Torque, angular momentum and their relationship, Law's of Conservation of angular momentum (qualitative) and its examples, Moment of inertia and radius of gyration. Gravitational force, Acceleration due to gravity, Kapler's Law, Escape velocity.		
Unit 4	Harmonic motion and Elasticity	Number of Lecture Hours	9
	Simple Harmonic Motion (SHM): definition, expression for displacement, velocity, acceleration, time period,Wave motion: Transverse and longitudinal wave motion with examples, Velocity of sound waves, frequency and wave length of a wave (relationship $v = \upsilon\lambda$) and their applications, Sound wave, Characteristics of sound (Pitch, Quality/Timbre, Intensity, Loudness), Echo, Reverberation, Stress, strain, Hooke's law. Young's modulus of elasticity. Elementary idea of shear modulus, bulk modulus and Poisson's ratio, Surface tension.		
Unit 5	Heat and Thermodynamics	Number of Lecture Hours	5
	Postulates of kinetic theory of gases, concept of heat and temperature. Adiabatic and isothermal process (concept only), Zeroth law of thermodynamics. First law of thermodynamics, statements of second law of thermodynamics and Modes of heat transfer (Conduction, Convection and Radiation), Entropy, enthalpy, Thermal conductivity.		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Course Objectives:

The objective of this course is to:

1. To help students to learn the basic concept of Mathematics.
2. To prepare students to know the usage of basic applications of Mathematics.

Course Outcomes

At the end of the course student will be able to:

CO1	Remember the formula for nth term and sum of finite terms of series. Concept of binomial expansion, determinant.
CO2	Understand the concept of vectors, vector dot and cross product also scalar and vector triple product.
CO3	Apply the concept and properties trigonometric ratio, relationship between side and angle of triangle in various problems.
CO4	Analyze and understand the concept of conic section, condition of a conic section represent a circle, parabola and ellipse.
CO5	Have the conceptual knowledge of three dimensional geometry. Evaluate the distance between two point, DR'S, DC'S and equation of line.

Text Book (s)

1. Applied Mathematics for Polytechnic (H.K. Das).
2. Applied Mathematics by Prof. V.K.Parashar.

Reference Book (s)

1. Mathematics for CLASS XI & XII NCERT.

Unit 1	Algebra	Number of Lecture Hours	12
	1) Sequence and Series, Arithmetic progression & Geometric progression and n-th term, Sum and Mean. 2) Binomial Theorem: Binomial theorem for any index (without proof) and its applications. 3) Determinants, Minors and Cofactors, elementary properties of determinants,Crammer's rule.		
Unit 2	VECTOR ALGEBRA	Number of Lecture Hours	5
	Vector Algebra - Dot and Cross product, Scalar and vector triple product.		
Unit 3	TRIGONOMETRY	Number of Lecture Hours	12
	1) Statement and use of various formulae showing relationship between sides and angle of a triangle. 2) Trigonometric ratios, sum and difference of two angles, multiple and submultiples angle. 3) Inverse circular functions (Simple cases)		
Unit 4	CO-ORDINATE GEOMETRY	Number of Lecture Hours	8
	1) Circle- Equation of circle in a standard form, diameter form, two intercept form, General form. 2) Conic- Standard equation of Parabola, Ellipse.		
Unit 5	THREE DIMENSIONAL GEOMETRY	Number of Lecture Hours	7
	1) Line & Plane- Distance between two points in space, direction cosine and direction ratios. 2) Equations of a straight line and Plane in space (Different Forms). 3) Sphere $x^2 + y^2 + z^2 + 2gx + 2fy + 2wz=d$ (Radius, Centre and General Equation).		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	**Professional Communication-I**				
Course Code	**SLPC1003**				
Prerequisite	**None**				
Corequisite	**SLPC1007**				
Antirequisite					
		L	**T**	**P**	**C**
		2	**0**	**0**	**2**

Course Objectives:

The objective of this course is to:

1. To help students to introduce themselves
2. To prepare students to know the usage of basic grammar
3. To help students understand the basics of communication and barriers to communication
4. Prepare students to be able to write letters, paragraphs and precise

Course Outcomes

At the end of the course student will be able to:

CO1	The course is ideal for English language students who wish to complement their vocabulary and phrases with a greater understanding of grammar. It is also suitable for native English speakers who want to revise their grammar or learn to communicate more effectively.
CO2	It will help the students to use the language as well as giving detailed information about the Language.
CO3	It provides ample guidance and practice in sentence building, correct usage, comprehension, written composition to equip the students with the ability to communicate effectively in English.
CO4	At the end of the course, the student will be able to develop comprehension skills, improve vocabulary, use proper grammar, acquire writing skills, correspond with others and enhance communication skills.
CO5	The course is designed to build natural interest for language among students so that they can develop the spoken and written skill enthusiastically.

Text Book (s)

1. Wren & Martin (sultan Chand Publication)
2. Professional Communication-By Malti Agarwal
3. Technical Comminication-M Ashraf Rizwi

Reference Book (s)

1. The functional Aspect of Communication Skills , Dr. P. Prasad
2. Professional Communication, Malti Agarwal

Unit 1	Grammar and usage	Number of Lecture Hours	4
	Tenses and their kinds Articles Sentence, its kind, transformation of Sentence Parts of Speech- Noun, Pronoun, Adjective, Adverb, Verb, Preposition, Conjunction, Interjection		
Unit 2	Usage of Grammar	Number of Lecture Hours	4
	Active Passive Voice Auxiliaries & Modals Narration-Direct, Indirect speech		
Unit 3	Translation and vocabulary building-	Number of Lecture Hours	5
	Glossary of Administrative & Technical Terms (Jargon) (English and Hindi) . Self Introduction: How to, and Tips. Word Formation, Idioms and Phrases, Antonyms, Synonyms, Homonyms, One Word Substitution.		
Unit 4	Fundamentals of Communication	Number of Lecture Hours	4
	Communication Process Types of Communication Difference between General and Professional Communication Purpose/Importance of Communication Barriers to Communication		
Unit 5	Composition and Writing Skills	Number of Lecture Hours	6
	Comprehension skill Precise Writing Letter Writing Paragraph Writing Report Writing		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	BASIC CHEMISTRY				
Course Code	CHEM1005				
Prerequisite					
Corequisite	CHEM1009				
Antirequisite					
		L	T	P	C
		3	2	0	4

Course Objectives:

1. Create awareness and emphasize the need for the roll of in daily life and related to engineering.

2. Prepare students to know the concept of electrolysis of solution and their various industrial applications.

3. Understand the concept of corrosion and its prevention in daily life.

4. Explain the need of quality of water for the steam generation alongwith various water purification methods.

5. Develop the concept of lubricant and Polymers its mechanism along with its uses.

Course Outcomes

CO1	Recall the basic concept of atomic structure and its characteristics for technical aspect.
CO2	Apply the concept of electrochemistry, pH and Buffer in industrial applications.
CO3	Solve specific problems due to Corrosion related to Industrial Engineering.
CO4	Enable the students to know the importance of water for industrial use and calculate hardness of water.
CO5	Knowledge of polymer and its types.

Text Book (s):

1. Basic Applied Chemistry by P. C. Jain and Monica Jain.

2. Text book of Engineering Chemistry by S. S. Dara.

3. Polymer Science and Engineering David J. Williams.

Reference Book (s):

1. NCERT Chemistry for class 11 and 12.

2. Polytechnic Chemistry by V.P. Mehta.

3. Applied Chemistry, Anita Dhawan

4. H.C. Srivastav, Engineering Chemistry.

5. Jain and Jain, Engineering Chemistry.

Unit-1	Introduction: Atomic Structure & Chemical Bonding	11 Lecture Hours
1.1 Atomic Structure: Dalton theory of Atom, Atom, Fundamental Particles of Atom, Molecule and Compound, Atomic number, Mass number, Isotopes, Isobars, Isotones, Thomson model, Rutherford model, de-Broglie Equation, Planck's quantum theory, Heisenberg's uncertainty principle, Quantum number, Shapes of orbital's, Electronic Configuration(1 - 20). 1.2 Chemical Bonding: Ionic bond, Covalent bond & Co-ordinate with example, Hydrogen bonding & its types, Valence bond theory, VSEPR theory, Hybridisation & its types, Molecular orbital theory with respect to - homonuclear diatomic molecules.		
Unit-2	Electrochemistry, pH Value and Buffer Solution	07 Lecture Hours
2.1 Electrochemistry: Electrolytes and its types, Metallic and Electrolytic Conductance, Electrochemical Cell (Galvanic / Daniel Cell), Faraday's laws of electrolysis, Problems based on these laws, Industrial application of electrolysis, (Electroplating, Electro-refining, Electrometallurgy and Electrotyping). 2.2 pH Value: Definition, Scale of pH, Numerical problems based on pH value. 2.3 Buffer Solution: Buffer solution, types of Buffer solution and mechanism of Buffer solution / action.		
Unit-3	Corrosion	05 Lecture Hours

Corrosion: Introduction, Cause of corrosion, Factors on corrosion, Types of corrosion, Galvanic cell corrosion, Waterline corrosion and Pitting corrosion, Theories of corrosion: Electrochemical theory and Chemical, Preventions of corrosion.		
Unit-4	Water and its Treatment	10 Lecture Hours
Sources of natural water, Uses of water for domestic and industries purposes, Impurities in natural water, Soft and hard water, Hardness & its types, Degree of hardness & its numerical problems, Boiler feed water and problems due to hard water in boilers, External methods of treatment of hard water: Boiling method, Clarks method, Washing soda method, Lime Soda method (Intermittent process, Continuous Cold Lime Soda process and Hot Lime Soda process), Numerical problems on Lime Soda method, Zeolite or Permutit process and Ion - exchange process.		
Unit-5	Lubricants	05 Lecture Hours
Lubricants: Definition of lubricants, Functions of lubricants, Classification of lubricants, Mechanism of lubricants, Physical Properties of lubricants and their significance:- Viscosity Index, Volatility, Flash and Fire point , Pour and Cloud point, Chemical Properties of lubricants and its significance:- Saponification value, Neutralization number, Emulsification.		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	Applied Physics Lab-I				
Course Code	PHYE1006				
Prerequisite	None				
Corequisite	PHYE1001				
Antirequisite					
		L	T	P	C
		0	0	2	1

Course Objectives:

Course Outcomes

CO1	Perform the experiments related to basic measurements in Physics.
CO2	Create awareness and emphasize the need of physics in daily life and related to Engineering.
CO3	Perform the experiments related to mechanical and thermal measurements in Physics.

Text Book (s)

1. Fundamental of Physics- D-Halliday, R.Rasnick and J.Walker.
2. Physics for class XI and XII NCERT

Reference Book (s)

1. Physics for class XI and XII by Gogia, PradeepPrakashan
2. Applied Physics, by R K. Gaur.
3. Physics for class XI and XII, N.K. Bajaj.

Name of The Course	Professional Communication-I Lab				
Course Code	SLPC1007				
Prerequisite	None				
Corequisite	SLPC1003				
Antirequisite					
		L	**T**	**P**	**C**
		0	**0**	**2**	**2**

Experiments

1. To measure diameter of a small cylindrical body using Verniercalipers.
2. To measure diameter of a given wire using screw gauge.
3. To find the weight of a given body using parallelogram law of vectors.
4. To find the coefficient of friction between a block and a horizontal surface.
5. To determine the coefficient of viscosity of a given viscous liquid by measuring the terminal velocity of a given spherical body.
6. To determine value of 'g' using simple pendulum.
7. To determine Young's modulus of elasticity of the material of a given wire.
8. To find the force constant of a helical spring by plotting a graph between load and extension.
9. To find the speed of sound in air at room temperature using a resonance tube by two resonance positions.
10. Determination of 'k' for good conductor (Searle's Method).

Continuous Assessment Pattern

Internal Lab (IA)	End Term Exam. (ETE)	Total Marks
50	50	100

Course Objectives:

The objective of this course is to:

1. Able to write and speak correctly
2. Develop their personality by enhancing Professional skills which make them job ready.
3. Demonstrate appropriate and professional ethical behavior.

Course Outcomes

At the end of the course student will be able to:

CO1	Understanding the grammar for pply appropriate Writing, Vocabulary and communication skills across settings, purposes, and audiences.
CO2	Apply appropriate Writing, Vocabulary and communication skills across settings, purposes, and audiences.
CO3	Demonstrate knowledge of communication theory and application.
CO4	Practice critical thinking and build humanistic approach to develop innovative and well-founded perspectives related to the students' emphases.
CO5	Build and maintain healthy and effective relationships.

Text Book (s)

1. Wren & Martin (sultan Chand Publication)
2. The functional Aspect of Communication Skills , Dr. P. Prasad
3. Technical Comminication-M Ashraf Rizwi

Reference Book (s)

4. The functional Aspect of Communication Skills , Dr. P. Prasad
5. Professional Communication, Malti Agarwal
6. Effective Technical Communication, M.Ashraf Rizvi

Unit 1	Grammar and usage	Number of Lecture Hours	4
	Tenses and their kinds Articles Sentence, its kind, transformation of Sentence Parts of Speech- Noun, Pronoun, Adjective, Adverb, Verb, Preposition, Conjunction, Interjection		
Unit 2	Usage of Grammar	Number of Lecture Hours	4
	Active Passive Voice Auxiliaries & Modals Narration-Direct, Indirect speech		
Unit 3	Translation and vocabulary building-	Number of Lecture Hours	5
	Glossary of Administrative & Technical Terms (Jargon) (English and Hindi) . Self Introduction: How to, and Tips. Word Formation, Idioms and Phrases, Antonyms, Synonyms, Homonyms, One Word Substitution.		
Unit 4	Fundamentals of Communication	Number of Lecture Hours	4
	Communication Process Types of Communication Difference between General and Professional Communication Purpose/Importance of Communication Barriers to Communication		
Unit 5	Composition and Writing Skills	Number of Lecture Hours	6
	Comprehension skill Precise Writing Letter Writing Paragraph Writing Report Writing		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	BASIC CHEMISTRY LAB				
Course Code	CHEM1009				
Prerequisite					
Corequisite	CHEM1005				
Antirequisite					
		L	T	P	C
		0	0	4	2

Course Objectives:

1. To create awareness and emphasize the need for the roll of in daily life and related to Engineering.

2. To develop skills in three-dimensional visualization of engineering component as related to chemistry.

Course Outcomes

CO1	Enable the students to determine and calculate hardness of water.
CO2	Apply the concept of electrochemistry in industrial applications.

Text Book (s):

1. Basic Applied Chemistry by P. C. Jain and Monica Jain.
2. Text book of Engineering Chemistry by S. S. Dara.
3. Applied Chemistry by U. S. Gupta, Anita Dhawan, N. U. Khan

Reference Book (s):

1. NCERT Chemistry for class 11 and 12.

2. Polytechnic Chemistry by V.P. Mehta.
3. Applied Chemistry, Anita Dhawan
4. H.C. Srivastav, Engineering Chemistry.
5. Jain and Jain, Engineering Chemistry.

Unit-1	EXPERIMENT NO. - 01	04 Lecture Hours
To determine the alkalinity of given Sodium hydroxide solution by titrating it against N/10 HCl using phenolphthalein as an indicator.		
Unit-2	EXPERIMENT NO. - 02	04 Lecture Hours
To determine the Chloride content in supplied water sample by using Mohr's methods.		
Unit-3	EXPERIMENT NO. - 03	04 Lecture Hours
To determine the total hardness of given water sample in terms of $CaCO_3$ by using EDTA as standard solution by Complexometry.		
Unit-4	EXPERIMENT NO. - 04	04 Lecture Hours
To analyse the given inorganic compound for its acidic (or Anionic) as well as basic (or Cationic) radical. $CO_3^{2—}$, NH_4^+		
Unit-5	EXPERIMENT NO. - 05	04 Lecture Hours
To analyse the given inorganic compounds for its two acidic (or Anionic) radicals. $Cl^—$, $CH_3COO^—$		
Unit-6	EXPERIMENT NO. - 06	04 Lecture Hours
To analyse the given inorganic compound for its basic as well as acidic radical. Pb^{2+}, $S^{2—}$		
Unit-7	EXPERIMENT NO. - 07	04 Lecture Hours
To determine the percentage of available Chlorine in the given sample of Bleaching powder (Iodometrically).		
Unit-8	EXPERIMENT NO. - 08	04 Lecture Hours
Determination of temporary hardness of water sample by O - Hener's method.		
Unit-9	EXPERIMENT NO. - 09	04 Lecture Hours

To analyse the given inorganic compounds for two basic (or Cationic) radicals. NH_4^+, Pb^{2+}
Unit-10 EXPERIMENT NO. - 10 04 Lecture Hours
To analyse the given inorganic compounds for two acidic (or Anionic) and two basic (or Cationic) radicals. NO_3^{2-}, SO_4^{2-}, Cu^{2+}, Fe^{3+}

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	Applied Physics-II			
Course Code	PHYE1010			
Prerequisite	PHYE1001 & PHYE1006			
Corequisite	PHYE1015			
Antirequisite				
	L	T	P	C
	3	2	0	4

Course Objectives:

Course Outcomes

CO1	Understand the basic properties of light and nature of light.
CO2	Understand the edge cutting application of light as Fiber optics and LASER.
CO3	Explain the properties and specification of electrostatics.
CO4	Explain the electromagnetism with applications.
CO5	Describe about semiconducting devices and their applications.

Text Book (s)

1. Fundamental of Physics- D-Halliday, R.Rasnick and J.Walker.
2. Physics for class XI and XII NCERT

Reference Book (s)

1. Physics for class XI and XII by Gogia, PradeepPrakashan
2. Applied Physics, by R K. Gaur.
3. Physics for class XI and XII, N.K. Bajaj.

Unit-1(Optics) 8 hours
Nature of light, Laws of Reflection and Refraction, Snell's Law, interference of light, Young's double slit experiment, expression for fringe width, conditions for maxima and minima. Diffraction and Polarization of light (concept only), Method of getting polarized light
Unit-2 (Fiber optics and lasers)
Optical fiber, principle of total internal reflection, Critical angle, Principle of transmission of light through optical fiber, Types and applications of optical fibers. LASER: Spontaneous and Stimulated Emission, Population inversion, Types of Lasers (Concept only): Ruby Laser, He-Ne Laser, Applications of lasers.
Unit-3(Electrostatics)
Coulombs law, electric potential and electric potential difference, Electric field, electric field intensity, electric lines of force, electric flux ,Capacitance, types of capacitors, capacitance of parallel plate capacitor, series and parallel combination of capacitors, Ohm's law and its applications, concept of

resistance, conductance, specific resistance, series and parallel combination of resistors, Kirchhoff’s laws, Wheatstone bridge principle and its applications (Meter bridge, Carey Foster's bridge, post office Box)
Unit-4(Electromagnetism)
Magnetic field and its units, magnetic field intensity, magnetic lines of force, magnetic flux, Right hand thumb rule, Force on a charge moving in a uniform magnetic field (Lorentz force). Force on a current carrying straight conductor. Conversion of a galvanometer into ammeter and voltmeter, Electromagnetic induction. Ampere’s Law, AC and DC current, capacitance and inductance in A.C. Circuits(R-L, R-C & L-R-C in series).
Unit-5(Semiconductors and Digital Electronics)
Formation of energy bands, insulators, intrinsic and extrinsic semiconductors, p-n junction diode and its characteristics (in forward and reverse bias), Diode as rectifier – half wave and full wave rectifier, pnp and npn–transistors and their uses in electronic circuits. Concept of number system, Binary and decimal number system; Conversion of decimal number into binary number, Conversion of binary number into decimal number. Logic gates, Types of basic logic gates i.e. OR gate, AND gate, NOT gate (Symbol, Boolean expression, Truth table & Analogue circuit).

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	Applied Mathematics-II				
Course Code	MATD1011				
Prerequisite	None				
Corequisite	MATD1011				
Antirequisite					
		L	T	P	C
		4	2	0	5

Course Objectives:

The objective of this course is to:

1. To help students to learn the basic concept of Mathematics.
2. To prepare students to know the usage of basic applications of Mathematics.

Course Outcomes

At the end of the course student will be able to:

CO1	Have the conceptual knowledge of sets, relation and function. Remembering the statement and proofs of some theorems of limit and continuity, student will be able to solve the real life problems.
CO2	Understand the purpose of Higher order derivatives and application to various problems.
CO3	Understand the purpose of Higher order derivatives and application to various problems.
CO4	Analyze and Apply the concept and properties of integration to find length and area of curve.
CO5	Have the conceptual knowledge of complex numbers. Evaluate the Modulus and amplitude also apply the De-moivre theorem in problems.

Text Book (s)

1. Understanding ICSE Mathematics by M.L. Agrawal.

2.Mathematics for XI and XII NCERT

3.Applied Mathematics for Polytechnic (H.K. Das).

4.B.S.Grewal,Higher Engineering Mathematics, Khanna Publishers

5.Applied mathematics for polytechnic by N.P.Bali

Reference Books:-

1. R.K. Jain & S.R.K. Iyenger, Advance Engineering Mathematics, Narosa Publication House,.
2. Chandrika Prasad, Advanced Mathematics for Engineers, Prasad Mudralaya, 1996.
3. Engineering Mathematics,byN.P.Bali

Unit 1	Differential Calculas I	Number of Lecture Hours	12
	Differential Calculas I Sets, Relations, Functions- functions and there graphs and range and domain. Limits & Continuity- elementary methods of finding limits (right and left), elementary test for continuity and differentiability. Methods of finding derivative - Function of a function, Logarithmic differentiation, Differentiation of implicit functions.		
Unit 2	Differential Calculas II	Number of Lecture Hours	8
	Scalar and Vector quantities, representation of vectors, types of vectors, Addition, subtraction, multiplication of vectors, scalar and vector products, Work, Energy: Potential Energy, kinetic energy, Conservation law of energy, Power, Force: Newton's laws of motion, linear momentum and its conservation laws, impulse, Friction, Viscosity and coefficient of viscosity.		
Unit 3	Integral Calculus I	Number of Lecture Hours	8
	Indefinite Integration- Integration by substitution. Integration of rational function. Integration by partial fraction. Integration by parts. Definite Integrals- Evaluation of definite integrals		
Unit 4	Integral Calculus II	Number of Lecture Hours	8
	Application of Definite integrations: Finding area of bounded regions by simple curves (Straight line, Parabola, Ellipse, circle)		
Unit 5	INTRODUCTION TO COMPLEX NUMBERS	Number of Lecture Hours	5
	Complex Numbers-Complex numbers, Representation, Modulus and amplitude. De-moivre theorem, its application in solving algebraic equations. Modulus function and its properties		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	**Professional Communication-II**		
Course Code	**SLPC1012**		
Prerequisite	**None**		
Corequisite	**SLPC1016**		
Antirequisite			

	L	T	P	C
	3	**0**	**0**	**2**

Course Objectives:
The objective of this course is to:

1. Able to write and speak correctly

2. Develop their personality by enhancing Professional skills which make them job ready.

3. Demonstrate appropriate and professional ethical behavior.

4. Able to prepare and present power point presentations.

Course Outcomes
At the end of the course student will be able to:

CO1	Remembering communication skills across settings, purposes, and audiences.
CO2	Apply appropriate communication skills across settings, purposes, and audiences.
CO3	Demonstrate knowledge of communication theory and application.
CO4	Practice critical thinking and build humanistic approach to develop innovative and well-founded perspectives related to the students' emphases.
CO5	Build and maintain healthy and effective relationships.

Text Book (s)

1. Wren & Martin (sultan Chand Publication)
2. Professional Communication-By Malti Agarwal
3. Technical Comminication-M Ashraf Rizwi

Reference Book (s)

1. English Grammar in use, Raymond Murphy
2. Professional Communication, Malti Agarwal
3. Effective Technical Communication, M.Ashraf Rizvi

Unit 1	Fundamentals of Communication	Number of Lecture Hours	5
	Professional Communication: Features, Communication Process, Language as a tool of communication, Levels of communication, The flow of communication, Importance of Professional Communication, Barriers to communication		
Unit 2	Grammar	Number of Lecture Hours	7
	Subject Verb Agreement; Error Detection & Correction; Simple, Compound, Complex Sentence; Uses of Conjunction; Transformation of Sentences; Vocabulary: Synonyms, Antonyms, One Word Substitution, Jargons, Phrasal Verbs.		
Unit 3	Professional Writing	Number of Lecture Hours	8

	Writing Skills: Importance & Types; Letter writing skills, Personal & Business Letters, Sales and Credit letter, Inquiry and Complaint letter; Job application ; Business Memos; E-mail writing, Reports : Types, Significance, Structure, Style & Writing of Report, Article Writing.		
Unit 4	Presentation Strategies and LSRW Skills	Number of Lecture Hours	4
	LSRW Skills and methods of improving them Nature and Importance of Presentation, Preparing the Presentation, Organizing your Presentation, Rehearsing the Presentation, Improving Delivery, Handling stage fright, Body Language; Paralinguistic features of voice		
Unit 5	Verbal and Non Verbal Abilities	Number of Lecture Hours	
	Non Verbal Communication, Extempore, Debate, Telephonic Etiquettes		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	BASIC CHEMISTRY				
Course Code	CHEM1014				
Prerequisite					
Corequisite	CHEM1017				
Antirequisite					
		L	T	P	C
		3	2	0	4

Course Objectives:

1. Create awareness and emphasize the need for the roll of in daily life and related to engineering.

2. Prepare students to know the concept of electrolysis of solution and their various industrial applications.

3. Understand the concept of corrosion and its prevention in daily life.

4. Explain the need of quality of water for the steam generation along with various water purification methods.

5. Develop the concept of lubricant and Polymers its mechanism along with its uses.

Course Outcomes

CO1	Recall the basic concept of atomic structure and its characteristics for technical aspect.
CO2	Apply the concept of electrochemistry, pH and Buffer in industrial applications.
CO3	Solve specific problems due to Corrosion related to Industrial Engineering.
CO4	Enable the students to know the importance of water for industrial use and calculate hardness of water.
CO5	Knowledge of polymer and its types.

Text Book (s):

1. Basic Applied Chemistry by P. C. Jain and Monica Jain.

2. Text book of Engineering Chemistry by S. S. Dara.

3. Polymer Science and Engineering David J. Williams.

Reference Book (s):

1. NCERT Chemistry for class 11 and 12.

2. Polytechnic Chemistry by V.P. Mehta.

3. Applied Chemistry, Anita Dhawan

4. H.C. Srivastav, Engineering Chemistry.

5. Jain and Jain, Engineering Chemistry.

Unit-1	Introduction: Atomic Structure & Chemical Bonding	11 Lecture Hours
1.1 Atomic Structure: Dalton theory of Atom, Atom, Fundamental Particles of Atom, Molecule and Compound, Atomic number, Mass number, Isotopes, Isobars, Isotones, Thomson model, Rutherford model, de-Broglie Equation, Planck's quantum theory, Heisenberg's uncertainty principle, Quantum number, Shapes of orbital's, Electronic Configuration(1 - 20). 1.2 Chemical Bonding: Ionic bond, Covalent bond & Co-ordinate with example, Hydrogen bonding & its types, Valence bond theory, VSEPR theory, Hybridisation & its types, Molecular orbital theory with respect to - homonuclear diatomic molecules.		
Unit-2	Electrochemistry, pH Value and Buffer Solution	07 Lecture Hours
2.1 Electrochemistry: Electrolytes and its types, Metallic and Electrolytic Conductance, Electrochemical Cell (Galvanic / Daniel Cell), Faraday's laws of electrolysis, Problems based on these laws, Industrial application of electrolysis, (Electroplating, Electro-refining, Electrometallurgy and Electrotyping). 2.2 pH Value: Definition, Scale of pH, Numerical problems based on pH value. 2.3 Buffer Solution: Buffer solution, types of Buffer solution and mechanism of Buffer solution / action.		
Unit-3	Corrosion	05 Lecture Hours
Corrosion: Introduction, Cause of corrosion, Factors on corrosion, Types of corrosion, Galvanic cell corrosion, Waterline corrosion and Pitting corrosion, Theories of corrosion: Electrochemical theory and Chemical, Preventions of corrosion.		
Unit-4	Water and its Treatment	10 Lecture Hours
Sources of natural water, Uses of water for domestic and industries purposes, Impurities in natural water, Soft and hard water, Hardness & its types, Degree of hardness & its numerical problems, Boiler feed water and problems due to hard water in boilers, External methods of treatment of hard water: Boiling method, Clarks method, Washing soda method, Lime Soda method (Intermittent process, Continuous Cold Lime Soda process and Hot Lime Soda process), Numerical problems on Lime Soda method, Zeolite or Permutit process and Ion - exchange process.		
Unit-5	Lubricants	05 Lecture Hours
Lubricants: Definition of lubricants, Functions of lubricants, Classification of lubricants, Mechanism of lubricants, Physical Properties of lubricants and their significance:- Viscosity Index, Volatility, Flash and Fire point , Pour and Cloud point, Chemical Properties of lubricants and its significance:- Saponification value, Neutralization number, Emulsification.		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	**30**	**50**	**100**

Name of The Course	Applied Physics Lab-II				
Course Code	PHYE1015				
Prerequisite	PHYE1006				
Corequisite	PHYE1010				
Antirequisite					
		L	T	P	C
		0	0	2	1

Course Objectives:

Course Outcomes

CO1	Organize different setups to determine properties of electric current.
CO2	Sketch the number system, binary conversion in digital electronics.
CO3	Perform the experiments to understand the properties of light.

Text Book (s)

1. Fundamental of Physics- D-Halliday, R.Rasnick and J.Walker.
2. Physics for class XI and XII NCERT

Reference Book (s)

1. Physics for class XI and XII by Gogia, PradeepPrakashan
2. Applied Physics, by R K. Gaur.
3. Physics for class XI and XII, N.K. Bajaj.

Experiments
11. To determine wavelength of monochromatic light using Newton's rings. 12. To study Polarization of light by the reflection. 13. To find the numerical aperture of given optical fiber. 14. To verify Ohm's Law. 15. Determination of specific resistance by Carry Foster Bridge. 16. To draw the I-V characteristics curves of a p-n junction in forward bias and reverse bias. 17. To study the characteristics of a common-emitter npn or pnp transistor. 18. Verification and design of AND, OR, NOT gates.

Continuous Assessment Pattern

Internal Lab (IA)	End Term Exam. (ETE)	Total Marks
50	50	100

Course Objectives:

The objective of this course is to:

1. Able to write and speak correctly
2. Develop their personality by enhancing Professional skills which make them job ready.
3. Demonstrate appropriate and professional ethical behavior.

Course Outcomes

At the end of the course student will be able to:

CO1	Remembering communication skills across settings, purposes, and audiences.
CO2	Apply appropriate communication skills across settings, purposes, and audiences.

CO3	Demonstrate knowledge of communication theory and application.
CO4	Practice critical thinking and build humanistic approach to develop innovative and well-founded perspectives related to the students' emphases.
CO5	Build and maintain healthy and effective relationships.

Text Book (s)

4. Wren & Martin (sultan Chand Publication)
5. The functional Aspect of Communication Skills , Dr. P. Prasad
6. Technical Comminication-M Ashraf Rizwi

Reference Book (s)

7. The functional Aspect of Communication Skills , Dr. P. Prasad
8. Professional Communication, Malti Agarwal
9. Effective Technical Communication, M.Ashraf Rizvi

Unit 1	Fundamentals of Communication	Number of Lecture Hours	4
	DISCUSSIONS Discussion Over A Common Topic Between Two (Video Recording) Discussion Over A Topic Of National Importance Between Two (Video Recording) INTERVIEWS Book An Appointment & Interview A Sr Engineer / General Manager Of A Company Book An Appointment & Interview A Doctor / Reporter / Author / Editor		
Unit 2	Grammar	Number of Lecture Hours	4
	Subject Verb Agreement, Pronoun Errors Error Detection & Correction Idioms Synonym Clusters Presentation		
Unit 3	Professional Writing	Number of Lecture Hours	4
	WRITING SKILLS Preparing Newspaper Advertisement Preparing Presentation On a Model Based On Technical Subject Of Choice Writing To Take Stand On a Debate & Critical Reasoning		
Unit 4	Presentation Stratergies and LSRW skills	Number of Lecture Hours	5
	Video Presentation Of Dos & DON'Ts Of A Group Discussion Analyzing a GD Video Of The Other Group (Group Of 10) Presentation On an Important Topic From CSR Final Presentation 1 On a Model Based On Technical Subject (A) Of Choice OR Final Presentation 2 On a Model Based On Technical Subject (B) Of Choice OR Final Presentation On a Model Based On Technical Subject (C) Of Choice		
Unit 5	Verbal and Non verbal Skills	Number of Lecture Hours	4
	PREPARE A SKIT & Presentation ON ONE OF THE FOLLOWING Where The Mind Is Without Fear, Poem - Rabindranath Tagore The Road Not Taken, Poem -Robert Frost The World Is Too Much With Us, Poem - William Wordsworth Of Studies, A Short Essay- Francis Bacon Three Questions, A Short Story- Leo Tolstoy		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	BASIC CHEMISTRY LAB				
Course Code	CHEM1017				
Prerequisite					
Corequisite	CHEM1014				
Antirequisite					
		L	T	P	C
		0	0	4	4

Course Objectives:

1. To create awareness and emphasize the need for the roll of in daily life and related to Engineering.

2. To develop skills in three-dimensional visualization of engineering component as related to chemistry.

Course Outcomes

CO1	Enable the students to determine and calculate hardness of water.
CO2	Apply the concept of electrochemistry in industrial applications.

Text Book (s):

1. Basic Applied Chemistry by P. C. Jain and Monica Jain.

2. Text book of Engineering Chemistry by S. S. Dara.

3. Applied Chemistry by U. S. Gupta, Anita Dhawan, N. U. Khan

Reference Book (s):

1. NCERT Chemistry for class 11 and 12.

2. Polytechnic Chemistry by V.P. Mehta.

3. Applied Chemistry, Anita Dhawan

4. H.C. Srivastav, Engineering Chemistry.

5. Jain and Jain, Engineering Chemistry.

Unit-1	EXPERIMENT NO. - 01	04 Lecture Hours
To determine the alkalinity of given Sodium hydroxide solution by titrating it against N/10 HCl using phenolphthalein as an indicator.		
Unit-2	EXPERIMENT NO. - 02	04 Lecture Hours
To determine the Chloride content in supplied water sample by using Mohr's methods.		
Unit-3	EXPERIMENT NO. - 03	04 Lecture Hours
To determine the total hardness of given water sample in terms of $CaCO_3$ by using EDTA as standard solution by Complexometry.		

Unit-4	EXPERIMENT NO. - 04	04 Lecture Hours
To analyse the given inorganic compound for its acidic (or Anionic) as well as basic (or Cationic) radical. CO_3^{2-}, NH_4^+		
Unit-5	EXPERIMENT NO. - 05	04 Lecture Hours
To analyse the given inorganic compounds for its two acidic (or Anionic) radicals. Cl^-, CH_3COO^-		
Unit-6	EXPERIMENT NO. - 06	04 Lecture Hours
To analyse the given inorganic compound for its basic as well as acidic radical. Pb^{2+}, S^{2-}		
Unit-7	EXPERIMENT NO. - 07	04 Lecture Hours
To determine the percentage of available Chlorine in the given sample of Bleaching powder (Iodometrically).		
Unit-8	EXPERIMENT NO. - 08	04 Lecture Hours
Determination of temporary hardness of water sample by O - Hener's method.		
Unit-9	EXPERIMENT NO. - 09	04 Lecture Hours
To analyse the given inorganic compounds for two basic (or Cationic) radicals. NH_4^+, Pb^{2+}		
Unit-10	EXPERIMENT NO. - 10	04 Lecture Hours
To analyse the given inorganic compounds for two acidic (or Anionic) and two basic (or Cationic) radicals. NO_3^{2-}, SO_4^{2-}, Cu^{2+}, Fe^{3+}		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	Applied Mathematics-III			
Course Code	MATD2001			
Prerequisite	None			
Corequisite	MATD2001			
Antirequisite				
	L	T	P	C
	4	0	0	4

Course Objectives:

The objective of this course is to:

1. To help students to learn the basic concept of Mathematics.
2. To prepare students to know the usage of basic applications of Mathematics.

Course Outcomes

At the end of the course student will be able to:

CO1	Remember the concept of matrix and type of matrices.
CO2	Understand the conceptual knowledge of complex numbers andtheir Modulus and amplitude also apply the De-moivre theorem inproblems.
CO3	Apply the elementary Row/ Column Transformations in matrix alsofind rank, characteristic equation, characteristic value of matrix.
CO4	Analyze the working methods of gamma and beta functions indefinite integral and apply for finding Laplace transform of varioustype of function.
CO5	Understand the concept of differentiation and Evaluate thecomplete solution of ODE.

Text Book (s)

1. Engineering mathematics by M.P.BALI

2. Advanced Engineering Mathematics by Jain and Iyenger

Reference Book (s)

1. Engineering mathematics by M.P.BALI
2. Advanced Engineering mathematics by Erwin Kreyszing (WILLEY)

Unit 1	INTRODUCTION TO MATRICES	Number of Lecture Hours	6
	1. Algebra of Matrices - Addition, Subtraction, Multiplication of matrices. 2. Type of Matrices- Null & Unit matrix, rectangular & square matrix, symmetric and skew symmetric matrix, Hermitian& Skew Hermitian matrix, Orthogonal & Unitary matrix, diagonal & triangular matrix, determinants of matrix.		
Unit 2	INTRODUCTION TO COMPLEX NUMBERS	Number of Lecture Hours	4
	Complex Numbers-Complex numbers, Representation, Modulus and amplitude. De-moivre theorem, square root of complex number and cube root of unity		
Unit 3	APPLICATIONS OF MATRICES	Number of Lecture Hours	8
	1. Elementary Row/ Column Transformations- Linear dependence/independence of vector, Rank of matrix, Inverse of matrix, Consistency of equations, Solution of simultaneous equations. 2. Eigen Pairs, Cayley-Hamilton Theorem- Definition and evaluation of Eigen values and Eigen vectors of a matrix of order two and three, Cayley-Hamilton theorem (without Proof) and its verification, Use in finding inverse and powers of a matrix.		
Unit 4	INTEGRAL TRANSFORM	Number of Lecture Hours	6
	1. Special Functions- Gamma & Beta functions and their use in Integration. 2. Laplace Transform- Definition, Basic theorem and properties, Unit step and Periodic functions, inverse Laplace transform Solution of Ordinary differential equation		
Unit 5	DIFFERENTIAL EQUATION-I	Number of Lecture Hours	10
	1. Definitions- ODE, Order, Degree, Types, Solution, Linear and Non-linear ODE. 2. Formation of Differential Equations. 3. First order differential equations using (a) Variable separation. (b) Homogeneous differential Equation 4. Linear Differential Equation. 5.Higher Order Differential Equations- Solution of linear differential equations with constant coefficients having $e^{ax}, Sin\ ax, Cos\ ax\ and\ x^m$ and their mixture in the right hand side.		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Course Objectives:

Name of The Course	Industrial Management and Entrepreneurship Development		
Course Code	IMED2001		
Prerequisite	None		
Corequisite	IMED2001		
Antirequisite			
L	T	P	C
3	0	0	3

The objective of this course is to:

1. Candidate must have moderate level of interaction & understanding of changing business environment.
2. He must be able to identify general production activities happening around us.

Course Outcomes

At the end of the course student will be able to:

CO1	Understand and Apply the latest trends in industrial management & entrepreneurial ventures.
CO2	Analyze & develop human resource policies.
CO3	Recognizing change in industrial relations.
CO4	Assess the market potential & marketing environment.
CO5	Explain and interpret different laws of labor legislations and importance of safety and health organization.

Text Book (s)

1. Industrial Organization and Management by Tara Chand; Nem Chand and Brothers; Roorkee.
2. Industrial Management and Entrepreneurship Development by A.P. Verma
3. Industrial Engineering and Management by O.P.Khanna; DhanpatRai and Sons, Delhi

Reference Book (s)

1. Industrial Organization and Engineering Economics by Banga and Sharma; Khanna Publishers, Delhi.
2. Marketing Management by Phillip Kotler; Prentice Hall of India, New Delhi.

Unit 1	Principles of Management and Entrepreneurship	Number of Lecture Hours	8
	Management: Definition, concepts, objectives, characteristics and functions (Planning, Organizing, Leading and Controlling). Organization: Structure, types and functions of different departments. Motivation: Factors, characteristics and methods of improving motivation, incentives, pay, promotion, rewards. Leadership: Types and Need of leadership, Factors for accomplishing effective leadership, Functions of a leader, Manager as a leader, Promoting team work. Needs of entrepreneurship in the current economic conditions. Concept of entrepreneurship, Motivation to be an entrepreneur. Distinction between an entrepreneur and a manager. Project identification, selection, formulation and appraisal.		
Unit 2	Human Resource Development, Wages and Incentives	Number of Lecture Hours	8
	Introduction, objectives and functions of human resource development (HRD) department. Recruitment, methods of selection, training strategies and career development. Responsibilities of human resource management (HRM) – policies and functions. Definition, types and factors affecting wages, methods of wage payment. Incentive – type of incentive, incentives of supervisor, difference in wage, incentive and bonus.Job enrichment and enlargement, evaluation.		
Unit 3	Industrial Relations and Professional Ethics	Number of Lecture Hours	7
	Industrial relations and disputes, Relations with subordinates, peers and superiors. Characteristics of group behavior. Trade unionism, Mob psychology, Agitations, Strikes, Lockouts, Picketing and Gherao. Grievance, Handling of grievances. Labor welfare schemes, Workers' participation in management. Concepts and Need for code of professional ethics, Professional bodies and their role.		
Unit 4	Marketing, Sales and Material management	Number of Lecture Hours	9
	Marketing: Concepts, methods and problems, Distribution channels of marketing, AdvertisementPricing policy, break even analysis. Functions and duties of sales department, Sales forecasting, Sales promotion and after sale services.Inventory Control: Introduction and Models of Inventory control: Economic ordering quantity (EOQ), perpetual inventory control and ABC Analysis. Safety stock, Stores equipment, Stores records, purchasing procedures, Bin card and Material handling techniques.		
Unit 5	Labor Legislation Act (as amended on date), Accidents and Safety	Number of Lecture Hours	10
	Factory Act 1948, Industrial Dispute Act 1947.Workmen's Compensation Act 1923, Payment of Wages Act, 1936.Employers State Insurance Act 1948, Provident Fund Act 1968, Apprentices Act 1961. Accidents: Characteristics, Classification based on nature of injuries, event and place, causes and effects. Accident-prone workers, Action to be taken in case of accidents with machines, electric shock, fires & erection and construction sites. Safety consciousness, publicity, procedures, measures – Do's and Don'ts and Good housing keeping.		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Course Objectives:

Name of The Course	Environmental Education and Disaster Management				
Course Code	EEDM2013				
Prerequisite	None				
Corequisite	None				
Antirequisite					
		L	T	P	C
		3	0	0	3

The objective of this course is to:

1. To help students to aware the environment and disaster management.
2. To give the knowledge and understanding the environment.

Course Outcomes

At the end of the course student will be able to:

CO1	Understand and make the students to aware and sensitize to the environment and its challenges
CO2	Implement the concern for the environment and motivation to improve.
CO3	Understand the importance to maintain environmental quality at very beginning stage.
CO4	Relate and identify the problems and further resolve environmental challenges
CO5	Create the activities that lead to the resolution of environmental challenges

Text Book (s)

1. Gaur R.C., Basic Environmental Engineering, New Age International Publishers, Delhi.
2. Anil Kumar De, Environmental Education, New Age International Publishers, Delhi

Reference Book (s)

1. Khopkar S.M., Environmental Pollution Monitoring and Control, New Age International Publishers,Delhi.
2. SrivastavaSmriti, Environment and Ecology, S.K. Kataria& Sons, Delhi
3. R.B.Singh (Ed). Disaster Management, Rawat Publication, New Delhi, 2000
4. Davis, M. L. and Cornwell, D. A. (2008). Introduction to Environmental Engineering, Fourth Edition, McGraw-Hill, Boston et al.

Unit 1	Ecology and Environment	Number of Lecture Hours	6
	i)Basics of ecology, Ecosystem, Human activities and its effect on ecology and eco system, different development i.e. irrigration, urbanization, road development and other engineering activities and their effects on ecology and eco system. ii) Mining and deforestation and their effects. Resources- renewable and non- renewable, Components of Atmosphere, Biodiversity, Lowering of water level. iii)Biodegradation and Bio degradability, composting, bioremediation, Microbes .Use of bio pesticides and bio fungicides. Global warning concerns, Ozone layer depletion, Green house effect, Acid rain, etc.		
Unit 2	Pollution and its Classification	Number of Lecture Hours	14
	Definition, classification, air, water, solid waste, thermal, noise and radioactive pollutions. Different parameter of pollution i) Water POLLUTION: Sources , transport of pollutants, effect of water pollutants on man, animal ,plants material, various types of pollutants. Mainly discuss various types of wastes from community, domestic & industrial wastes and their affects on environment, Indian Standards for quality of drinking water, Indian Standards for quality of treated waste water. Treatment methods of effluent (domestic waste water and industrial/ mining waste water), its reuse/safe disposal.		

	ii)AIR POLLUTION :Definition of Air pollution, types of air pollutants, causes and its effects on the environment Monitoring and control of air pollutants, Ambient air quality measurement and their standards. Effects of mining, blasting and deforestation, Vehicular Pollution and Its control with special emphasis of Euro-I, Euro-II, Euro-III and Euro IV. iii) NOISE POLLUTION : Sources, measurement of pollution. Degree of noise. Echos and their control. Industrial noise, units characteristics occupational injuries due to noise, criteria and standard for occupational injuries due to noise. Means to control noise in industry. iv)RADIOACTIVE POLLUTION: Sources and its effect on human, animal, plant and material, means to control and preventive measures. v)SOLID WASTE MANAGEMENT :Review of various types of solid waste. sources, components of solid waste, city garbage and industrial solid waste handling and disposal equipment . Method of disposal, salvage and recovery. Volume reduction in solid waste.		
Unit 3	Legislation	Number of Lecture Hours	5
	i) Regulatory frame work and code of practice (Petroleum act-1 934, Factories act-1948, Insecticide,The Water (Prevention and Control of Pollution) Act – 1 974, ii) The Air (Prevention and Control of Pollution) Act – 1 981 , Explosives act-1 984, Environmentalprotection act-1 986, iii) Municipal Solid Wastes (Management and Handling) Rules,2000,The Noise Pollution (Regulation and Control)(Amendment) Rules, 2002.		
Unit 4	Environmental Impact Assessment	Number of Lecture Hours	4
	Definition and Objectives (Category I,II & III) of environmental impact assessment, EIA guidelines, Environmental management system.		
Unit 5	Disaster Management	Number of Lecture Hours	10
	(i) Definition of disaster - Classification of disasters, causes and consequences – Natural disasters (cyclone, earth quake, tsunami, flood, drought, land slide, lightning, forest fire, volcanic eruption) and Human-induced disasters (Air, road & rail accidents, oil spill, building collapse, fire,industrial hazards, chemical hazards, explosion, war). (ii) Disaster management cycle - Pre-disaster phase (Planning,Preparedness, Prevention& Mitigation). (iii) Disaster profile of India - Institutional frame work of disaster management in India (National, state and district level) – Use of information technology (GIS, GPS etc) in disaster management. .		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	**Environmental Education and Disaster Management**		
Course Code	**EEDM3001**		
Prerequisite	**None**		
Corequisite	**None**		
Antirequisite			
L	**T**	**P**	**C**
3	**0**	**0**	**3**

Course Objectives:

The objective of this course is to:

3. To help students to aware the environment and disaster management.
4. To give the knowledge and understanding the environment.

Course Outcomes

At the end of the course student will be able to:

CO1	Understand and make the students to aware and sensitize to the environment and its challenges
CO2	Implement the concern for the environment and motivation to improve.
CO3	Understand the importance to maintain environmental quality at very beginning stage.
CO4	Relate and identify the problems and further resolve environmental challenges
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3. Gaur R.C., Basic Environmental Engineering, New Age International Publishers, Delhi.
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Unit 1	Ecology and Environment	Number of Lecture Hours	6
	i)Basics of ecology, Ecosystem, Human activities and its effect on ecology and eco system, different development i.e. irrigation, urbanization, road development and other engineering activities and their effects on ecology and eco system. ii) Mining and deforestation and their effects. Resources- renewable and non- renewable, Components of Atmosphere, Biodiversity, Lowering of water level. iii)Biodegradation and Bio degradability, composting, bioremediation, Microbes .Use of bio pesticides and bio fungicides. Global warning concerns, Ozone layer depletion, Green house effect, Acid rain, etc.		
Unit 2	Pollution and its Classification	Number of Lecture Hours	14
	Definition, classification, air, water, solid waste, thermal, noise and radioactive pollutions. Different parameter of pollution i) Water POLLUTION: Sources , transport of pollutants, effect of water pollutants on man, animal ,plants material, various types of pollutants. Mainly discuss various types of wastes from community, domestic & industrial wastes and their affects on environment, Indian Standards for quality of drinking		

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Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100