



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

**Bachelor of Architecture**

(B. Arch.)

**Five Year Full Time Degree Programme**

SYLLABUS

**School of Architecture**

**August 11, 2018**

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	<b>ABBREVIATIONS / CODES / NOMENCLATURE</b>
BARC/ARE	Architecture Course Code
ARE XYZ	X-Year Number, YZ-Course Number
M	Module
T	Tutorial
S	Studio
P	Practical
C	Course Credit
FFCS	Fully Flexible Credit System

## Teaching & Examination Scheme

B. Arch. , Semester -I (Fall), FIRST YEAR															
Subject Code	Subject Code (NEW)	Module Subject	INTRODUCTION TO ARCHITECTURE	PRODUCT ANALYSIS	LANGUAGE OF ARCHITECTURE	ART AND ARCHITECTURE	WORKSHOP								
			M1	M2	M3	M4	M5		Internal	External	Total	Grade point	Credit	Credit points	
BARC1001	BARC1001	Architectural Design-I	10	50	30	10				100	100	200	10	6	60
BARC1002	BARC1002	Building Construction-I	20	40	40					100	100	200	10	2	20
BARC1003	BARC1003	Building Structures-I	15	35	35	15				100	100	200	10	2	20
BARC1004	BARC1004	History of Architecture-I	25		75					100	100	200	10	1	10
BARC1005	BARC1005	Computer Application in Architecture-I			50	50				100	100	200	10	1	10
BARC1006	BARC1006	Architectural Graphics-I	5	35	35	25				100	100	200	10	3	30
BARC1007	BARC1007	Communication	25	25	50					100	100	200	10	1	10
		<b>marks/Total Credits</b>												16	160
												1400			
														SGPA	10

B. Arch. , Semester -II (Winter), FIRST YEAR															
Subject Code	Subject Code (NEW)	Module Subject	UNIVERSAL DESIGN	MOMENTS	CONTEXT	ARBORATUM	SCIOGRAPHY	Internship							
			M6	M7	M8	M9	M10	T1	Internal	External	Total	Grade point	Credit	Credit points	
BARC1009	BARC1009	Architectural Design-II	20		30	45	5			100	100	200	10	6	60
BARC1010	BARC1010	Building Construction-II		30	30	40				100	100	200	10	3	30
BARC1011	BARC1011	Building Structures-II		30	35	35				100	100	200	10	1	10
BARC1012	BARC1012	History of Architecture-II	50	50						100	100	200	10	1	10
BARC1013	BARC1013	Computer Application in Architecture-II		20		20	60			100	100	200	10	1	10
BARC1014	BARC1014	Architectural Graphics-II			40		60			100	100	200	10	2	20
BARC1015	BARC1015	Surveying and Levelling	30		70					100	100	200	10	1	10
BARC1016	BARC1016	Climatology			50	50		0		100	100	200	10	2	20
BARC1017	BARC1017	Building Services-I	20		40	40				100	100	200	10	1	10
BARC1018	BARC1018	Summer Internship-I						100		100	100	200	10	2	20
		<b>marks/Total Credits</b>	<b>120</b>	<b>130</b>	<b>295</b>	<b>230</b>	<b>125</b>	<b>100</b>						<b>20</b>	<b>200</b>
												2000			
														SGPA	10

### B. Arch. , Semester -III (Fall), SECOND YEAR

Subject Code	Subject Code (NEW)	Module Subject	LARGE SPAN	SOCIOLOGY	PAVILION	REINFORCED CEMENT CONCRETE	RENDER	Internship	Internal	External	Total	Grade point	Credit	Credit points
			M11	M12	M13	M14	M15	T2						
BARC2001	BARC2001	Architectural Design-III	15	10	25	35	15		100	100	200	10	7	70
BARC2002	BARC2002	Building Construction-III	5		35	60			100	100	200	10	3	30
BARC2003	BARC2003	Building Structures-III	40	10	50				100	100	200	10	2	20
BARC2004	BARC2004	History of Architecture-III			50	50			100	100	200	10	2	20
BARC2005	BARC2005	Computer Application in Architecture-III			25	30	45		100	100	200	10	2	20
BARC2006	BARC2006	Sociology and Psychology		100					100	100	200	10	1	10
BARC2007	BARC2007	Building Services-II			65	35			100	100	200	10	1	10
BARC2018	BARC2018	Summer Internship-II						100	100	100	200	10	3	30
		<b>marks/Total Credits</b>	<b>60</b>	<b>120</b>	<b>250</b>	<b>210</b>	<b>60</b>	<b>100</b>					<b>21</b>	<b>210</b>
											1600			
													SGPA	10

### B. Arch. , Semester -IV (Winter), SECOND YEAR

Subject Code	Subject Code (NEW)	Module Subject	VERNACULAR	M17 - STEEL	DECODING PATTERN	CLIMATE RESPONSIVE ARCHITECTURE	FACADE	Internship	Internal	External	Total	Grade point	Credit	Credit points
			M16	M17	M18	M19	M20	T3						
BARC2009	BARC2009	Architectural Design-IV	15	10	35	40			100	100	200	10	7	70
BARC2010	BARC2010	Building Construction-IV		20	40	35	5		100	100	200	10	3	30
BARC2011	BARC2011	Building Structures-IV		35	65				100	100	200	10	1	10
BARC2012	BARC2012	History of Architecture-IV	10		45	45			100	100	200	10	2	20
BARC2013	BARC2013	Computer Application in Architecture-IV		25			75		100	100	200	10	1	10
BARC2014	BARC2014	Architectural Graphics-III			100				100	100	200	10	1	10
BARC2015	BARC2015	Building Services-III	40			60			100	100	200	10	2	20
BARC2016	BARC2016	Estimation and Costing-I					100		100	100	200	10	1	10
BARC2008	BARC2008	Winter Internship-I						100	100	100	200	10	2	20
		<b>marks/Total Credits</b>	<b>65</b>	<b>80</b>	<b>250</b>	<b>140</b>	<b>180</b>	<b>100</b>					<b>20</b>	<b>200</b>
											1600			
													SGPA	10

**B. Arch. , Semester -V (Fall), THIRD YEAR**

Subject Code	Subject Code (NEW)	Module Subject	CONGENT	CONGENT2	DIONYSIA	DECOR	BIM	Internship	Internal	External	Total	Grade point	Credit	Credit points
			M21	M22	M23	M24	M25	T4						
ARE 311	BARC3001	Architectural Design-V	15	15	35	35			100	100	200	10	9	90
ARE 312	BARC3002	Building Construction-V			40	60			100	100	200	10	3	30
ARE 313	BARC3003	Building Structures-V	20	20	60				100	100	200	10	1	10
ARE 316	BARC3004	Theory of Design	65	35					100	100	200	10	1	10
ARE 315	BARC3005	Computer Application in Architecture-V			15	10	75		100	100	200	10	2	20
ARE 319	BARC3006	Building Services-IV Acoustics			50	50			100	100	200	10	1	10
ARE 320	BARC3007	Estimation and Costing-II				50	50		100	100	200	10	1	10
ARE 339	BARC3016	Summer Internship-III						100	100	100	200	10	3	30
		<b>marks/Total Credits</b>	<b>100</b>	<b>70</b>	<b>200</b>	<b>205</b>	<b>125</b>	<b>100</b>					<b>21</b>	<b>210</b>
											1600			
													SGPA	10

**B. Arch. , Semester -VI (Winter), THIRD YEAR**

Subject Code	Subject Code (NEW)	Module Subject	PREFAB	TALL BUILDING	NEIGHBORHOOD	AGORA	MANAGEMENT	internship	Internal	External	Total	Grade point	Credit	Credit points
			M26	M27	M28	M29	M30	T5						
ARE 321	BARC3009	Architectural Design-VI	15	10	40	35			100	100	200	10	10	100
ARE 322	BARC3010	Building Construction-VI	30	15		25	30		100	100	200	10	2	20
ARE 323	BARC3011	Building Structures-VI		25	55		20		100	100	200	10	1	10
ARE 329	BARC3012	Human values		80	20				100	100	200	10	1	10
ARE 330	BARC3013	Computer Application in Architecture-VI			30	35	35		100	100	200	10	2	20
ARE 331	BARC9997	Research/dissertation				55	45		100	100	200	10	1	10
ARE 332	BARC3014	Building Economics			50	50			100	100	200	10	1	10
ARE 338	BARC3008	Winter Internship-II						100	100	100	200	10	2	20
		<b>marks/Total Credits</b>	<b>45</b>	<b>130</b>	<b>195</b>	<b>200</b>	<b>130</b>	<b>100</b>					<b>20</b>	<b>200</b>
											1600			
													SGPA	9.091

### B. Arch. , Semester -VII (Fall), FOURTH YEAR

Subject Code	Subject Code (NEW)	Module Subject	RESURGENCE	Ocular	HOSPITALITY	HEALTH CARE	Perception		Internal	External	Total	Grade point	Credit	Credit points
			M31	M32	M33	M34	M35							
ARE 412	BARC4001	Architectural Design-VII			45	55			100	100	200	10	8	80
ARE 413	BARC4002	Building Construction-VII			50	50			100	100	200	10	2	20
ARE 414	BARC4003	Environmental Studies	100						100	100	200	10	1	10
ARE 416	BARC4005	Project Management			50	50			100	100	200	10	1	10
ARE 418	BARC9998	Research/dissertation	50		50				100	100	200	10	2	20
ARE 419	BARC4009	Product Design*1		100					100	100	200	10	2	20
ARE 420	BARC4010	Art Appreciation*1		100					100	100	200	10	2	20
ARE 429	BARC4011	Low Cost Architecture*2					100		100	100	200	10	2	20
ARE 430	BARC4012	Architectural Journalism*2					100		100	100	200	10	2	20
		<b>marks/Total Credits</b>	<b>150</b>	<b>100</b>	<b>195</b>	<b>155</b>	<b>100</b>						<b>18</b>	<b>180</b>
											1000			
*1 = Elective 1    *2 = Elective 2													SGPA	10

### B. Arch. , Semester -VIII (Winter), FOURTH YEAR

Subject Code	Subject Code (NEW)	Module Subject	Professional training						Internal	External	Total	Grade point	Credit	Credit points
			M36											
ARE 428	BARC4008	Professional training	100						100	100	200	10	22	220
		<b>marks/Total Credits</b>	<b>100</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>					<b>22</b>	<b>220</b>
											200			
													SGPA	10

<b>B. Arch. , Semester -IX (Fall), FIFTH YEAR</b>																		
Subject Code	Subject Code (NEW)	Module Subject		AMENABLE	smart cities	Urban Design	Mixed use development	Sprawl				Grade point	Credit	Credit points				
				M37	M38	M39	M40	M41		Internal	External				Total			
ARE 511	BARC5001	Architectural Design-IX			10	40	45	5				100	100	200	10	12	120	
ARE 516	BARC5002	Professional Practice-I		15	35	50	0					100	100	200	10	2	20	
ARE520	BARC5006	Disaster Mitigation & Management*3		85	15							100	100	200	10	2	20	
ARE523	BARC5007	Sustainable Cities & Energy Compliance*3		<b>85</b>	<b>15</b>							100	100	200	10	2	20	
ARE524	BARC5008	Tranport Planning*4					15	85				100	100	200	10	2	20	
ARE525	BARC5009	Urban & Regional Planning*4					15	85				100	100	200	10	2	20	
		<b>marks/Total Credits</b>		<b>100</b>	<b>60</b>	<b>90</b>	<b>60</b>	<b>90</b>								<b>18</b>	<b>180</b>	
												800						
*3 = Elective3    *4 = Elective 4																		
														SGPA	10			

<b>B. Arch. , Semester -X (Winter), FIFTH YEAR</b>																		
Subject Code	Subject Code (NEW)	Module Subject		ARCHITECTUR AL THESIS								Grade point	Credit	Credit points				
				M42							Internal				External	Total		
ARE 521	BARC9999	Architectural Thesis		<b>100</b>								100	100	200	10	24	240	
ARE 522	BARC5005	Professional Practice-II		<b>100</b>								100	100	200	10	2	20	
		<b>marks/Total Credits</b>		<b>200</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>						<b>26</b>	<b>260</b>	
												200						
														SGPA	10			

Semester 1 codes

Subject Code	Subject Name	Assigned Credit
BARC1001	Architectural Design-I	6
BARC1002	Building Construction-I	2
BARC1003	Building Structures-I	2
BARC1004	History of Architecture-I	1
BARC1005	Computer Application in Architecture-I	1
BARC1006	Architectural Graphics-I	3
BARC1007	Communication	1



<b>Module 1 ARMO 1001</b>		<b>M1: Introduction to Architecture</b>	
<b>Contacts Hours</b>		<b>50 (2 Weeks)</b>	
<b>Assigned Credit</b>		<b>2</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC1001	Architectural Design-I	10	10
BARC1002	Building Construction-I	20	10
BARC1003	Building Structures-I	15	10
BARC1004	History of Architecture-I	25	05
BARC1006	Architectural Graphics-I	10	10
BARC1007	Communication	10	05

### COURSE OUTCOMES

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Create an piece of art	K6 in Cognitive domain	Rubric/Viva
2	Appraise architecture profession	K4 in Cognitive domain	(MCQ's)
3	Correlate various courses in architecture pedagogy	K4 in Cognitive domain	(MCQ's)
4	Demonstrate hand eye Coordination through sketches	P5 in psychomotor domain	Rubric/Viva
5	Value role of human settlement in history	A3 in Affective domain	Rubric/Viva

### COURSE OBJECTIVES

1. Unlearn the traditional classroom system and get acquainted to Project Based Learning
2. Learning graphical representation of everyday experience
3. Understanding professional ethics and values

### Project: Expressions though graffiti/abstract art/collage/painting

### COURSE CONTENT

#### BARC1001 Architectural Design-I

Introduction to Architecture Profession, Roles, Responsibilities and Liabilities of an Architect and other professionals in the building and construction field. Architects Act-CoA, I.I.A, NASA.A brief summary of Architecture; its various definitions, associated aspects/dimensions, approaches through different ages and factors affecting architecture of a region. Relationship between basic design and architectural design, understanding of space, form, order and design.

#### BARC1002 Building Construction-I

Introduction to commonly used building terminology, tools, materials and elements of a building from foundation to roof (Stepped footing & strip foundations, Plinth, DPC, Flooring, Walls, Door, Window, Sill, Lintel, Column, Beam, Slab, Parapet, Terracing.

#### BARC1003 Building Structures-I

Introduction of structural systems: Behavior of structural components, How we choose materials. How different materials behaves. How the shape, stability, durability of a structure has role on structure and how the factors varies as per the structural design.

Introduction of Vectors, Resultant and vectors, Components of vectors

Moment of Inertia, Centre of gravity. Types of loads, Moment, Torsion, Shear.

#### BARC1004 History of Architecture-I

##### Introduction to History of Architecture

Role of history in Architecture, Evolution of human habitat in History

##### Prehistoric Age

Introducing concepts of culture and civilization - Paleolithic and Neolithic culture - art forms and evolution of shelter - megaliths - agricultural revolution and its impact on culture and civilization with examples from Carnac and Stonehenge. In reference to the Asia-minor region with nascent cities like Jericho, Catalhoyuk, and Hattasus etc.

**BARC1006 Architectural Graphics-I**

Introduction to Art and graphics, its role and significance, basic Sketching techniques and line drawing, charcoal studies. Expression of Ideas and Concepts through visual communication. Using tools for graphics and architecture- setting up of parallel bar and drafting table.

Introduction to technical drawing, drawing equipment, Drafting and quality of lines with pencil, Basic Geometry- Construction of planes, curves, circles tangent and regular polygons, Free hand and mechanical lettering- Free hand drawing and lettering for titles, line work with the use of Drawing Instruments.

**BARC1007 Communication**

Orientation to course and program, the system of education, assigning faculty mentors, assessing individual qualities, identification of fears, strength and weakness Inculcating human values and professional ethics, behavior towards faculty, staff and peers. Introduction teaching pedagogy- Syllabus, curriculum, Project Based Learning (PBL) and Outcome Based Education (OBE). Story writing to capture themes and images.

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Assignments/ MCQs/ Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.

**SUGGEST BOOKS:**

1. Ching, Francis D. K. "Architecture: Form, Space and Order", John Wiley and Sons Inc.
2. Lidwell, William, Holden, Kestina, Butler, Jill, "Universal Principles of Design", Rockport – Publications, Massachussets
3. "The History of Architecture" by Sir Bannister Fletcher
4. Building Construction & Materials, S.C. Rangwala
5. Robert W. Gill, Rendering with Pen and Ink, Thames & Hudson; 1984

<b>Module 2 ARMO 1002</b>		<b>M2: Product Analysis</b>	
<b>Contacts Hours</b>		<b>150 (6 Weeks)</b>	
<b>Assigned Credit</b>		<b>6</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC1001	Architectural Design-I	50	90
BARC1002	Building Construction-I	40	20
BARC1003	Building Structures-I	35	16
BARC1007	Communication	25	04
BARC1006	Architectural Graphics-I	35	20

### **COURSE OUTCOME**

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Appraise different types of structural forces	K4 in Cognitive domain	MCQ's
2	Appraise the correlation between human measurements and surrounding	K4 in Cognitive domain	Rubric/Viva
3	Develop basic comm. Skills and sense of composition and design	K4 in Cognitive domain	Rubric/Viva
4	Create object with Movement function	P7 in psychomotor domain	Rubric/Viva
5	Participate in debates, group discussion and presentation	A3 in Affective domain	Rubric/Viva

### **COURSE OBJECTIVES**

1. Linework, lettering, Autocad, google sketchup,
2. Composition in 2D and 3D
2. Introduction to technical drawing and print.

**Project: 2D composition in color media & 3D composition using Sketchup**

**Geometrical Composition (2-D to 3-D composition and asymmetrical sculptures of geometric forms)**

### **COURSE CONTENT**

#### **BARC1001 Architectural Design-I**

##### **Unit-I: Elements of Design**

Introduction to elements of Design like point, line, shape, form, texture, color; their definitions and expression quality. Application of elements in architectural design through the use of line, plane, solid and voids and application of texture, color, etc. Exercises like logo, cover page, greeting card, mural design etc. to be considered. Application of design elements in 2D and 3D compositions. Exercises of 3D compositions to be introduced  
Model making workshop –Basic 3-D geometric forms

#### **BARC1003 Building Structures-I**

How the structural behavior of different materials vary as per Ductility, Brittleness, Malleability Toughness, Hardness. Load-displacement behavior of a structure. How ductile and brittle materials behaves in Tension, Compression, Shear. Stress-strain relationship of materials, Young's modulus, Shear Modulus, Bulk modulus, Poisson's ratio, Hooke's law. Stress, Strain Curves for different materials in compressive and tensile loading. Nominal and True Curve. How the stress strain behavior varies for different materials. Limit of proportionality, Elastic limit, Elastic and Plastic behavior of material. Yielding of material. Ultimate stress, fracture

#### **BARC1006 Architectural Graphics-I**

##### **Freehand Drawing**

Drawing trees, Humans and furniture, 2D compositions using elements of Design, composition in color media.

##### **Color Fundamentals**

Perception of color and light, related definitions like hue, value, intensity, color wheel, color theory, color schemes, effect of color in architecture, color symbolism.

##### **Basic technical Drawing and Lettering**

Introduction to basics- introduction to subject and drawing equipment, Drafting and quality of lines with pencil, Basic Geometry- Construction of planes, curves, circles tangent and regular polygons, Free hand and mechanical lettering- Free hand drawing and lettering for titles, line work with the use of Drawing Instruments.

### **Scale and Dimensioning**

Types and uses of scales: Plain, diagonal, comparative, and scale of chords, Scales used in architecture, Reducing and enlarging scales, Representative fraction, Dimensioning of lines and plane figures, Measuring and drawing to scale the following: furniture items, rooms, doors and windows, etc.

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.

### **SUGGESTED BOOKS:**

1. I.H. Morris, Geometrical Drawing for Art Students - Orient Longman, Madras, 2004..
2. Francis Ching, Architectural Graphics, Van Nostrand Reinhold Company, New York, 1964..
3. N.D.Bhatt, Elementary Engineering Drawing (Plane and Solid Geometry), Charotar Publishing House, India.
4. Punmia P. C., "Strength of Materials & Mechanics of Structures"
5. Khurmi R. S., "Strength of Materials"

<b>Module 3 ARMO 1003</b>		<b>M3: Language of Architecture</b>	
<b>Contacts Hours</b>		<b>150 (6 Weeks)</b>	
<b>Assigned Credit</b>		<b>6</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC1001	Architectural Design-I	30	50
BARC1002	Building Construction-I	40	20
BARC1003	Building Structures-I	35	16
BARC1004	History of Architecture-I	75	16
BARC1005	Computer Application in Architecture-I	50	10
BARC1006	Architectural Graphics-I	35	26
BARC1007	Communication	50	12

### COURSE OUTCOME

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Apply basic architectural terminologies in speech and writing	K3 in Cognitive domain	(MCQ's)
2	Appraise painting on the principles of design	K4 in Cognitive domain	Rubric/Viva
3	Appraise building form on the basis of solids, voids, shades and shadows	K4 in Cognitive domain	Rubric/Viva
4	Create forms using clay and pottery	P7 in psychomotor domain	Rubric/Viva
5	Participate in debates and group discussion	A3 in Affective domain	Rubric/Viva

### COURSE OBJECTIVES

1. Developing concepts
2. Understandings- sense of space
3. Meaning of walls (Enclosure)
4. Establishing boundaries
5. Introduction to natural materials
- 6.

**Project: Multiple projects to build Vocabulary of Architecture: Building Appraisal, enclosure without roof, concept (writing), Clay modelling and pottery, model and dwgs**

### COURSE CONTENT

#### COURSE OBJECTIVES

3. Linework, lettering, Autocad, google sketchup,
4. Composition in 2D and 3D
2. Introduction to technical drawing and print.

**Project: 2D composition in color media & 3D composition using Sketchup  
Geometrical Composition (2-D to 3-D composition and asymmetrical sculptures of geometric forms)**

### COURSE CONTENT

#### BARC1001 Architectural Design-I

##### Unit-I: Elements of Design

Introduction to elements of Design like point, line, shape, form, texture, color; their definitions and expression quality. Application of elements in architectural design through the use of line, plane, solid and voids and application of texture, color, etc. Exercises like logo, cover page, greeting card, mural design etc. to be considered. Application of design elements in 2D and 3D compositions. Exercises of 3D compositions to be introduced  
Model making workshop –Basic 3-D geometric forms

## **BARC1002 Building Construction-I**

### **Unit 1 Construction Process and Components:**

1. Introduction to various components of a load-bearing structure
2. Sub-structure: Introduction to various methods, materials, tools and equipment used in Excavation; Foundation and Plinth.
3. Superstructure: Walls; Floors; Roofs (flat, sloping and vaults); Openings in walls- lintels (flat, corbelled, arched); sills; staircase; sun-shading devices.

To be explained through Section of a building sheet work and site visit to a live site.

### **Unit 2 Building Materials:**

Mud, Earth, fly ash, burnt brick- Manufacture, Classification, preparation and usage- Sectional Model of Hut using Mud as primary material

## **BARC1003 Building Structures-I**

Creep, Fatigue, Stress Relaxation. Post elastic strain.

Understanding the applications of Different types of loading conditions and load combinations.

Introduction of beam element. Behavior of internal hinge.

Classifications of beams according to their loadings and support condition.

Application of loads on Beam. Support reactions.

Static equilibrium conditions, Determinate and Indeterminate structures.

Concepts and working principles of Different types of supports. How hinge supports, roller, fixed support works.

## **BARC1004 History of Architecture-I**

### **Ancient River Valley Civilizations**

Nile, Indus, Tigris and Euphrates Rivers (Mesopotamia), yellow River(Chinese)

## **BARC1005 Computer Application in Architecture-I**

### **MS Office**

MS Office - MS Word Create a document that can be used by previous versions of word, Saving Options.

Create a document -

Open a new document and start typing, Start a document from a template, Delete a document, Add a heading, Adjust the spaces between lines or Paragraphs, Insert a page break, Insert a picture or clip art, Insert or create a table, Headers, Footers, and Page numbers, Create a table of contents, Apply themes to Word documents, Add a cover page.

Read documents in Word - Read a document, Mark up a document, Find or look up words and phrases, Turn on or off - full screen reading view.

MS Office – MS Excel - Getting Started with Excel - Create a workbook, Enter data in a worksheet, Format a worksheet, Format numbers in a worksheet, Print a worksheet, Create an Excel table, Filter data by using an auto filter, Sort data by using an auto filter, Apply conditional formatting, Apply data validation, Create a formula, Use a function in a formula, Chart your data, Create a macro, Create a pivot table report, Activate and use an add-in

Keyboard shortcuts in Excel 2010 - Keyboard access to the ribbon, CTRL combination shortcut keys, Function keys, Other useful shortcut keys.

MS Office – MS Power point - Create a basic Power Point presentation -

Name and create a new presentation, Open a presentation, Save a presentation, Insert a new slide, Add, Rearrange and delete slides, Add text to a slide, Apply a template to your presentation, Apply a theme to add color and style to your presentation, Insert a picture or clip art and insert content or insert a screenshot, Add, Change, or Delete shapes, Create a smart art graphic, Add slide numbers, Page numbers, Date and time, Create a hyperlink, Deliver and distribute your presentation, View a slide show and View your speaker notes privately, while delivering a presentation on multiple monitors, Print out a presentation, Tips for creating an effective presentation

## **BARC1006 Architectural Graphics-I**

Measuring and drawing to scale the following: furniture items, rooms, doors and windows, etc.

### **FreeHand Drawing**

Basic rendering and drawing techniques to depict textures: Scribbling, stippling, shading, hatching, doodling. Rendering 3D objects, still life sketching

### **Orthographic Projections**

Introduction to orthographic projections - Planes of Projections, First angle projections, Drawing of lines, basic geometrical shapes in different positions, Projection of regular rectilinear and circular solids (prisms, pyramids, cones, cylinders,

spheres etc.) in different positions, construction of plan, elevation and section of 3D objects and projections in various positions.

**Surface Development**

Surface development of solids and sectional solids- Study of development of surfaces, drawing of unfolded surfaces of right solids like Cubes, Prisms, Cylinders; drawing the development of the lateral surface of a pyramid & Cone.

**BARC1007 Communication**

**English Grammar**

**English Grammar**

Simple Grammar – using appropriate words, filling of blanks, completing of sentences, active and passive voice, correcting mistakes in texts. Use of proverbs, metaphors and punctuation.

**Comprehension**

Reading and listening comprehension, to develop the ability to read and listen with understanding and draw reasoned conclusions. Art of notes taking from spoken and written English. Comprehension of lectures and speeches to locate key points.

\*Experts from humanities/English Department to be invited  
And personality development program

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.

**SUGGESTED BOOKS:**

6. IH. Morris, Geometrical Drawing for Art Students - Orient Longman, Madras, 2004..
7. Francis Ching, Architectural Graphics, Van Nostrand Rein Hold Company, New York, 1964..
8. N.D.Bhatt, Elementary Engineering Drawing (Plane and Solid Geometry), Charotar Publishing House, India.
9. Punmia P. C., “Strength of Materials & Mechanics of Structures”
10. Khurmi R. S., “Strength of Materials

<b>Module 4 ARMO1004</b>		<b>M4: Art and Architecture</b>	
<b>Contacts Hours</b>		<b>50 (2 Weeks)</b>	
<b>Assigned Credit</b>		<b>2</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC1001	Architectural Design-I	10	15
BARC1003	Building Structures-I	15	10
BARC1006	Architectural Graphics-I	25	15
BARC1005	Computer Application in Architecture-I	50	10

### COURSE OUTCOME

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Apply Elements of Design	K3 in Cognitive domain	Rubric/Viva
2	Create a 2D composition in color medium	K6 in Cognitive domain	Rubric/Viva
3	Create a 3D composition using Google Sketch up.	K6 in Cognitive domain	Rubric/Viva
4	Demonstrate better hand eye Coordination through line drawings using manual drafting	P5 in psychomotor domain	Rubric/Viva
5	Follow Gestalt theory of visual perception	A3 in Affective domain	Rubric/Viva

### COURSE OBJECTIVES

1. Scale, Properties w.r.t Human Dimensions(Users),Adult/Child(Gender)
2. Understanding of ergonomics – to design furniture
3. Structures till equilibrium, loads
4. Presentation using (CAD, Sketchup, Photoshop)
5. Sketching perspective and isometric

### Project: Shelter

### COURSE CONTENT

#### **BARC1001 Architectural Design-I**

##### **Unit-I: Design Aspects- Ergonomics**

Basic Ergonomics and anthropometrics, human body measurements, human functions and their implications for product and space requirements. Minimum and optimum areas for mono functions. User's data, Movement and circulation diagrams. Spatial interpretations – various activities and their relationship with spaces.

##### **Unit-II: Product Analysis**

Functional product analysis, user body dimensions, ease of use, comfort, material and aesthetics. Analysis of mechanical objects with movements – folding chair, tape dispenser, spectacles, compass, player, stapler, Pencil Sharpener with rotating handle, lock, wooden toys for kid, fountain pen, spray bottle etc. Redesigning product based on the findings

#### **BARC1003 Building Structures-I**

Cantilever beams, Deflection in Cantilever beams.

Concentrated loads. Analysis of support reactions for simply supported beams under concentrated loading.

Distributed loads. Analysis of support reactions for simply supported beams subjected to uniformly distributed loading.

. Solving problems for determining the support reaction values for beams subjected to combination of loading conditions.

#### **BARC1006 Architectural Graphics-I**

##### **Orthographic Projections**

Projection of regular rectilinear and circular solids (prisms, pyramids, cones, cylinders, spheres etc.) in different positions, construction of plan, elevation and section of 3D objects and projections in various positions.

#### **BARC1005 Computer Application in Architecture-I**

AutoCAD 2D 2017 – How to Open new file, sheet sets, Drawing tools

Sketch up 2016 – Tutorial on drawing 3d objects using sketchup

Adobe in Design, Presentation methods, preparing raw drawings for laser cutting machines



NOTE:	Internal and external exams shall be carried out by a Jury of Internal & External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.
	Site Visit- Religious Place, Monumental Scale or Human Scale.

## Semester 2 Codes

		<b>Assigned Credit</b>
BARC1009	Architectural Design-II	6
BARC1010	Building Construction-II	3
BARC1011	Building Structures-II	1
BARC1012	History of Architecture-II	1
BARC1013	Computer Application in Architecture-II	1
BARC1014	Architectural Graphics-II	2
BARC1015	Surveying and Levelling	1
BARC1016	Climatology	2
BARC1017	Building Services-I	1
BARC1018	Summer Internship-I	3

<b>Module 6 ARMO 1005</b>		<b>M6: Universal Design</b>	
<b>Contacts Hours</b>		<b>50 (2 Weeks)</b>	
<b>Assigned Credits</b>		<b>2</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC1009	Architectural Design-II	20	26
BARC1012	History of Architecture-II	50	10
BARC1017	Building Services-I	20	04
BARC1015	Surveying and Levelling	30	10

## COURSE OUTCOMES

Architectural Graduate will be able to:		Knowledge domain and level	Evaluation Method
1	Analyze architecture of early river civilizations	K4 in Cognitive domain	Rubric/Viva
2	Organize furniture layout for mono-cellular units such as kitchen, toilet, bedroom, living room	K6 in Cognitive domain	Rubric/Viva
3	Analyze human activities on the basis of space requirement	K6 in Cognitive domain	Rubric/Viva
4	Apply basic concepts of water supply for mono-cellular unit	K4 in Cognitive domain	MCQ's
5	Apply basic concepts of surveying and levelling in design of mono cellular units	K4 in Cognitive domain	MCQ's

## COURSE OBJECTIVES

1. Early river civilization
2. Brick
3. Anthropometry-mono cellular- kitchen, living room, bathroom
4. Services- water supply

**Project: Analysis of human activities on the basis of space requirement on 1:1 scale**

## COURSE CONTENT

### BARC1009 Architectural Design-II

#### Unit-I: Architectural Design Aspects

Basic anthropometrics, human functions and their implications for space requirements. Minimum and optimum areas for mono functions. User's data, Movement and circulation diagrams. Spatial interpretations – various activities and their relationship with spaces.

#### Unit-II: Floor Space Layout

Functional furniture layout, circulation, lighting and ventilation for spaces such as living/dining, kitchen, bedrooms, Architect's office, Doctor's clinic, Food parlor etc. Analysis of human activities on the basis of space requirement on 1:1 scale, chalk, new

#### Unit-III: Preliminary Architectural Design

Design of mono-cellular-unit/structure on a level plane, designing of simple activity spaces, designing of multiple but simple activity spaces involving primarily horizontal circulation

Note: The requirements pertaining to the handicapped and elderly people are to be addressed in design and detailing.

### BARC1012 History of Architecture-II

**Ancient Civilizations:** Aegean - With reference to cities in Aegean like Troy, Sparta, Mycenae

#### **Egyptian Civilization**

Egypt - Landscape and culture of Ancient Egypt- history - religious and funerary beliefs and practices - monumentality tomb architecture: evolution of the pyramid from the mastaba – Great Pyramid of Cheops, Gizeh etc. Temple architecture: mortuary temples and cult temples - Temple of Ammon Ra, Karnak, Khons - Temple of Abu Simbel (Rock Cut) etc. Mesopotamia - Urbanization in the fertile crescent - Sumerian, Babylonian, Assyrian and Persian culture, Evolution of city-states and their character, law and writing , theocracy and architecture - Ninveh, Khorsahbad, Marie, Babylon etc. Evolution of the ziggurat - Ziggurat of Ur, Urnamu etc., Evolution of the palaces - Palace of Sargon, Khorsabad - Palace at Persepolis.

**BARC1017 Building Services-I**

**Unit-I: Water Supply Requirements**

Introduction to Water Supply; Water Requirement for different building types; storage, Storage and Distribution of Water - Different methods of water distribution boosting water, gravity and pressure distribution by storage tanks of individual buildings. Potable Water Standards, Domestic water demand, capacity of overhead tanks and calculation of water consumption.

**Unit-II: Water Distribution Systems**

Water distribution networks. Cold and hot water distribution within the building. Specifications and sketches of various plumbing fittings for buildings. Uses of valves, taps, and their different types. Layout of water supply lines in a domestic building.

**BARC 1015 Surveying and Levelling**

Introduction of Surveying. Plans, maps. Horizontal and Vertical measurements. Type of instruments for linear and angular measurements. Chain surveying, Compass surveying, Theodolite, Tacheometry, Plane table surveying, Total stations, Dumpy level. Triangulation and traversing. Practical applications of surveying.

Leveling, methods for leveling, reciprocal leveling, Rise and fall method, Height of the instrument method. Contour lines. Contour maps and necessity and guidelines for drawing contour maps

NOTE:	Internal and external exams shall be carried out by a Jury of Internal & External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.
	Site Visit- Three to Four days educational trip to a different climatic zone.

<b>Module 7 ARMO 1006</b>		<b>M7: Moments</b>	
<b>Contacts Hours</b>		<b>50 (2 Weeks)</b>	
<b>Assigned Credits</b>		<b>2</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC1010	Building Construction-II	30	24
BARC1011	Building Structures-II	30	12
BARC1012	History of Architecture-II	50	10
BARC1013	Computer Application in Architecture-II	20	04

### COURSE OUTCOMES

Architectural Graduate will be able to:		Knowledge domain and level	Evaluation Method
1	Construct structural model based on truss	K6 in Cognitive domain	Rubric/Viva
2	Make models/sketches based on Roman History	K6 in Cognitive domain	Rubric/Viva
3	Make models/sketches based on Greek History	K6 in Cognitive domain	Rubric/Viva
4	Analyze a room using Structural kinetics	K4 in Cognitive domain	Rubric/Viva
5	Apply basic rendering in Vray	A2 in Affective domain	Rubric/Viva

### COURSE OBJECTIVES

1. Natural Form, Kinetic Sculpture based on structures
2. Models and MCQs on History of Architecture

**Project: turning torso, hands in motion-Model based on structures/history**

### COURSE CONTENT

Building Construction

#### BARC1010 Building Construction-II

##### Brick and Clay Products

BRICKS: Manufacturing, Composition, Sizes, Properties and Classification of bricks, Tests for bricks. Introduction of Brickworks: masonry bonding & ornamental bonding, which will focus on: (types of Brick bonds: English, Flemish & Stretcher bond for both 230 mm & 115 mm brick wall, detail brick layout at corners, junctions and brick columns. Applicable IS Codes for Bricks.

Load Bearing Structures using Modular units-Stabilized Earth, Brick, Stone etc.

#### BARC1012 History of Architecture-II

##### Unit-I: Greek Architecture

Classical orders and constituent elements of architecture - Column orders and the articulation of temples. Classification of temples, Geometry and symmetry of individual buildings and their relationship with others based on different organizing principles and conditions of site. Study of importance- Acropolis, Agora, Temples, Theatres, Tombs and House forms.

##### Unit-II: Roman Architecture

Introduction to building types to correspond the complex social functions and structure. Concrete and construction of vaults and domes. Uses of classical orders in surface articulation. Study of important forums, Temples, Basilicas, Theaters, Amphitheatres, Circuses, Tombs, Triumphal arches, palaces, houses and villas.

#### BARC1011 Building Structures-II

Introduction of Reinforced Cement Concrete.

Role of Mix Design in Structural Analysis.

Types of Cement and their uses.

How we choose types of cement in RCC and PCC construction.

Tests for Cement and concrete

Aggregate tests and size considerations

Workability of a mixture. Factors affecting Workability

IS Code: 456, Code norms and uses of tables as per load carrying capacity of structural elements.

Factor of safety in structural design. Distribution of load. Shear failure of Structures. How the dimension of elements varies with the load carrying capacity and material properties. RCC junctions

**BARC1013 Computer Application in Architecture-II**

**Google Sketch Up+ V-ray**

Google Sketchup 3D, Drawing & Measurement Tools, creation of geometrical shapes & forms, union and intersection of forms. Application of color& materials. Introduction to editing tools, modifying existing shapes and forms, 3D drawings with site and surroundings, sciography & rendering in 3D drawings. Concept of camera and walkthrough.

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.

<b>Module 8 ARMO 1007</b>		<b>M8: Context</b>	
<b>Contacts Hours</b>		<b>150 (6 Weeks)</b>	
<b>Assigned Credits</b>		<b>6</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC1009	Architectural Design-II	30	50
BARC1010	Building Construction-II	30	20
BARC1015	Surveying and Levelling	70	10
BARC1017	Building Services-I	40	16
BARC1011	Building Structures-II	35	10
BARC1014	Architectural Graphics-II	40	18
BARC1016	Climatology	50	26

### COURSE OUTCOMES

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Design a house with brick	K6 in Cognitive domain	MCQ's
2	Produce a measure drawings of a given building	K6 in Cognitive domain	Rubric/Viva
3	Adapt their design to climatic considerations	K6 in Cognitive domain	Rubric/Viva
4	Use surveying techniques and equipment to measure a building	K6 in Cognitive domain	Rubric/Viva
5	Organize and plan a study trip	A4 in Affective domain	Rubric/Viva

### COURSE OBJECTIVES

1. Understanding context w.r.t historic site.
2. Graphical representation of landscape and built form/space

**Project: Design a G+1 Residence in brick**

#### **BARC1009 Architectural Design-II**

Design of a G+1 residence in Brick. Focus will be on the construction details, site and context and their relationship to the built environment.

Introduction to element of site-planning and landscaping. Design of a group of buildings set in the context of the study with a focus on site and context. The design of the environment outside the building.

#### **Unit-I: Ecology & Ecosystem**

Concept of Ecology & Ecosystem, Resource analysis for various ecosystems and development imperatives (land, geology, soil, climate, water, vegetation) characteristics, exploitation, causative factors for degradation, analytical techniques.

#### **Unit-II: Environmental Pollution**

Definition, causes, effects, standard parameters and control measures of Air, Water, Soil, Noise, Marine, Thermal, Nuclear and Light pollution.

Causes, effects and control measures of urban and industrial waste.

Physical, Chemical and Biological transformation of pollutants.

**Study tour:**3-4 days study tour to a different climate zones to perform measured drawing/exhibition/photography/documentation report

#### **BARC1010 Building Construction-II**

Construction Details for Brick Residence (Excluding doors and windows) - Foundation, Plinth, Walls, columns, Beam, Slab, Projections, Flooring, cavity wall, corbel, cornice, sill, lintel, parapet, drip course etc. All water supply services.

Timber theory

#### **BARC1015 Surveying & Leveling**

##### **Unit-I: Plane Surveying and Theodolite**

Introduction to plane surveying, conventional tape measurement, electronic distance measurement

– Meridians, Azimuths and bearings – Theodolites – Temporary and permanent adjustment – Horizontal and Vertical angle measurements – Electronic total station.

### **Unit-II: Leveling and Contouring**

Differential leveling, Longitudinal & cross section leveling, Refraction & curvature correction, Reciprocal leveling -Tachometry – Stadia tachometry, tangential tachometry & substance tachometry- Contouring.

### **Unit-III: Calculation of Earthwork and GPS**

Area, volume calculation of earth work – Introduction to Global positioning system – GPS surveying methods.

### **Unit-IV: Curve Surveying**

Definitions, designation of curve, elements of simple curve - Settings of simple circular curve, Compound and reverse curve- Transition curve – Introduction to vertical curves.

### **Unit-V: Geodetic surveying**

Introduction to geodetic surveying, Triangulation surveying – Base line measurement & correction, Satellite station. Surveying adjustments – Principle of least square and adjustment of triangulation network.

## **BARC1017 Building Services-I**

### **Unit-I: Drainage Systems**

Basic principles of disposal of waste water from buildings. Systems of drainage – separate, combined and partially separate system, advantages and disadvantages of each system. Concept, design and detailing of rainwater harvesting systems. Study of sanitary fittings, washbasins, WC's, bathtubs, sink, urinals, bidets, flushing cistern, traps etc. Proper location and ventilation of traps, intercepting chambers and inspection chambers.

### **Unit-II: Sanitation- Sewerage**

Introduction, importance and purpose of sanitation, terminology and definitions; bacteria, invert, sewer, sewerage, refuse, collection and disposal of refuse. Man holes – drop manholes, manhole with intercepting trap, inspection chambers, self-cleansing velocity, drains on sloping sites, sub soil drainage, storm water disposal – catch basins, inlets, storm water regulators. Septic Tanks; Capacity calculations and Details of a Septic Tank, soak pit, soak well, design aspects, disposal of effluent. Systems of plumbing – single stack, one pipe, one pipe partially ventilated, two pipe disposal of waste water from buildings.

### **BARC1011 Building Structures-II**

Introduction of Reinforced Cement Concrete.

Role of Mix Design in Structural Analysis.

Types of Cement and their uses.

How we choose types of cement in RCC and PCC construction.

Tests for Cement and concrete

Aggregate tests and size considerations

## **BARC 1014 Architectural Graphics-II**

Aesthetics

Introduction to aesthetics and interpretation of its meaning, aesthetics (rasa) in artworks, definition of beauty, three basic parameters of judgment of art works (skill, originality & aesthetic quality), relation between art and life, application of aesthetic theories in visual arts

## **BARC1016 Climatology-I**

### **Unit – I Background:**

Club of Rome, “Limits of Growth”, The Brundtland Report (UN), An

Inconvenient Truth; these texts are to be read to understand the history of environmental degradation and the concepts that underlie a strategy towards sustainable habitat. The Changing Climate, Factors Responsible for Change, Global Warming, Ozone Depletion, etc.

Interrelation between natural and built environment: An Overview Mapping the ecology of settlements and buildings. Water and Waste cycles; energy demand for production, transportation, construction and operation of buildings; material consumption and natural resources Water: conservation, harvesting, recycling. Waste: minimizing, recycling, eliminate toxicity and management. Energy: conservation, renewable sources: wind, solar, geo-thermal, bio-fuels. Materials: minimizing, recycling, reducing energy content, life-cycle cost.

### **Unit-II Concept of Sustainable development**

Case Studies of traditional / vernacular buildings and settlements demonstrating relationship between climate, local material resources and settlement/ building forms The “natural” or landscape environment as an aspect of deliberate design. Case study illustrating traditional concepts of “garden”, “park”, relationship with river, lakes, drawn from different cultures. Analysis of contemporary city (case-study) and its challenges of environmental sustainability- Energy, water, waste, air quality, transportation vis-à-vis the integration of open space, water bodies and other natural systems into city form.

### **Unit-III Introduction to Climatology**



- a) Introduction to Climatology, Relation to Architecture, Macro and Micro Climate, Climatic Zones. Climatic data-parameters- relevance to design of built environment. Describing climate-climate summary chart, solar geometry- sun path diagram, heating and cooling periods. Psychometric charts.
- b) Thermal Comfort: Factors and Balance, Body's Mechanism of Heat Production and Loss, Methods of Heat Transfer, Comfort Scale, Effective Temperature, operative temperature, CET, Adaptive comfort.
- c) Heat transfer in Buildings: Sol Air Temperature, Solar Gain Factor, Thermal Quantities: Temperature, Heat, Heat Flow Rate Specific Heat, Conductance, Resistance, Surface Conductance, U value, Periodic Heat Flow, Time Lag & decrement factor, Effect of Different Materials, Effect of Multilayered Bodies - Insulation/Cavity (ECOTECT software may be used).  
Ventilation: Principles of Ventilation in Buildings.

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.

<b>Module 9 ARMO 1008</b>		<b>M9: Arboretum</b>	
<b>Contacts Hours</b>		<b>150(6 Weeks)</b>	
<b>Assigned Credits</b>		<b>6</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC1009	Architectural Design-II	45	80
BARC1010	Building Construction-II	40	22
BARC1011	Building Structures-II	35	08
BARC1017	Building Services-I	40	10
BARC1013	Computer Application in Architecture-II	20	04
BARC1016	Climatology	50	26

### COURSE OUTCOMES

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Design a house with timber	K6 in Cognitive domain	Rubric/Viva
2	Illustrate constructional details using timber and stone	K3 in Cognitive domain	Rubric/Viva
3	Confirm to Indian tradition, crafts and culture	A2 in Affective domain	Rubric/Viva
4	Produce digital rendering of residence	K6 in Cognitive domain	Rubric/Viva
5	Develop understanding of the environment and related issues	A4 in Affective domain	Rubric/Viva

### COURSE OBJECTIVES

1. Timber as material and joinery details
2. Basics of plan and elevation

**Project: Timber kiosk/tree house/G+1 residence in Timber with stone foundation**

#### **BARC1009 Architectural Design-II**

To Design a G+1 Building using timber as primary material, including doors, windows, flooring, walls, roof etc. in timber. Foundation can be done in stone.

#### **BARC1010 Building Construction-II**

##### **Unit-I: Timber and Wooden Products**

Timber: Definition, obtaining timber from nature (Selection, Felling and Transportation), Conversion of timber, Seasoning, Storage, Defects in timber and its preservation. Use of different types of wood in various parts of building. Industrial timber: veneers, plywood, fibreboard, etc. Bamboo: Basic concepts to use it as a building material. Applicable IS Codes for Timber.

##### **Unit II: Carpentry in workshop**

Timber Joinery; types of joints, lengthening and widening joints, common joints for various building and furniture works. Types, Classification, Usage & the application of various tools & machinery used in the process.

##### **Unit-III: Wooden Doors & Windows**

DOORS: Details of doors which will include Basic Doors (Battened /ledged/Braced door), Flush Doors (both solid & hollow core flush doors) & paneled Door (both single & double shutter panel doors – in timber, wire mesh & glazed panel door.)

WINDOWS: Types of window which will include Casement window, fully glazed window, Ventilator Simple & pivoted, Fixed Glass window, louvered window, corner and Bay window. Hardware related to wooden doors & windows. Design & Details of Casement window. Introduction to Carpentry tools & basic techniques of carpentry; sawing, cutting, planning, chiseling and finishing. Understanding of timber joinery in construction and basic wooden joints for doors, windows and furniture.

#### **BARC1011 Building Structures**

Introduction of Axial members and struts. Load distribution behavior of a column element. Failure of axial compression members in crushing and buckling. Behavior of RCC slabs. How the thickness of RCC slabs varies. One way and two way slabs. Drop slabs. Load distribution on a slab element

#### **BARC1017 Building Services-I (35 contact Periods)**

Water supply and sanitation details to be prepared for the timber building design.

## **BARC1013 Computer Application in Architecture-II**

### **Google Sketch Up+ V-ray**

Basics of Google Sketchup, Drawing & Measurement Tools, creation of geometrical shapes & forms, union and intersection of forms. Application of color& materials. Introduction to editing tools, modifying existing shapes and forms, 3D drawings with site and surroundings, sciography & rendering in 3D drawings. Concept of camera and walkthrough.

## **BARC 2016 Climatology**

### **Unit-IV Architectural Design as a Response to Climate**

Tool for Design in All climatic Conditions of India- Microclimatic Factors: Landform, topography, vegetation type and pattern, water bodies, street widths and orientation, ground character. Plan form and elements, building orientation, roof form, fenestration pattern, orientation and configuration, controls like shading devices, design of shading devices using available software's. Walls, choice of materials, roof materials, external colors and textures, layouts and internal finishes. (Ecotect and sketch up software may be used). Solar Passive Heating and Cooling Systems, roof pond, trombe wall, green house, air flow, stack effect, wind tower, earth air tunnel. Examples of Vernacular architecture of different climatic zones may be used to illustrate the above design processes.

### **Unit-V Energy**

Introduction to sustainability & Intelligent buildings Social, economic, environmental factors, ecological footprint, local and worldwide sustainable benchmarks, building ecosystem, building lifecycle Concept. Concept of intelligent buildings, energy efficiency, vertical transportation systems, communication systems, security systems, building automation and lighting systems.

Green Rating Systems-GRIHA, IGBC, LEED. Case studies on alternative sources of energy- Sustainable design Principles and strategies, site design, energy management, renewable energy, sustainable material selection, water management, indoor air quality, alternative energy, environmental systems, environmental assessment methods.

### **Unit VI Building Management Systems (BMS)**

Building Economics- Methods to control, monitor and optimize building services, eg., lighting, heating, security, CCTV and alarm systems, access control, audio-visual and entertainment systems, ventilation, filtration and climate control, etc., even time & attendance control and reporting (notably staff movement and availability).

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.

<b>Module 10 ARMO 1009</b>		<b>M10: Sciography</b>	
<b>Contacts Hours</b>		<b>50 (2 Weeks)</b>	
<b>Assigned Credits</b>		<b>2</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC1014	Architectural Graphics-II	60	22
BARC1009	Architectural Design-II	05	08
BARC1013	Computer Application in Architecture-II	60	20

### COURSE OUTCOME

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Apply knowledge of sciography in architectural drawings	K3 in Cognitive domain	Rubric/Viva
2	Create digital portfolio of academic work	K6 in Cognitive domain	Rubric/Viva
3	Do a Presentation of academic work	A3 in Affective domain	Rubric/Viva
4	Analyze light and shade through Charcoal study	K4 in Cognitive domain	Rubric/Viva
5	Construct a scale model of a timber residence	K6 in Cognitive domain	Rubric/Viva

### COURSE OBJECTIVES

1. To study and learn live sketching (building perspectives) **to produce illusions, 3D perspectives**
2. Understanding light, shades, shadows and depth 3D forms to **produce depth in depth in drawings.**
3. **To compile the semester work in a portfolio format**

### Project: Charcoal Studies

#### BARC1009 Architectural Design II

Produce short articles about own work. Introduction Importance of architectural research and writing. Concept Writing Language, Impersonal and formal language, Elements of style, Techniques. Visual Communication: Gestalt law of composition, using grids, typography, color, texture in composition of work in portfolio

#### BARC1014 Architectural Graphics-II

##### Unit-I: One Point Perspective

Purpose and use of perspectives, Anatomy of a perspective-cone of vision, station points, picture plane, eye level horizon line, ground line, vanishing point, etc, One point perspective of simple objects, combination of geometrical forms, One point perspective of Interiors, Perspective of simple household furniture items. Building exterior and interior perspectives.

##### Unit-II: Two Point Perspective

Introduction to two point perspective, perspective of simple blocks. Preparation of Perspective by innovative methods like approximate method, Diagonal Method, Grid Method etc. Other innovative methods of perspective presentation. Introduction to shortcut methods in perspective drawing. Freehand perspective drawing.

##### Unit-III: Sciography

Principles of drawing shade and shadow with point source of light and light from Sun. Drawing exercises of sciography of simple objects on ground, simple building element (projections like sunshade) on walls. Sciography of complex and curvilinear elements on ground and on walls.

#### BARC1013 Computer Application in Architecture-II

Illustrator, Indesign, Photoshop, MS Publisher to compose work portfolio digitally

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
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Semester 3 codes

Subject Code	Subject Name	Assigned Credits
BARC2001	Architectural Design-III	7
BARC2002	Building Construction-III	3
BARC2003	Building Structures-III	2
BARC2004	History of Architecture-III	2
BARC2005	Computer Application in Architecture-III	2
BARC2006	Sociology and Psychology	1
BARC2007	Building Services-II	1
BARC2018	Summer Internship-II	3

<b>Module 11 ARMO 2001</b>		<b>M11: Large Span</b>	
<b>Contacts Hours</b>		<b>50 (2 Weeks)</b>	
<b>Assigned Credits</b>		<b>2</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC2001	Architectural Design-III	15	26
BARC2002	Building Construction-III	05	04
BARC2003	Building Structures-III	40	20

### COURSE OUTCOMES

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Apply the basic concepts of concrete as a construction material	K3 in Cognitive domain	Rubric/Viva
2	Illustrate various structural systems	K3 in Cognitive domain	Rubric/Viva
3	Compare various properties of concrete through testing	K5 in Cognitive domain	Rubric/Viva
4	Make scale models of structural systems	K6 in Cognitive domain	Rubric/Viva
5	Justify the role of structural system in architectural design	A3 in Affective domain	Rubric/Viva

### COURSE OBJECTIVES

- 1.To understand aspects of large spans w.r.t Trusses
2. Anatomy of trusses, To acquaint the students to usage of building materials such as Timber and Hardware, Damp
3. Proofing Courses and Cement Concrete.
- 4.To familiarize the students with construction techniques for use of the above materials in building works. and joinery in carpentry
- 5.To familiarize the student with the basic building construction practices on site/yard.

### Project: Structural Systems/ Trusses

#### BARC2001 Architectural Design-III

Structural Systems in Architecture – Types form, Materials, Load transfer etc. Model making, truss design and analysis.

#### BARC2002 Building Construction-III

Types of wooden and steel trusses, related terminology and their applicability for various uses.

Detailing of timber/ steel trussed roofs, Truss lighting (North lighting), Tubular steel trusses, north light glazing, roof covering/sheets and drainage details of trussed roofs. Steel as construction material. Riveted, bolted and welded joints, steel foundation.

Cement Concrete: mixing, Curing, Water Cement Ration, Qualities and workability

Concrete using special materials: Lime, fiber reinforced, polymer, fly ash, silica fume concrete, Temperature control, water proof concrete etc. Test for concrete to be performed in concrete testing lab

#### BARC2003 Building Structures-III

##### Trusses

Elastic Theorum, Roof Trusses - Calculation of dead load, live load, wind load and earthquake load - Design of Joints – supports - members for pitched roof truss and purlins, IS codes for steel

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
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<b>Module 12 ARMO 2002</b>		<b>M12: Sociology</b>	
<b>Contacts Hours</b>		<b>50(2 Weeks)</b>	
<b>Assigned Credits</b>		<b>2</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC2001	Architectural Design-III	10	15
BARC2006	Sociology and Psychology	100	30
BARC2003	Building Structures-III	10	05

### COURSE OUTCOMES

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Analyze social behavior changes in an urban village	K4 in Cognitive domain	Rubric/Viva
2	Organize social field surveys	K6 in Cognitive domain	Rubric/Viva
3	Create art work based on social issues	K6 in Cognitive domain	Rubric/Viva
4	Predict attitude and social behavior	K5 in Cognitive domain	Rubric/Viva
5	Experience team work and social behavior patterns	A5 in Affective domain	Rubric/Viva

### COURSE OBJECTIVES

1. Depicting expression, context, spatial via built form and materials
2. Relation between history and technology

**Project: Artwork based on social issues (Murals, Collage, wall painting, poster, field survey)**

#### BARC2001 Architectural Design-III

User oriented design, understanding client behavior levels, Field surveys, questionnaire preparation, poster making on social issues. Conduct Capacity building in a low income/rural settlement. Anova & SPSS

#### Art studio

Develop a hands on approach, skills of working with different materials and the ability to choose an appropriate material as and when required for presentation or design purposes. Working with model making materials like thermocol, paper, wire etc. Basic workshop techniques for carpentry and joinery, sheet metal work, fabrication and foundry as an extension to Building Construction course.

#### BARC2006 Sociology & Psychology

Nature, scope and utility of Sociology, relation between Sociology and society. Human Development Index, Essential elements of society, bio-social and socio-cultural systems. Rural and urban communities and their characteristics. Origin, growth and influence of cities. Definition of urbanization – patterns of life and influence of urbanization on rural life, urbanization process in India.

Migration and its impact on urbanization, social problems of urbanization – problems relating to public health, public transport and public housing, sociological understanding of slums. Social surveys and Social research – principles of social research, scope of research, units of study, choice of research topics, sources of information, literature review – official and unofficial documents, library references, publication etc., Field survey – adoption of suitable techniques in field research viz., Questionnaires, interview, case study etc., analysis and classification of data.

#### BARC2003 Building Structure-III

Indian Standard codes for different types of loads, Introduction of foundation engineering, Soil-foundation relationship, Indian standard guidelines in different types of foundations.

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
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Module 13 <b>ARMO 2003</b>		<b>M13 : PAVILION</b>	
Contacts Hours		<b>150(6 Weeks)</b>	
<b>Assigned Credits</b>		<b>6</b>	
Subject Code	Subject Name	Max Marks	Contact Hours
BARC2001	Architectural Design-III	25	50
BARC2002	Building Construction-III	35	20
BARC2003	Building Structures-III	50	20
BARC2004	History of Architecture-III	50	30
BARC2005	Computer Application in Architecture-III	25	15
BARC2007	Building Services-II	65	25

### COURSE OUTCOMES

Architectural Graduate will be able to:		Knowledge domain and level	Evaluation Method
1	Apply basic concepts of electrical and lighting services	K3 in Cognitive domain	Rubric/Viva
2	Apply basic concepts of firefighting services	K3 in Cognitive domain	Rubric/Viva
3	Apply basic concepts of lift and escalators in a multipurpose halls	K3 in Cognitive domain	Rubric/Viva
4	Illustrate early Christian to gothic architectural history	K3 in Cognitive domain	Rubric/Viva
5	Create multipurpose hall on the basis of structural systems	K6 in Cognitive domain	Rubric/Viva

### **BARC2001 Architectural Design-III**

#### **BARC2001 Architectural Design-III**

Architectural Design Process- Predesign, Site Analysis and Concept. Design of a Large-span multipurpose hall with incorporation of building services. Preparation of Design brief, performing case study, detailed drawing of foundation and cladding. 3d Model of Skin section and cladding details or be prepared

#### **BARC2004 History of Architecture-III**

##### **Early Christian Architecture & Byzantine Architecture**

Development of early church and Roman basilica. Interiors of churches and the articulation of interiors to create spiritualized space. Study of Italian basilicas and churches. Centrality and interiors of both cross domed and cross in square plan churches. Study of Interior and Exterior of churches. Construction of domes over polygonal compartments through the use of pendentives.

##### **Romanesque Architecture**

Massiveness and verticality of medieval churches combination of five towered structures and longitudinal basilica. Gradual integration of tower from early to later examples. Integration of centralized and longitudinal plans. Articulation of external wall like arcaded interiors resulting in dematerialization of exterior. Study of important cathedrals and churches from Italy and France.

##### **Gothic Architecture**

Continued integration of centralized and longitudinal plans. Spatial and formal integration of Romanesque churches. Integration of wall and vault. Ribbed vault and the dissolution external wall to allow light. Sensitivity to light and use of stained glass for mysterious interiors. Need and development of different external buttressing. Study of important cathedrals and churches in France.

#### **BARC2007 Building services II**

##### **Unit 1 Electrical**

**Introduction** –Terminology and architectural symbols (as per NBC/NEC) for electric installations in buildings. Need to generate and save electricity, transmission and distribution of electricity (single and three phases), procuring service connection. Familiarization to various lighting accessories, wires and cables, metering, distribution panels / boards etc. for single and three phase supply. Guidelines for installation of fittings.



### **Design of simple electrical circuits –**

Introduction to simple light and fan circuits. System of connection of appliances and accessories e.g. series and parallel connection, joint box system, looping-in system.

### **Systems of wiring –**

Basic considerations. Various types of internal wiring systems e.g. cleat, casing and capping, batten and conduit (surface & concealed).

### **Protection of electrical installation and human life –**

Basic considerations. Protection against excess current, short circuit earth fault and protection against electric shock.

Introduction to various types of protection devices e.g. switches, fuses and circuit breakers.

Need for earthing of domestic fittings and appliances, earthing and its relation with soil resistivity, earth electrodes, earth wires. Load assessment and selection of appropriate cross section of the conductor.

## **Unit 2 FIRE PROTECTION**

**Introduction** Causes and spread of fire. Fire triangle/tetrahedron. Classes of fire.

Combustibility of materials and fire resistance. Building Plans, Drawings, and Schematics.

### **Fire Detection & Alarm Systems**

Fire Detection Equipments - Heat and Smoke sensors. Fire Alarm Systems.

### **Fire Fighting & Extinguishing Techniques**

First stage fire fighting equipment, Ladders, Snorkel Ladder. Fire fighting pump and water storage, Hose and hose fittings, Dry and wet risers, Automatic sprinklers. Fire Extinguishers - Portable fire extinguisher and other fire fighting equipments. Means of escape, Fire escape, Fire doors, and Water curtains.

### **Unit-III: Lifts & Escalators**

Brief history-types of Elevators like traction, Hydraulic etc., Double-decker, sky lobby, lift lobby, lift interiors etc., Definition and components of Elevator in a building: environmental considerations i.e., location in building, serving floors, grouping, size, shape of passenger car, door arrangement etc.,

Service requirements: Quality of service, quantity of service, time, passenger handling capacity, space and physical requirements, machine room spaces and their typical layout.

Escalators – Definition, Application, Capacity, Location and Arrangement in buildings. Space requirement, Conveyor belts-movement of passengers and goods.

## **BARC2002 Building Construction-III**

### **Construction Details**

Column, beams, slabs, RCC foundations, retaining walls, basic reinforcement details, DPC, staircase, expansion joints in RCC, introduction to folded plate and form active structures

### **Wall Finishing Materials**

Introduction to internal & external wall finishing materials, their properties, use and methods of application. Types of mortar, plasters (smooth, rough, textured, grit-wash), cladding etc. Construction Details of external stone cladding & internal wooden panelling.

## **BARC2003 Building Structure-III**

The type of foundations depending on the factors. Types of foundations varies depending on several factors. Structural behavior of Piles, raft, isolated, combined and stripped footing, well foundation. Friction and end bearing piles, under-reamed piles. Role of water table and how the soil properties changes accordingly and how the structural detailing of Piles varies according to that.

## **BARC2005 Computer Application in Architecture-III**

### **Revit**

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.

## References

### Sl.No Details

1. "Structural Systems in Architecture", Ahmet Hadrevic, Book Serj Publishing, South Karolina.
2. "Structure System" by Heinoengel,
3. Structural System for Tall Buildings, CTBUH, McGraw-Hill, Inc.
4. Sir Banister Fletcher, A History of Architecture, University of London, The AntholonePress, 1996
5. A History of Architecture - Setting and Rituals , Spiro Kostof -, Oxford UniversityPress, London, 1985
6. History of World Architecture, by Pier Luigi Nervi, General Editor - Series, Harry N.Abrams, Inc.Pub., New York, 1972
7. Understanding Architecture: Its elements, history and meaning; by Leland M Roth; Craftsman House; 1994
8. History of World Architecture by .Lloyd and H.W.Muller, - Series, Faber and Faber Ltd., London,
9. National Building Code of India.
10. National Electrical Code.
11. Electrical Design estimating and costing, by Raina K.B. & Bhattacharya S.K; New Age International (P) Limited, New Delhi, 2004.
12. Handbook of Lighting Design by Rudiger Ganslandt & Harald Hofmann, Druckhaus Maack, Lüdenscheid, 1992.
13. Interior Lighting Design - A Student's Guide. Kevin Kelly & Kevin O'Connell,
14. Mechanical and Electrical Equipment for Buildings, B. Stein and J. Reynolds, 10th Edition, 2005, Wiley & Sons Inc
15. The Building Systems Integration Handbook, R Rush, 1991, American Institute of Architects

<b>Module 14 ARMO 2004</b>		<b>M14: RCC</b>	
<b>Contacts Hours</b>		<b>150 (6 Weeks)</b>	
<b>Assigned Credits</b>		<b>6</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC2001	Architectural Design-III	35	60
BARC2002	Building Construction-III	60	50
BARC2004	History of Architecture-III	50	20
BARC2007	Building Services-II	35	10
BARC2005	Computer Application in Architecture-III	30	10

### COURSE OUTCOMES

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Illustrate Reinforced Cement Concrete construction techniques	K3 in Cognitive domain	Rubric/Viva
2	Apply Reinforced Cement Concrete structural analysis to a residence	K3 in Cognitive domain	Rubric/Viva
3	Design institutional building for children with RCC	K6 in Cognitive domain	Rubric/Viva
4	Illustrate architectural historical concepts from renaissance period to rococo period	K3 in Cognitive domain	Rubric/Viva
5	Apply basic concepts of soil mechanics	K3 in Cognitive domain	Rubric/Viva

### COURSE OBJECTIVES

1.2.

**Project: institutional, public building, Kidzania**

#### **BARC2001 Architectural Design-III**

##### **Building By Laws and Regulations**

Introduction to Building Bye Laws Introduction to building bye laws and regulation, Need and relevance, General definitions such as building height, building line, FAR, Ground Coverage, Set Back Line. Role of various statutory bodies governing building works like development authorities, municipal corporations etc. Introduction to Master Plan and understanding various land uses and related terminology. Development Authority Familiarizing with Building Bye-laws through NBC & Local Development Authority, State Housing board, etc. Interpretation of the Bye Laws applicable to residence in plotted developments, Group Housings, Commercial Buildings, Educational Buildings and other Public Institutions. Other statutory controlling authorities e.g. Water, Electricity, Fire, Airport, Archaeology BIS Codes Introduction to various BIS codes in building industry

##### **Site Planning**

Introduction to building types and Density typology, Key plan, depicting context and site surrounding, building access, parking regulations as per NBC, special considerations for differently abled people in site. Showing site circulation-vehicular and pedestrian. Hardscape and Softscape. ROW, road width, types of open spaces, street and road typology  
Theme Based Design

#### **BARC2002 Building Construction-III**

##### **Unit-I: Introduction to RCC and Building Components**

Introduction to RCC; Types, Mixing, Curing, Water Cement Ratio, Properties and Workability. Use of RCC in buildings. Relevant IS Codes for RCC works and tests. RCC Admixtures. Introduction to RCC Components of a Building; Foundation, Columns, Beams, Walls, Slab etc; Types of RCC Foundations, related terminology & details.

##### **Unit-II: Staircase**

Introduction to Staircase; its definition and related terminology. Types of Staircases, construction methods of – Masonry staircase, Timber staircase, RCC staircase, Steel Staircase and composite staircase. Study of fire escape staircase in view of building materials & construction technology.

##### **Unit-III: Building Components & Details**

Typical Building Sections of a Two Storied load bearing brick masonry and RCC framed building illustrating basic building components together with special features like toilet, staircase and DPC details.

#### **BARC2004History of Architecture-III**

##### **Unit-I: Renaissance & Baroque Architecture**

Background and influences on Renaissance Architecture. Characteristics of Renaissance Architecture in general. Eg: St Andrea, Mantua and Palazzo Rucellai by Leon Alberti, Villa Rotunda (Capra) by Palladio, (New) St Peter's Rome by Michelangelo and others, St Paul's London by Sir Christopher Wren. General characteristics of Baroque. Eg: St Peter's Piazza by Bernini.

**Unit-II: Modern Movement in Europe**

Transitional Period – A brief account of the situation before the changeover to Modern architecture in Europe. Palladian Revival in Britain, Greek revival and Gothic Revival Eg: Chiswick House, London, Mereworth castle, Kent, St Pancras Church, London, West Minister Palace, London, Arc de Triomphe, Paris. Impact of Industrial Revolution in Europe – The Social, economic and political changes effected, new requirements of the society, new materials and technological developments.

**Unit-III: Modern Architecture in America**

The Chicago School – works of Louis Sullivan, Early Industrial buildings, Contributions of Bauhaus, De Stijl movement, Italian Futurism, Art Noueavau movement and Arts and Crafts Movement to Modern Architecture. Eg: WainWright Building, St Louis, Guaranty Building, Buffalo, Crystal Palace, London. Bauhaus school at Dessau, Schroder house by Rietveld, Casa Mila, Casa Batlo, Sagrada Familia, Tassel House, Brussels, Paris Metro Station Entrance, Red house, Kent.

**BARC2007 Building Services- II**

**HVAC Services**

Need for mechanical ventilation in buildings. Rate of ventilation for different occupancies. Methods and equipment employed for mechanical ventilation in buildings. Brief introduction to psychometric process, air cycle and refrigeration cycle. Summer and winter air-conditioning, calculation of air conditioning loads, Zoning: purpose and advantages. Air-distribution systems: Ducts and duct systems. Air-outlets Air-conditioning methods and equipment: window units, split units and central Air conditioning systems. Location of air-conditioning equipment in buildings. Architectural requirement of various equipment.

**BARC2005 Computer Application in Architecture-III**

**V-Ray in Revit**

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<b>Module 15 ARMO 2005</b>		<b>M15 : Render/origami</b>	
<b>Contacts Hours</b>		<b>50 (2 Weeks)</b>	
<b>Assigned Credits</b>		<b>2</b>	
Subject Code	Subject Name	Max Marks	Contact Hours
BARC2001	Architectural Design-III	15	30
BARC2005	Computer Application in Architecture-III	45	20

### COURSE OUTCOMES

Architectural Graduate will be able to:		Knowledge domain and level	Evaluation Method
1	Analyzing and designing of new and complex origami.		Rubric/Viva
2	Understanding and analysis of Rigidity theory and Tensegrity.		Rubric/Viva
3	Generate model to understand fold and joint in origami.		Rubric/Viva
4	Making of multi-dimensional model using grasshopper.		Rubric/Viva
5	To develop the ability to move between digital representations and physical constructions.		Rubric/Viva

#### BARC2001 Architectural Design-III

**Origami intro:** Origami alphabet, higher dimensions

**Universality:** Terminology history, practical strip folding, pseudo polynomial bounds, seam placement, hide gadget via simple folds.

**Simple folds:** Metal/wood/plastic motivation, definition, examples, linear-time algorithm, extra creases

**Single-vertex crease patterns:** Linear-time algorithm, local foldability examples, T-shirt folding, higher dimensions, why flat foldability.

**Efficient origami design:** Uniaxial, TreeMaker and Origamizer in practice, box-pleating tree method, tree method triangulation, universal molecule, gift wrapping, checkerboard gadgets, Origamizer software vs. mathematics, vertex/edge tucking molecules, Voronoi diagrams.

**Artistic origami design:** Jason Ku designs, other materials (dollars, cardboard, hydro, metal, polypropylene), tessellations, Tess, connected cranes, modular origami, business card cubes.

Architectural Origami: Origamizer, Freeform Origami, Rigid Origami Simulator.

**Universal hinge patterns:** Box-pleating history, maze-folding prints.

NP-hardness: Simple foldability, crease pattern flat foldability.

**Fold and one cut:** Software, scissor vs. mathematical cuts, tree folding, density, examples, how many disks, comparison to tree method, continuous flattening.

Pleat folding: Triangulated hypars, smoothness, normals, mathematical vs. real paper, pleat folding algorithms, hyper folding.

**Folding motions:** Trouble with holes.

Linkages to sign your name: Sliding joints, contraparallelogram bracing, higher dimensions, semi-algebraic sets, splines. Geometric construction: Straight edge and compass, origami axioms, angle trisection, cube doubling.

**Rigidity theory:** Pebble algorithms, rigid component decomposition, body-and-bar framework, angular rigidity, 5-connected double bananas.

**Tensegrities:** Dot products, springs, software, sculpture.

**Locked linkages:** Why expansiveness, energy algorithm correctness, pointed pseudotriangulations (combinatorics, rigidity, universality, expansiveness, extremeness), linear equilateral trees can't lock, unfolding 4D chains.

**Hinged dissections:** Animations, polyform inductive construction, rectangle to rectangle, furniture, pseudopolynomial construction, 3D, Dehn invariant.

**Polyhedron unfolding:** Handles, holes, ridge trees; sun unfolding; zipper unfolding; more unfoldable **polyhedra**; NP-completeness of edge unfolding; band unfolding; continuous blooming.

Polyhedron unfolding: Topologically convex vertex-unfoldable polyhedron, unfolding orthogonal polyhedra with quadratic refinement.

**Polyhedron folding:** Pita forms, D-forms, seam forms, convex hull and crease properties, rolling belts, Burago-Zalgaller folding into nonconvex polyhedra.

Polyhedron refolding: Fractal unfolding, three boxes, flat boxes.

**3D linkage folding:** ribosomes, HP protein folding NP-hardness, flattening is strongly NP-hard, flips, flipturns, deflations, pops, popturns.

### **BARC2005 Computer Application in Architecture-III**

#### **Using and Exploring 3D Models**

Specify 3D views, Define a 3D view with a camera, Create preview animations, Create motion path animations, Creating a simple 3D mesh, Editing faces and edges, Creating mesh surfaces, Converting meshes to solids, Editing surfaces

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References

Sem 4 codes

Subject Code	Subject Name	Assigned Credits
BARC2009	Architectural Design-IV	7
BARC2010	Building Construction-IV	3
BARC2011	Building Structures-IV	1
BARC2012	History of Architecture-IV	2
BARC2013	Computer Application in Architecture-IV	1
BARC2014	Architectural Graphics-III	1
BARC2015	Building Services-III	2
BARC2016	Estimation and Costing-I	1
BARC2008	Winter Internship-I	2

<b>Module 16 ARMO 2006</b>		<b>M16: Vernacular</b>	
<b>Contacts Hours</b>		<b>50 (2 Weeks)</b>	
<b>Assigned Credits</b>		<b>2</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC2009	Architectural Design-IV	15	25
BARC2012	History of Architecture-IV	10	10
BARC2015	Building Services-III	40	15

### COURSE OUTCOMES

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Analyze concepts of vernacular architecture in different regions of India	K4 in Cognitive domain	Rubric/Viva
2	Apply basic principles of acoustics in built environment	K3 in Cognitive domain	Rubric/Viva
3	Display professional commitment to ethical practice on every day basis	A5 in Affective domain	Rubric/Viva
4	Make scale models of various styles of vernacular architecture in groups	P5 in psychomotor domain	Rubric/Viva
5	Illustrate basic application of vernacular architecture in contemporary scenario	K3 in Cognitive domain	Rubric/Viva

### COURSE OBJECTIVES

1. Building services/acoustics as prerequisite
2. Human Values and professional ethics
3. Vernacular architecture in India-Sheets models and analysis

### Project: Analysis of Vernacular Architecture of a Unique Climatic Zone in India

#### BARC2009 Architectural Design-IV

Elements of Vernacular Architecture- locality, context, water, light ventilation, wind, temperature, availability of material, skills and construction techniques. Study and analysis of vernacular architecture of various regions and climatic zones in India on the basis of given parameters.

Study of vernacular architecture, emerging out of the traditional way of life of the people in a given climatic context and region. Understanding how the social and physical environment, climate of the place, materials and methods of construction impact vernacular architecture.

Works of Laurie baker etc.

#### BARC2012 History of Architecture-IV

History of Indian Vernacular Architecture – Documentaries etc.

#### BARC2015 Building Services III

##### Architectural Acoustic

Introduction to the study of acoustics – nature of sound, basic terminology – frequency, pitch, tone, sound pressure, sound intensity, decibel scale, loudness, threshold of audibility and pain, masking, sound and distance – inverse square law. Behavior of sound in enclosed spaces. Absorption of sound, sound absorption coefficient, reverberation, reverberation time calculation, use of Sabine's and Eyring's formulae, sound absorbers, porous materials, panel or membrane absorbers and cavity or Holmboltz resonators, role of functional absorbers. Absorption coefficients of indigenous acoustical materials, use of IS code 2526-1963.

Material- Internal finishing and details.

Books: Aishwarya Tipnis, Vernacular Traditions: contemporary architecture, The Energy and Resources Institute (TERI), 01-Jan-2012

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
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<b>Module 17 ARMO 2007</b>		<b>M17: Steel</b>	
<b>Contacts Hours</b>		<b>50 (2 Weeks)</b>	
<b>Assigned Credits</b>		<b>2</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC2009	Architectural Design-IV	10	20
BARC2010	Building Construction-IV	20	10
BARC2011	Building Structures-IV	35	15
BARC2013	Computer Application in Architecture-IV	25	05

### COURSE OUTCOMES

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Analyze structural design of steel buildings	K4 in Cognitive domain	Rubric/Viva
2	Apply basic concepts of steel as a construction material	K3 in Cognitive domain	Rubric/Viva
3	Design an abstract (conceptual) form using steel as a building material	K6 in Cognitive domain	Rubric/Viva
4	Illustrate steel construction details	K3 in Cognitive domain	Rubric/Viva
5	Make a scale 3 dimensional model with steel	P5 in psychomotor domain	Rubric/Viva

### COURSE OBJECTIVES

1. Create an Abstract form using steel as a material – innovative 3D form
2. All the construction details to be designed in steel – cladding, foundation, anchor, counterweights
3. Apply a function to the abstract form in human scale
4. Result in terms of model with humans and constructing details in steel, INSDAG brief

**Project:** Steel Abstract form (Library, Auditorium)

Sheets / Drawing in one of the methods below

Deliverables- Design based and Report on Pre- fabrication/ Pre- casting theories.

#### **BARC2009 Architectural Design-IV**

Design in Steel, Case studies of steel buildings, IS Codes of steel construction

#### **BARC2010 Building Construction-IV**

##### **Unit 1: Structural Steel Works**

Typical metal joinery - Mechanical (riveted & bolted), Soldering and Brazing and welding.

Detailing of structural steel work – Beam to Column joint, Beam to Beam joint, Column Splice, Column Base, Roof Truss to Column joint. IS codes for steel members

##### **Unit 2: Doors & Windows (Metals)**

Mild steel L and Z section Pressed steel section. Steel windows, their types, various sections and elements used in construction / fabrication. Relevant IS Codes for steel doors & windows.

##### **Unit 3: Shutters (Operational Mechanisms)**

Complete understanding of operational mechanism (automatic and manual) of variety of Rolling shutters and Collapsible shutters.

##### **Unit 4-Industrial Construction**

Structural Steel Works: Portal Frame Construction, north-light truss and lattice girder roof with various roof coverings.

## **BARC2011Building Structures-IV**

Introduction of Steel structures. Types and grades of steels and types of steel members. Introduction of IS Code: 800. Steel structure components and joints. Safety measures for steel elements. How the structural assembly of steel structures differs for other structures. Applications of bolts, welds, steel plates

BARC 2013Computer Application in Architecture-III

### **Unit I- Mastering in Revit Architecture**

Introduction, Modifying the view, Common tasks, System options, File locations, Spelling options, Settings,

### **Unit-2 Building the Model and Modify**

Walls, Doors, Windows, Components, Architectural columns, Roofs, Ceilings, Floors, Openings, Model text, Model lines, Compound structure, Sloped surfaces, Stairs, Ramps, Railings, Adding and modify curtain wall. Attaching wall to roof, Modifying the entry deck, Modifying the roofs.

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.

<b>Module 18 ARMO 2008</b>		<b>M18: Decoding Patterns</b>	
<b>Contacts Hours</b>		<b>150 (6 Weeks)</b>	
<b>Assigned Credits</b>		<b>6</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC2009	Architectural Design-IV	35	60
BARC2010	Building Construction-IV	40	20
BARC2011	Building Structures-IV	65	20
BARC2012	History of Architecture-IV	45	20
BARC2014	Architectural Graphics-III	100	30

### COURSE OUTCOMES

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Analyze patterns in built form and nature	K4 in Cognitive domain	Rubric/Viva
2	Illustrate architectural history from Vedic to Dravidian period	K3 in Cognitive domain	Rubric/Viva
3	Organize and plan a study trip	A4 in Affective domain	Rubric/Viva
4	Create an art installation based on patterns (art thesis)	K6 in Cognitive domain	Rubric/Viva
5	Illustrate construction details related to non-ferrous metals, GRC , UPVC, Plastics rubbers and asbestos	K3 in Cognitive domain	Rubric/Viva

### COURSE OBJECTIVES

1. Understanding patterns from city core to a room
2. Relation of space and form in different scales
3. Art thesis- report on the process of deriving the art form, inspiration, creativity, installation process etc. 2D patterns and explanation, study of architectural pattern, deriving a 3D pattern, 3D Art Installation
4. Study Tour on Climate responsive architecture

### Project: Art Thesis/Mural

#### Issue/context based design study (deep dive studios)

#### BARC2009 Architectural Design-IV

##### Study of Hierarchy

**In interiors, in building, in street in neighborhood.** Figure ground, site analysis, site inventory. Study of the built environment and to develop a basic understanding of space and form. Looking at the immediate built environment and understanding its fundamental components and their impact on the surroundings. Analysis of Architects work and deciphering pattern in their work  
Drawing techniques and methods.

##### Deep dive studios

Systems approach/ scientific approach to introduce significance of theoretical and philosophical dimensions in architecture.

- Objective knowledge vs. Subjective Ideas,
- Distinction of & relationship between Science and Philosophy
- Rational process and Empirical process
- Rules, Formulas, Principles and Theories.
- Accuracy vs. Indeterminacy in Design
- Analytic approach vs. Mimetic approach
- Old Architectural treatises in Europe and India

##### Study tour

City Core

### **BARC2010 Building Construction-IV**

Building materials- Rubber, GRC, Ferro-cement, UPVC, Non-Ferrous Metals, Plastics, Asbestos, water proofing materials

### **BARC2012 History of Architecture-IV**

#### **Unit-I: Indus Valley Civilization and Vedic Period**

Characteristic features of town planning and architecture of Indus Valley Civilization; City of Harappa, Mohanjodaro and Lothal, layout of domestic units & public facilities, building materials and construction technologies used.

The Vedic civilization; Layouts of Aryan Village, type of dwellings and building materials.

#### **Unit-II: Jain & Buddhist Architecture**

Evolution of Jain & Buddhist Architecture; Development by Ashoka, Hinayan & Mahayan styles of Buddhist architecture, Stupas, Monolithic Pillars, Rock cut architecture (Chaityas & Viharas), Monasteries, Rock edicts, Gandhar style.

#### **Unit-III: Evolution of Temple Architecture**

Beginning of Hindu Temple Architecture under the Guptas and Chalukyas.

Architectural features of buildings/temples, construction technology, building materials of Chalukyan style; Early Chalukyan Architecture, Later Chalukyan Architecture. Evolution at Badami, Aihole and Pattadakal, examples such as Ladh Khan, Durga, Maleguti, Papanath Temple.

#### **Unit-IV: Developments in Temple Architecture**

Architectural features of buildings/temples, construction technology, building materials of Indo Aryan Style; Orissa Style – Kalinga Style, Khajuraho Style, Gujrat & Rajasthan Style. Dravidian Style; Pallava Style, Chola Style, Pandya Style, Vijayanagar Style. Late Pandya Style or Madura Style.

### **BARC2014 Architectural Graphics-III**

**Unit 1 History of Indian Art** Lectures on outline History of Indian Art, from earliest times to Mauryan Period. Gupta Period to Mughal Period, Company Style (British Period).

Renaissance in Indian art i.e. 19th century, Post-independence art of India. Contemporary arts and artist in India, Works of AbanindraNath Tagore, Nand Lal Bose, Jamini Roy, Amrita Sher Gill, M.F. Hussain, Satish Gujral and S.H.Raza

Unit 2

**Design of various objects.** Designing of gate, grill, railing, jaali, in suitable materials.

### **BARC2011 Building Structures-IV**

#### **Principals of Steel Structure Design**

Members under combined stresses: Beams and Columns

Book: Timeless way of Building and Pattern language by Christopher Alexander

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.

<b>Module 19 ARMO 2009</b>		<b>M19: Climate Responsive Architecture</b>	
<b>Contacts Hours</b>		<b>150 (6 Weeks)</b>	
<b>Assigned Credits</b>		<b>6</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC2009	Architectural Design-IV	40	80
BARC2010	Building Construction-IV	35	20
BARC2012	History of Architecture-IV	45	20
BARC2015	Building Services-III	60	30

### COURSE OUTCOMES

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Internalize energy conscious concepts in built environments	A5 in Affective domain	Rubric/Viva
2	Design of hostel building based on principles of sustainability	K6 in Cognitive domain	Rubric/Viva
3	Create working drawings of a hostel building	K6 in Cognitive domain	Rubric/Viva
4	Construct and simulate a scale model of hostel building	P5 in psychomotor domain	Rubric/Viva
5	Illustrate Indian architectural history from Islamic to Colonial period	K3 in Cognitive domain	Rubric/Viva

### COURSE OBJECTIVES

1. To produce a set of working drawing and GFCs of project
2. Indian History of Islamic Architecture
3. Trip report
4. Climatology
5. Environmental Lab

**Project:** working drawing and GFCs of Hostel Building

#### **BARC2009 Architectural Design-IV**

Design of climate responsive hostel building, using passive cooling techniques and strategies taught during the module.

#### **BARC2010 Building Construction-IV**

##### **Unit-I: Expansion Joints**

Introduction to expansion joints, need and their types, design criteria as per IS codes, construction details at foundation, walls, floor and roof level. Study of materials used in their construction, filling and finishing.

##### **Unit-III: Building Chemicals**

Anti-termite treatment to foundation, masonry walls and wood work (pre-construction) water proofing and weather proofing materials like chemical admixtures and surface applications, sealants for water, smoke and fire proofing. Pest & rodent control treatment.

##### **Unit-III: Interior Materials & Details**

Types & Details of Internal Partition & False Ceiling systems.

Design and detailing of wardrobes, modular kitchens, cabinet shelves and show cases for residence, offices, book stores and commercial buildings, work stations using materials like plywood, PVC, marble, granite, cement, fiber board, gypsum products, particle board, wood wool, straw and any other materials introduced in the market.

#### **BARC2012 History of Architecture-IV**

##### **Unit-I: Introduction to Islamic Architecture**

Introduction and understanding of “Islam’s” philosophy and its interpretation in building types –

Mosque, Tomb, Fort and their elements like dome, arches, minarets etc. Typical Layout of

Mosque, its features and related nomenclature. Islamic Architecture Worldwide – Persia, Turkish, Arabian and their typical features

##### **Unit-II: The Imperial Style**

With reference to the Slave, Khalji, Tughlaq, Sayyid & Lodi Dynasties. Explanation with examples of the buildings, construction technology, building materials used, evolution of form and development with significant changes over the time period.

### **Unit-III: The Provincial Style**

Architecture at Punjab & Bengal, Gujrat, Bijapur, Jaunpur, Malwa and Deccan. Explain with examples of the buildings, construction technology, building materials used, evolution of form and development with significant changes over the time period.

### **Unit-IV: Mughal Architecture**

Concepts of city planning of various Islamic towns like Shahajahanabad and Fatehpur Sikri. The Architecture developed under the reign of Babur, Humayun, Akbar, Shahjahan Period and later Mughal period and its implication on Indian traditional architecture. Explain with examples of the buildings, construction technology, building materials used, evolution of form and development with significant changes over the time period.

### **Unit V: Colonial Architecture**

Colonial architecture and its amalgamation into India Architecture.

## **BARC2015 Building Services III**

### **Unit 1 Electrical Illumination Introduction –**

Terminology and unit. Light and its characteristics – scattering, propagation, transmission, reflection, absorption, refraction and dispersion of light. Electromagnetic spectrum and visible radiation.

#### **Illumination –**

Types of illumination schemes e.g. Ambient, Task, Focal and Decorative etc. lighting.

Design considerations for illumination Schemes. Methods for lighting calculation – Watts per square meter, Light flux and Point to point method.

#### **Sources of light (Electrical) –**

Familiarization and understanding of electrical sources of light e.g. Thermal radiators - Incandescent, Halogen. Discharge lamps – Low pressure (fluorescent, compact fluorescent, sodium, cold cathode neon), High pressure (mercury, metal halide, sodium). New technologies - LED, Fiberoptics.

#### **Luminaries –**

Types of Luminaries – Indirect, Semi-indirect, General diffusing, Semi-direct and Direct.

### **APPLICATION**

**Electrical Drawing** The understanding of electrical needs for individual spaces e.g. Living room, Dining room, Bed room, Kitchen, Toilet, Staircases, and Corridors etc.

The electrical layout drawing for a residence.

#### **Field / Market**

##### **Surveys**

Familiarization to types of electrical luminaries available in market, manufactured by various brands e.g. Recessed mounted luminaries, Spot / Projectors, Surface mounted luminaries, Decorative luminaries, Pendant luminaries, Free-floor-standing luminaries, Up lights, Trunking lighting systems, Down Lights.

<b>Module 20 ARMO 2010</b>		<b>M20: Facade</b>	
<b>Contacts Hours</b>		<b>50 (2 Weeks)</b>	
<b>Assigned Credits</b>		<b>2</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC2013	Computer Application in Architecture-III	75	20
BARC2016	Building construction	05	05
BARC2016	Estimation and Costing-I	100	25

### COURSE OUTCOMES

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Relate outer surface of buildings with its structure for performance improvement	K6 in Cognitive domain	Rubric/Viva
2	Create a building façade	K6 in Cognitive domain	Rubric/Viva
3	Analyze Glass as Building material	K4 in Cognitive domain	Rubric/Viva
4	Appraise manufacturing and processing of glass through industrial visit	K5 in Cognitive domain	Rubric/Viva
5	Justify the role of facade system in built environment	A3 in Affective domain	Rubric/Viva

### COURSE OBJECTIVES

1.

#### **Project: Building skin section design**

Lectures from Glass academy/ MOOC to be incorporated.

#### **BARC2010 Building Construction-IV**

##### **Unit-I: Glass & Glazing**

Introduction to Glass as building material, history of glass, manufacturing and properties of various types of glass like plate, tinted, decorative, reinforced, laminated glass block, fiber glass, glass murals, partially coloured glass, etching of glass and its applications in building industry for both exteriors and interiors. Glass fabrication techniques.

Application of glass in buildings, types of glazing, fixing methods, related hardware and construction details of glass curtain wall and structural glazing.

#### **BARC2016 Estimation and costing**

##### **Unit-I: Procedure of Estimation**

Introduction to Building Estimate and its need, importance of estimation, types of estimates, mode of measurement of various items.

Procedure of estimating and preparation of Bill of Quantity (BoQ) – Method of building estimates; estimation of earth work, PCC, brick work, DPC, RCC works, plastering, stone and tile works, wood work, water supply and sanitary work. Estimating of quantities of materials like cement, sand, aggregate, brick, reinforcement, tiles, structural steel for trusses, paints used in building, ACP, paneling and cladding, joinery etc.

##### **Unit-II: Specifications**

Brief and detailed specification (conforming to IS codes) for all items of works in the construction of a compound wall, septic tank, load bearing residential building, RCC framed office building, factory building with truss, etc; Specification of special items like false ceiling, decorative elements, flooring, wall cladding etc.

##### **Unit-III: Analysis of Rates**

Definition; method of preparation; quantity and manpower estimate for unit work.

Analysis of rates for items in building works like earth work, concrete works, first class brick work, reinforced brick and concrete work, cement plastering, DPC with cement mortar/ concrete, finishing (cement paint, distemper, acrylic emulsion, enamel paint) to walls & ceiling.

Local Schedule of Rates, market rates, measurement book, Running Account (RA) bill, interim and final certificate.

#### **BARC2013 Computer Application in Architecture-III**



**Modeling With Energy Simulation Software  
Ecotect and E-Quest**

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.

**Semester 5**

Subject Code	Subject Name	Assigned Credits
BARC3001	Architectural Design-V	9
BARC3002	Building Construction-V	3
BARC3003	Building Structures-V	1
BARC3004	Theory of Design	1
BARC3005	Computer Application in Architecture-V	2
BARC3006	Building Services-IV Acoustics	1
BARC3007	Estimation and Costing-II	1
BARC3016	Summer Internship-III	3

<b>Module 21 ARMO 3001</b>		<b>M21: Congent 1</b>	
<b>Contacts Hours</b>		<b>50 (2 Weeks)</b>	
<b>Assigned Credits</b>		<b>2</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC3001	Architectural Design-V	15	30
BARC3004	Theory of Design	65	15
BARC3003	Building Structures-V	20	05

### COURSE OUTCOMES

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Design an art gallery	K6 in Cognitive domain	Rubric/Viva
2	Appraise renowned architects work to understand their design philosophies	K6 in Cognitive domain	Rubric/Viva
3	Appreciate various design styles and movements	A3 in Affective domain	Rubric/Viva
4	Make a scale model of art gallery	P5 in psychomotor domain	Rubric/Viva
5	Develop his own Philosophy/Rational thought process	A5 in Affective domain	Rubric/Viva

### COURSE OBJECTIVES

1. To study various philosophies in and philosophers in popular literature
2. Congent – Clear, logical and convincing

#### Project: Art Gallery

#### **BARC3001 Architectural Design-V**

##### **Philosophy and Philosophers**

Idea of challenging the norm, questioning and analyzing the philosophies, manipulation and debate. Learning through Videos on sociology

Following philosophers shall be studied individually and discussed – Plato, Aristotle, Immanuel Kant, Karl Marx, Michel Foucault, Jacques Derrida, Friedrich Nietzsche, Rene' Descartes, David Hume, Jean Paul Sartre, Martin Heidegger, Socrates, Confucius

Popular philosophers in Architecture – Patric Schumarker, Christopher Alexander, Charles Jenx, Kevin Lynch, Jane Jacobs

Design Evaluation and Criticism: Value judgments in design, Appreciation of designer's skills, theories of perception and variability of perception. Theoretical issues in contemporary architectural thought, Seminars on the works of selected Indian and International architects and related topics.

Part 1 - Exhibition of the study and analysis

#### **BARC3004-Theory of Design**

**Modern Architecture** Social intentions and search for ideal world. Pluralism in place of past unity of styles. Search for paradigms in historical sources: It return to fundamentals and origins in geometry, nature and paradigms of technology.

Expressions of construction and technology. Equating technology and progress with present. Functionalism and functional appropriateness. Thoughts and works of Frank Lloyd Wright, Walter Groupies, Le Corbusier, Miesvander Rohe, Alvar Aalto, Louis Kahn, Dutch De Stijl Italian futurists and Russian Constructivists. International style: Oversimplification of the modern Movement into functional, steel and glass, cubes. Monotonous functionalist abstractions and Modernism as a style.

Disenchantment of modern cities and fall of modern Movement.

##### **Post Modern Architecture**

Post modern architecture as a revision of modern architecture and resistance to functional containers of 60's. Objective, representational and emphasis on content. Pluralistic and differing trends.

##### **Post Modern – Historicism**

Rooted to place and history. Regards of expression: ornaments, symbolism and context with irony and humour, exemplified through the works of James Stirling, Michael Graves, Charles Moore, Arata Isozaki.

**BARC3003 Building Structures-V**

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.

<b>Module 22 ARMO 3002</b>		<b>M22: Congent 2</b>	
<b>Contacts Hours</b>		<b>50 (2 Weeks)</b>	
<b>Assigned Credits</b>		<b>2</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC3001	Architectural Design-V	15	30
BARC3003	Building Structures-V	20	05
BARC3004	Theory of Design	35	15

### COURSE OUTCOMES

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Design an art gallery	K6 in Cognitive domain	Rubric/Viva
2	Appraise renowned architects work to understand their design philosophies	K6 in Cognitive domain	Rubric/Viva
3	Appreciate various design styles and movements	A3 in Affective domain	Rubric/Viva
4	Make a scale model of art gallery	P5 in psychomotor domain	Rubric/Viva
5	Develop his own Philosophy/Rational thought process	A5 in Affective domain	Rubric/Viva

### COURSE OBJECTIVES

1. Develop and understanding of architectural theories and act of being in time
2. Analyze and learn from master architects philosophies
3. Incorporate Philosophies in their work

### Project: Art Gallery

#### BARC3001 Architectural Design-V

Design of an Art Gallery based on the Philosophies studied

#### Theory of Architecture

Digitalization, utopia, deconstruction, fluidism, parametric design, morphism, modernism, classicism, minimalism, regionalism, brutalism, blobitecture, schism, expressionism, cubism, duality

#### Architects Work

Frank Lloyd Wright, Le Corbusier, Hassan Fathy, Piter Issenman, Mario Botta, Nervey, Renzo Piano, Richard Roger, Santiago Calatrava, Ebenzer Harvard, Richard Mier, Ciser Pelli, Felix, Bernard Tshumi, Zaha Hadid, Ero Saarinen, Charles Correa, B V Doshi, Raj Reval, AP Kanvinde

#### BARC3002 Building Construction-V

#### BARC3003 Building Structures-V

#### BARC3004 Theory of Design

**Neo - Modern** Disregard historical imaginary to recapture ideas for modern architecture of 20's. Hi-tech metal abstractions of Richard Rogers, Normal Foster, showing structure and equipment as implied ornament. References of Russian Constructivists. The early works of New York Five including later works of Richar Mier as complicated, exaggerated and sophisticated revival of the modern grid and Corbusier's geometry. Synthesis of Hi-Tech and Historicism in the works Aldo Rossi, Mario Botta, Cesar Pelli.

**Deconstructive** Narrative and representational. Sources in Russian Constructivism. Non perfection in the works of Frank Gehry, Peter Eisenman, Bernard Tschumi, Daniel Libeskind, Questioning traditional purity of form, geometry and structure.

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.

<b>Module 23 ARMO 3003</b>		<b>M23: Dionysia</b>	
<b>Contacts Hours</b>		<b>150 (6 Weeks)</b>	
<b>Assigned Credits</b>		<b>6</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC3001	Architectural Design-V	35	100
BARC3002	Building Construction-V	40	20
BARC3005	Computer Application in Architecture-V	15	10
BARC3003	Building Structures-V	60	10
BARC3006	Building Services-IV	50	10

### COURSE OUTCOMES

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Analyze large span roof forms	K6 in Cognitive domain	Rubric/Viva
2	Design an auditorium	K6 in Cognitive domain	Rubric/Viva
3	Apply the principles of acoustics in design of auditorium	K6 in Cognitive domain	Rubric/Viva
4	Compose a drama script and enact the same in groups	P6 in psychomotor domain	Rubric/Viva
5	Illustrate architectural history from modern to Contemporary period	K3 in Cognitive domain	Rubric/Viva

### COURSE OBJECTIVES

1. Scripting, Acoustics, performance, Set design, Video Making, Lighting and sounds, VR, Temperature control, AC control, Camera setting
2. Develop script, drama performance, apply history of, Auditorium design, apply acoustics

### Project: Auditorium/theater

#### BARC3001 Architectural Design-V

Dramatics, Introduction to designing of performance space-auditorium, theatre, cinema hall types on an intermediate scale. Importance of space programming, case studies and site analysis in architectural design. Importance of culture/traditions, and building byelaws in shaping built forms. Developing roof forms for large span structures, Angle of vision, types of Auditorium, Cinema Hall, Performance space.

#### BARC3002 Building Construction-V

Interior cladding/ thermal performance standards, interior insulating assemblies, sound absorbers, reflectors etc. Interior Finishes.

#### BARC3003 Building Structures-V

##### Unit-I Introduction to Shear and Development Length in Beams

Understanding of Shear stress, Diagonal tension, Shear reinforcement, Spacing of shear reinforcement, Problems of shear reinforcement, Development length, Anchorage bond, Flexural bond.

##### Unit-II Analysis & Design of R.C.C. Beam (Simply Supported & Cantilevered)

(Limit State Method) Analysis & Design of R.C.C. singly reinforced & doubly reinforced rectangular and flanged (L & T) beam sections.

Analysis & Design of R.C.C. Beam (Continuous).

(Limit State Method) Analysis & Design of R.C.C. continuous Beam.

Analysis & Design of R.C.C. Flat Slab.

(Limit State Method) Analysis & Design of R.C.C. flat slab.

Analysis & Design of R.C.C. Cantilever

Retaining Wall (Limit State Method) Introduction, Type of retaining walls, Analysis & Design of Cantilever retaining walls and detailing of its reinforcement.

##### Unit-III Analysis & Design of R.C.C. Stairs (Limit State Method)

Introduction, Types of stairs, Effective span of stairs, loading on stairs,

Analysis & design of stairs (dog legged with waist slab) and detailing of its Reinforcement.

**BARC3005 Computer Application in Architecture-V**

Introduction to Rhino

**BARC3006 Building Services-IV**

**Acoustics:**

**HVAV Application**

**Unit 1**

**Acoustical Design** The understanding the audio needs and layout for projects e.g. Auditoriums, Cinema halls, Conference rooms etc.

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.



<b>Module 24 ARMO 3004</b>		<b>M24: Decor</b>	
<b>Contacts Hours</b>		<b>150 (6 Weeks)</b>	
<b>Assigned Credits</b>		<b>6</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC3001	Architectural Design-V	35	90
BARC3002	Building Construction-V	60	20
BARC3007	Estimation and Costing-II	50	15
BARC3006	Building Services-IV	50	20
BARC3005	Computer Application in Architecture-V	10	05

### COURSE OUTCOMES

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Apply basic concepts of interior design	K3 in Cognitive domain	Rubric/Viva
2	Design interior of a restaurant	K6 in Cognitive domain	Rubric/Viva
3	Design a commercial kitchen	K6 in Cognitive domain	Rubric/Viva
4	Create furniture elements	K6 in Cognitive domain	Rubric/Viva
5	Estimate the cost of interiors in a built structure	K5 in Cognitive domain	Rubric/Viva

### COURSE OBJECTIVES

1. Interior environment, theme, ambience, material, color, texture and its impact on human psychology and behavior. Performing market surveys, soft furnishing and upholstery, floor finishes etc.
- 2.

**Project: Restaurant interiors / office interiors/ Hotel room/ Lobby**

#### **BARC3001 Architectural Design-V**

##### **Introduction to Interior Design**

Definitions related to interior design. Review of enclosing elements like walls, floors, ceilings, openings, staircases, furniture & design elements such as color, light textures in interior spaces. Principles of interior design.

##### **History of Interior & Furniture Design**

Concise understanding of evolution from ancient to modern, post-modern ideologies to contemporary (Egyptian, Greek, Roman, Gothic, Baroque, Renaissance, Arts and Crafts Movement, Art Nouveau, De Stijl, Modernism, Post Modernism and Contemporary).

##### **Study of Materials, Finishes & their applications in Furniture & other Interior Elements**

An in-depth understanding of the characteristics and workability of various materials used in interiors. Their classification could be on basis of elements of usage (floor, ceilings, walls, doors, windows and fabrics/upholstery) or materials based like wood, metal plastics and their variants.

##### **Understanding innovation in Furniture & Interior Design**

Modern materials, Modular furniture, interior landscaping, Fittings & fixtures.

##### **Analysis & Design of Furniture**

Analyzing existing designs of selected furniture on basis of ergonomics, user type, economics, material, joinery and maintenance to ascertain their suitability. Design furniture for specific use complying with the aforementioned formulated design criteria. Build scaled models of the designed furniture for better understanding of working and materials.

##### **Analysis & Design of small Interior spaces**

Analyze small selected interior spaces like study, bedroom, executive/ architect office, retail outlet, conference, reception & waiting lobby including toilets and kitchens in detail, for varied aspects like function, ergonomics, and materials and establishing detailed design criteria. Design of selected small interior spaces on specific sites/ locations based on formulated design criteria using modern design methodologies. Develop design details of the afore-designed projects for their furniture and finishing.

#### **BARC3002 Building Construction-V**

Introduction to Aluminum as building material, advantage and disadvantages, study of various sections available for doors and windows together with accessories. Aluminum framed doors, windows & partitions types, design and construction details. Preparation of variety of surfaces, Application of various coats.

**Finishes**

Lime / Color wash, Dry distemper, Oil bound distemper, Cement paints, Acrylic emulsions, Synthetic enamels, Wall textures etc. Polishes and Varnishes

**BARC3005      Computer Application in Architecture-V**  
Rendering of interior Views

**BARC3006      Building Services-IV**  
Advanced Building Services with respect to Commercial Interiors

**BARC3007      Estimation and Costing-II**  
Interior estimation only (to be revised)

**Unit-I: Procedure of Estimation**

Introduction to Building Estimate and its need, importance of estimation, types of estimates, mode of measurement of various items. Procedure of estimating and preparation of Bill of Quantity (BoQ) – Method of building estimates; estimation of earth work, PCC, brick work, DPC, RCC works, plastering, stone and tile works, wood work, water supply and sanitary work. Estimating of quantities of materials like cement, sand, aggregate, brick, reinforcement, tiles, structural steel for trusses, paints used in building, ACP, paneling and cladding, joinery etc.

**Unit-II: Specifications**

Brief and detailed specification (conforming to IS codes) for all items of works in the construction of a compound wall, septic tank, load bearing residential building, RCC framed office building, factory building with truss, etc; Specification of special items like false ceiling, decorative elements, flooring, wall cladding etc.

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
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<b>Module 25 ARMO 3005</b>		<b>M25: BIM</b>	
<b>Contacts Hours</b>		<b>50 (2 Weeks)</b>	
<b>Assigned Credits</b>		<b>2</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC3005	Computer Application in Architecture-V	75	40
BARC3007	Estimation and Costing-II	50	10

### **COURSE OUTCOMES**

Architectural Graduate will be able to:		Knowledge domain and level	Evaluation Method
1	Analyze interior specifications	K4 in Cognitive domain	Rubric/Viva
2	Analyze interior estimation and costing	K4 in Cognitive domain	Rubric/Viva
3	Create a project report of Ground+1 brick residence	K6 in Cognitive domain	Rubric/Viva
4	Apply basic concepts of building information modeling software	K3 in Cognitive domain	Rubric/Viva
5	Model a DPR in BIM software	K6 in Cognitive domain	Rubric/Viva

### **COURSE OBJECTIVES**

1. Create a project report of Ground+1 brick residence in BIM
- 2.

#### **Project: Interiors rendering**

### **COURSE OBJECTIVES**

1. To introduce the fundamentals of Building Information Modeling (BIM).
2. To learn various workflows and procedures of BIM work-environment.
3. To develop basic skills in application of BIM tools and techniques in Architecture.

### **COURSE CONTENT**

#### **BARC3005 Computer Application in Architecture-V**

##### **Unit-I: Introduction to BIM**

Introduction to BIM, Concepts & Principles, User-Interface, Viewing the Model, Resources.

Understanding terms, elements and properties. Creating a project in BIM environment, creating levels and grids, creating conceptual design.

##### **Unit-II: Basic Modelling**

Modelling of walls, windows, doors, setting view range, components, columns, roof, ceiling, floors, openings, surfaces, stairs, ramps, railings, curtain elements.

Understanding families and working with families, family editor, creating a component, in-place components, reference planes, voids, join/cut geometry. Rooms and areas.

##### **Unit-III: Annotation and Visualization**

Annotations; grids, dimensions, text, tags, rooms, schedules, sheets, symbols, creating views.

Setting of colour schemes, legends, openings.

Visualization; rendering, materials, lights, paint tool, decals.

Project phasing, detailing and preparing construction documents.

##### **Unit-IV: Site and Solar Studies**

Site, topo-surface, building pads, divided surface, creating topo-surface from CAD contours, massing studies. Setting up and creating solar studies. Applying and removing constraints.

##### **Unit-V: Maya/ Rhino/ Grasshopper**

3D Max, Lumion or any other rendering software.

#### **BARC3007 Estimation and Costing-II**

##### **Unit-III: Analysis of Rates**

Definition; method of preparation; quantity and manpower estimate for unit work. Analysis of rates for items in building works like earth work, concrete works, first class brick work, reinforced brick and concrete work, cement plastering, DPC with cement mortar/ concrete, finishing (cement paint, distemper, acrylic emulsion, enamel paint) to walls & ceiling. Local Schedule of Rates, market rates, measurement book, Running Account (RA) bill, interim and final certificate.

**Accounting Procedures** Introduction to P.W.D accounts procedure, measurement book, daily labour, muster roll, stores, stock, and issue of material from stock, indent form, imprest account, cash book, mode of payment.

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
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**Semester 6**

Subject Code	Subject Name	Assigned Credits
BARC3009	Architectural Design-VI	10
BARC3010	Building Construction-VI	2
BARC3011	Building Structures-VI	1
BARC3012	Human values	1
BARC3013	Computer Application in Architecture-VI	2
BARC9997	Research/dissertation	1
BARC3014	Building Economics	1
BARC3008	Winter Internship-II	2

<b>Module 26 ARMO 3006</b>		<b>M26: Prefab</b>	
<b>Contacts Hours</b>		<b>50 (2 Weeks)</b>	
<b>Assigned Credits</b>		<b>2</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC3009	Architectural Design-VI	15	40
BARC3010	Building Construction-VI	30	10

### COURSE OUTCOMES

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Analyze defects and remedies in buildings	K4 in Cognitive domain	Rubric/Viva
2	Analyze retrofitting in buildings	K4 in Cognitive domain	Rubric/Viva
3	Analyze prefabricated speedy construction in a building	K4 in Cognitive domain	Rubric/Viva
4	Apply basic concepts of modular construction	K3 in Cognitive domain	Rubric/Viva
5	Appreciate the role of prefab construction in respect of technology, culture, time and environment	A3 in Affective domain	Rubric/Viva

### COURSE OBJECTIVES

1. To develop and include universal design principles
2. Designing in light weight construction – concrete, pre tensioning, post tensioning
3. Defects and remedies

**Project: Analysis of buildings constructed through speedy construction**

#### **BARC3008 Architectural Design-VI**

##### **Defects in Building**

Analyze defects in building and understanding the role of advanced construction techniques. Defects in buildings and their remedies.

##### **Universal Design- People needs**

Principles of Universal Design, Universal Design Definition, seven principles:-Equitable Use

Flexibility in Use, Simple and Intuitive, Perceptible Information, Tolerance for Error, Low Physical Effort, Size and Space.

#### **BARC3009 Building Construction-VI**

##### **Unit1-Prefabrication Systems**

Open prefab system, large panel prefab system, joints, pre-casting methods, materials, on-site and off-site prefabrication, components, etc.

##### **Unit 2-Pre-stressed Concrete**

Introduction, methods of pre-stressing and their application to large-space structures.

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<b>Module 27 ARMO 3007</b>		<b>M27: Tall Buildings</b>	
<b>Contacts Hours</b>		<b>50 (2 Weeks)</b>	
<b>Assigned Credits</b>		<b>2</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC3009	Architectural Design-VI	10	25
BARC3010	Building Construction-VI	15	10
BARC3012	Human Values	80	10
BARC3011	Building Structures-VI	25	05

### **COURSE OUTCOMES**

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Design core of a tall building	K6 in Cognitive domain	Rubric/Viva
2	Analyze structural system of a tall building	K4 in Cognitive domain	Rubric/Viva
3	Illustrate evolution of mega structures	K3 in Cognitive domain	Rubric/Viva
4	Analyze building on the basis of earthquake and dynamic loads	K4 in Cognitive domain	Rubric/Viva
5	Appreciate the role of services in tall building design	A3 in Affective domain	Rubric/Viva

### **COURSE OBJECTIVES**

To design tall building core, earthquake resistant structures, structural grids- diagrid, tensegrity, fire proofing, historic evolution of tall buildings, contemporary mega structures

#### **Project: Design core of a Tall Building**

#### **BARC3009 Architectural Design-VI**

Documentaries of Megastructures for analysis of high rise structures. Understanding structural grids, form geometry

#### **BARC3010 Building Construction-VI**

Industrial Construction Structural Steel Works: Portal Frame Construction, Construction for tall buildings

#### **BARC3011 Building Structure-VI**

### **UNIT 1 INTRODUCTION TO HIGH-RISE BUILDINGS AND STRUCTURAL SYSTEMS**

Height analysis, plan shapes, grids and core design - Foundations and soil conditions - Construction sequencing, building skin and envelope - Design philosophy, structural loading, sequential loading, materials, high performance concrete – Fibre reinforced concrete, High strength concrete, Light weight concrete - Loading and movement Gravity Loading, Dead and Live load - Methods of Live load reduction – impact, gravity loading, construction loads, wind loading – Static and dynamic approach – Earth quake loading – Equivalent lateral force, model analysis, combinations of loading – Working stress design, limit state design, plastic design - Codes & Standards - Tensile structures in high-rise.

### **UNIT 2 BEHAVIOR OF VARIOUS STRUCTURAL SYSTEMS**

Factors affecting growth, height and structural form – High rise behavior, rigid frames, braced forms, infilled frames, shear walls, coupled shear walls, wall frames, tubular, cores, outrigger- braced and hybrid mega systems.

### **UNIT 3 DISASTER RESISTANT STRUCTURES**

Overall buckling analysis of frames, wall frames - Approximate methods, second order effects of gravity of loading, simultaneous first order and P delta analysis, translational, torsional instability, out of plumb effects, stiffness of member in stability, effect of foundation rotation - Case study of a high-rise structure with 3D model analysis.

### **UNIT 4 PREFABRICATED STRUCTURES**

Specific requirements for planning and layout of prefabricates plant, IS code specification - Design Principles, modular coordination, standardization, disuniting of prefabricates production, transportation and erection, stages of loading and code provisions, safety factors - Reinforced concrete - Prefabricated structures, wall panel types and two way fabricated slabs, partial and curtain walls, trusses, shells, crane - gantry systems - Floor slabs and roofs, types of floor slabs, cored and panel types and two way systems, stair case slab, insulation requirements, joints, their behavior and reinforcement requirements – Walls, types of wall panels blocks and large panels, curtain – Partition and load bearing walls, wall joints - Behavior and design, leak prevention, joint sealant, sandwich wall panels.

## **BARC3012 Human Values**

### **UNIT 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education**

1. Understanding the need, basic guidelines, content and process for Value Education
2. Self Exploration—what is it? - its content and process; ‘Natural Acceptance’ and Experiential Validation- as the mechanism for self exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations: understanding and living in **harmony** at various levels

### **UNIT 2: Understanding Harmony in the Human Being - Harmony in Myself!**

7. Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’
8. Understanding the needs of Self (‘I’) and ‘Body’ - *Sukh* and *Suvidha*
9. Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer)
10. Understanding the characteristics and activities of ‘I’ and harmony in ‘I’
11. Understanding the harmony of I with the Body: *Sanyam* and *Swasthya*; correct appraisal of Physical needs, meaning of Prosperity in detail
12. Programs to ensure *Sanyam* and *Swasthya*

- Practice Exercises and Case Studies will be taken up in Practice Sessions.

### **UNIT 3: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship**

13. *Understanding Harmony in the family – the basic unit of human interaction*
14. Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*; Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship
15. Understanding the meaning of *Vishwas*; Difference between intention and competence
16. Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship
17. Understanding the harmony in the society (society being an extension of family): *Samadhan*, *Samridhi*, *Abhay*, *Sah-astitva* as comprehensive Human Goals
18. Visualizing a universal harmonious order in society- Undivided Society (*Akhand Samaj*), Universal Order (*Sarvabhaum Vyawastha* )- from family to world family!



- Practice Exercises and Case Studies will be taken up in Practice Sessions.

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.

<b>Module 28 ARMO 3008</b>		<b>M28: Neighborhood</b>	
<b>Contacts Hours</b>		<b>150 (6 Weeks)</b>	
<b>Assigned Credits</b>		<b>6</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC3009	Architectural Design-VI	40	90
BARC3011	Building Structures-VI	55	20
BARC3014	Building Economics	50	15
BARC3012	Human Values	20	05
BARC3013	Computer Application in Architecture-VI	30	20

### COURSE OUTCOMES

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Apply basic theory of design	K3 in Cognitive domain	Rubric/Viva
2	Analyze advance structural concepts	K3 in Cognitive domain	Rubric/Viva
3	Analyze advance services concepts-(automation)	K3 in Cognitive domain	Rubric/Viva
4	Illustrate basic concept of neighborhood and master plans	K3 in Cognitive domain	Rubric/Viva
5	Design vertical housing	K6 in Cognitive domain	Rubric/Viva

### COURSE OBJECTIVES

1. Including building services and structural system
2. Area calculation, building byelaws, FAR/FSI, Height restrictions, covered area.

**Project: mid rise/low rise housing**

#### BARC3009 Architectural Design-VI

Design of a medium to high-rise building in a dense urban setting. The problem should attempt to bring out a comprehension of the framework that outlines a building interior, the structural system and the services core, and the relation of this interior with the exterior environment through the building skin. The project should be of high services complexity with mechanical systems for space conditioning, parking and other services, and include the integration of active energy systems

#### BARC3015 Building Economics

##### Elementary concepts of economics

Introduction to economics- Definitions, Needs & Wants, Nature & Scope of Economics.

Division of economics – Micro Economics - Scarcity, Utility - Marginal, Total & Average. Laws of Demand and Supply. Macro Economics - Economic system in India.

##### Economics in relation to architecture, engineering and other sciences

Meaning and scope of building economics, Issues and challenges associated with building projects. Building Efficiency, Building Life-cycle. Costs and Benefits of Building - Monetary and Non Monetary.

#### BARC3012 Human Values

##### UNIT 4: Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

1. Understanding the harmony in the Nature
2. Interconnectedness and mutual fulfillment among the four orders of nature-recyclability and self-regulation in nature
3. Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space
4. Holistic perception of harmony at all levels of existence
  - a. Practice Exercises and Case Studies will be taken up in Practice Sessions.

**UNIT 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics**

- 23. Natural acceptance of human values
- 24. Definitiveness of Ethical Human Conduct
  
- 25. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- 26. Competence in professional ethics:
  - a) Ability to utilize the professional competence for augmenting universal human order
  - b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,
  - c) Ability to identify and develop appropriate technologies and management patterns for above production systems.
  
- 27. Case studies of typical holistic technologies, management models and production systems
  
- 28. Strategy for transition from the present state to Universal Human Order:
  - a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers
  - b) At the level of society: as mutually enriching institutions and organizations

**BARC3013 Computer Application in Architecture-VI**

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.

<b>Module 29 ARMO 3009</b>		<b>M29: Agora</b>	
<b>Contacts Hours</b>		<b>150 (6 Weeks)</b>	
<b>Assigned Credits</b>		<b>6</b>	
<b>Assigned Credits</b>		<b>6</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC3009	Architectural Design-VI	35	100
BARC3010	Building Construction-VI	25	10
BARC3014	Building Economics	50	10
BARC9997	Research/Dissertation-I	55	15
BARC3013	Computer Application in Architecture-VI	35	15

**COURSE OUTCOMES**

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Analyse theory of design	K3 in Cognitive domain	Rubric/Viva
2	Analyse basic concepts of waste management	K3 in Cognitive domain	Rubric/Viva
3	Design a landscaped central court of vertical housing	K6 in Cognitive domain	Rubric/Viva
4	Write a dissertation	K5 in Cognitive domain	Rubric/Viva
5	Design a shopping mall	K6 in Cognitive domain	Rubric/Viva

**COURSE OBJECTIVES**

1. Study and analysis of a live site for site services and site planning.
2. Planning and designing of a campus.

**Project: Institutional building complex**

**BARC3008 Architectural Design-VI (130 Contact Periods)**

problem of a complex building involving a high level of services and advanced structural systems eg. Sports complex, institutional campus. Exercises in simulation and conceptual modeling shall be conducted. The studio will also focus on sustainable design principles, including waste recycling, rain water Harvesting, site planning principles and landscaping.

**BARC3010 Building Construction-VI**

**Unit 1-Lightweight constructions**

Hollow bricks, slabs, party wall and shell roofs.

**Unit 2 Speedy Construction Methods**

Types of floor construction - Beam & Slab, Waffle Grid Slab, Drop Beam & Slab, Flush Slab, Lift Slab Construction; Cast-in-situ service & stair cores; Cross wall & Box frame construction.

**BARC3014 Building Economics**

**Project Financing** Equity, Financing Institutions in Financing Process, Interim Finance and Permanent Financing, Bank Loan - Simple Interest and Compound Interest. Types of Mortgage, Lease Arrangements.

**Module-4 Economic performance of building**

Decision Making using techniques of economic performance to measure tangible and non-tangible issues - Cost-Benefit Analysis, Incremental Analysis and Multi-criteria Analysis.

**BARC9997 Research/Dissertation-I**

**BARC3013 Computer Application in Architecture-VI**

<b>NOTE:</b>	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
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<b>Module 30 ARMO 3010</b>		<b>M30: Management</b>	
<b>Contacts Hours</b>		<b>50 (2 Weeks)</b>	
<b>Assigned Credits</b>		<b>2</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC3010	Building Construction-VI	30	22
BARC3011	Building Structures-VI	20	8
BARC9997	Research/Dissertation-I	45	16
BARC3013	Computer Application in Architecture-VI	35	26

**COURSE OUTCOMES**

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Analyse building specifications	K4 in Cognitive domain	Rubric/Viva
2	Analyse building estimation and costing	K4 in Cognitive domain	Rubric/Viva
3	Appreciate the role of economics in built environment	K3 in Cognitive domain	Rubric/Viva
4	Apply building byelaws to their design	K3 in Cognitive domain	Rubric/Viva
5	Make a detail working drawing of shopping mall	K6 in Cognitive domain	Rubric/Viva

**COURSE OBJECTIVES**

- 1.
- 2.

**Project: Reports/Research/dissertation**

**BARC3010 Building Construction-VI**

**BARC3011 Building Structures-VI**

**BARC9997 Research/Dissertation-I**

**Unit I** Introduction Aspects of Analysis of an Architectural project

**Unit II**

Technical Writing Critical Appreciation of a Project: Analyzing on the basis of site, Built Form and Space, Spatial Organization, Materials and Techniques, Elements and Special Characteristics, Activity Pattern.

**Unit III**

Book Reviews Review of Book with presentation of the précis.

**BARC3013 Computer Application in Architecture-VI**

<b>NOTE:</b>	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.

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**Semester 7**

<b>Subject Code</b>	<b>Subject Name</b>	<b>Assigned Credits</b>
BARC4001	Architectural Design-VII	8
BARC4002	Building Construction-VII	2
BARC4003	Enviromental Studies	1
BARC4005	Project Management	1
BARC9998	Research/dissertation	2
BARC4009	Product Design*1	2
BARC4010	Art Appreciation*1	2
BARC4011	Low Cost Architecture*2	2
BARC4012	Architectural Journalism*2	2

<b>Module 31 ARMO 4001</b>		<b>M31: Resurgence</b>	
<b>Contacts Hours</b>		<b>50 (2 Weeks)</b>	
<b>Assigned Credits</b>		<b>2</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC4003	Environmental Studies	100	25
BARC9998	Research/Dissertation	50	25

**COURSE OUTCOMES**

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Apply basic concepts of environment and ecology	K3 in Cognitive domain	Rubric/Viva
2	Evaluate the impact of environmental pollution	K5 in Cognitive domain	Rubric/Viva
3	Apply basic concepts of environmental laws and regulations	K3 in Cognitive domain	Rubric/Viva
4	Make Environmental impact assessment reports	K6 in Cognitive domain	Rubric/Viva
5	Value the role of sustainability in built environment	A3 in Affective domain	Rubric/Viva

**COURSE OBJECTIVES**

- 1.
- 2.

**Project: project assessment**

**BARC4003 Environmental Studies**

**Unit-I: Ecology & Ecosystem**

Concept of Ecology & Ecosystem, Resource analysis for various ecosystems and development imperatives (land, geology, soil, climate, water, vegetation) characteristics, exploitation, causative factors for degradation, analytical techniques.

**Unit-II: Environmental Pollution**

Definition, causes, effects, standard parameters and control measures of Air, Water, Soil, Noise, Marine, Thermal, Nuclear and Light pollution.

Causes, effects and control measures of urban and industrial waste.

Physical, Chemical and Biological transformation of pollutants.

**Unit-III: Introduction to EIA & EMP**

Role of EIA in the Planning and decision making process, definition and need, evolution and objectives, tasks and scope, methods of EIA; advantages and limitations.

EMP, Best practices in Environmental Protection and Conservation.

**Unit-IV: Environmental Laws and Regulations**

Introduction to Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Factories Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, MoEF Guidelines.

**Sustainability**

**Unit I**

Introduction to sustainability & Intelligent buildings Social, economic, environmental factors, ecological footprint, local and worldwide sustainable benchmarks, building ecosystem, building lifecycle Concept. Concept of intelligent buildings, energy efficiency, vertical transportation systems, communication systems, security systems, building automation and lighting systems.

**Unit II**

Sustainable design Principles and strategies, site design, energy management, renewable energy, sustainable material selection, water management, indoor air quality, alternative energy, environmental systems, environmental assessment methods.

**Unit III**

Building Management Systems (BMS) Methods to control, monitor and optimize building services, eg., lighting, heating, security, CCTV and alarm systems, access control, audio-visual and entertainment systems, ventilation, filtration and climate control, etc., even time & attendance control and reporting (notably staff movement and availability).

**Unit IV**

Energy management in services

**BARC9998 Research/Dissertation**



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NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.

<b>Module 32 ARMO 4002</b>		<b>M32: Ocular</b>	
<b>Contacts Hours</b>		<b>50 (2 Weeks)</b>	
Assigned Credits		2	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC4009	Product Design*1	100	50
BARC4010	Art Appreciation*1	-	-

**COURSE OUTCOMES**

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Apply basic concept of the elective topic	K3 in Cognitive domain	Rubric/Viva
2	Appreciate the role of Elective topic in global scenario	K3 in Cognitive domain	Rubric/Viva
3	Internalize the values of the topic	A5 in Affective domain	Rubric/Viva
4	Conduct the surveys on the topic given	P5 in psychomotor domain	Rubric/Viva
5	Present the researched topic in an seminar	K6 in Cognitive domain	Rubric/Viva

<b>NOTE:</b>	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.

**BARC4009      Product Design (Elective I-A)**  
**BARC4010      Art Appreciation (Elective I-A)**

<b>Module 33 ARMO 4003</b>		<b>M33: Hospitality</b>	
<b>Contacts Hours</b>		<b>150 (6 Weeks)</b>	
<b>Assigned Credits</b>		<b>6</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC4001	Architectural Design-VII	45	100
BARC4002	Building Construction-VII	50	20
BARC4005	Project Management	50	10
BARC9998	Research/Dissertation	50	20

**COURSE OUTCOMES**

Architectural Graduate will be able to:		Knowledge domain and level	Evaluation Method
1	Design a hotel with convention center	K6 in Cognitive domain	
2	Apply basic concepts of service floor and safety in built environment	K3 in Cognitive domain	Rubric/Viva
3	Design indoor recreational facilities	K6 in Cognitive domain	Rubric/Viva
4	Application of waste management techniques in hotel	K3 in Cognitive domain	Rubric/Viva
5	Make a detail working drawing of service floor	K6 in Cognitive domain	Rubric/Viva

**COURSE OBJECTIVES**

1.

**Project: Hotel, Haat,**

**BARC4001 Architectural Design-VII**

**Concept**

**BARC4002 Building Construction-VII**

**Machinery , Advanced Building Technology**

Introduction of pre-stressing, prefabrication & systems building. Jointing, tolerances and modular co-ordination. Mass production, transportation, storage and handling of materials. Characteristics, performance and application of mechanized construction equipment. Advanced vernacular construction techniques.

**BARC4005 Project Management**

Introduction to Project Management. Project Planning, feasibility studies, project report, project financing, Project organisation, process and structure and personnel selection, responsibilities of the project manager. Project implementation, Site investigations, layout, site organisation, networking techniques, PERT/CPM, LOD, time-cost analysis, value engineering, Project monitoring, cost control, manpower management, safety and labour laws.

**BARC9998 Research/Dissertation**

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.

<b>Module 34 ARMO 4004</b>		<b>M34: Health Care</b>	
<b>Contacts Hours</b>		<b>150 (6 Weeks)</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC4001	Architectural Design-VII	55	110
BARC4002	Building Construction-VII	50	30
BARC4005	Project Management	50	10

**COURSE OUTCOM**

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Design a hospital	K6 in Cognitive domain	Rubric/Viva
2	Illustrate low cost constructional techniques	K3 in Cognitive domain	Rubric/Viva
3	Apply basic concepts of hospital information system	K3 in Cognitive domain	Rubric/Viva
4	Design healing landscapes	K6 in Cognitive domain	Rubric/Viva
5	Internalize the values of hygiene and social care	A5 in Affective domain	Rubric/Viva

**COURSE OBJECTIVES**

1.

**Project: Hospital**

**BARC4001 Architectural Design-VII**

(Working Drawings, GFC Drawings)

Preparation of architectural GFC drawings and details of a medium / large project. Preparation of electrical drawings, water supply and sanitary drawings, structural drawings of a small project. Specifications of building materials and simple construction as separate document or annotated on the working drawings.

**BARC4002 Building Construction-VII**

**Defects and Remedies**

The study of various defects in buildings and their remedies, Defects caused by dampness, applied forces and changes in size.

**BARC4005 Project Management**

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.

<b>Module 35 ARMO 4005</b>		<b>M35: Perception</b>	
<b>Contacts Hours</b>		<b>50 (2 Weeks)</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC4011	Low Cost Architecture*2	100	50
BARC4012	Architectural Journalism*2	-	-

**COURSE OUTCOMES**

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Apply basic concept of the elective topic	K3 in Cognitive domain	Rubric/Viva
2	Appreciate the role of Elective topic in global scenario	K3 in Cognitive domain	Rubric/Viva
3	Internalize the values of the elective topic	A5 in Affective domain	Rubric/Viva
4	Conduct the surveys related to elective topic	P5 in psychomotor domain	Rubric/Viva
5	Present research work through seminar	K6 in Cognitive domain	Rubric/Viva

**COURSE OBJECTIVES**

1.

**Project: Report**

**BARC4011 Low Cost Architecture (Elective II-A)**

**UNIT I**

- An introduction to the subject to understand the various building techniques adopted in different climatic zones of the country, which resulting in varied vernacular expressions.
- Use of cost effective technologies through the use of local materials, up gradation of traditional technologies, prefabrication etc.

**UNIT II**

- Need for low cost construction, both in the rural and the urban sectors.
- Innovations of building techniques for low cost construction.
- Analysis of space norms for low cost buildings.

**UNIT III**

- Study of usages pattern of low cost buildings by the habitants.
- Comparative analysis of building materials and costing.
- Works of Laurie Baker, Hassan Fathy and other prominent architects.

NOTE The time mentioned at the end of each of the above units indicates the tentative time taken to complete each. The marks for sessional work may be divided accordingly.

**REFERENCE BOOKS**

- “Building Systems for Low Income Housing”, Ashok Kumar Jain; Management Publishing House, 1992
- “Low Cost Housing in Developing Countries”, Guru Charan Mathur; For Centre for Science & Technology of the Non-Aligned and Other Developing Countries, Oxford & IBH Publishing Company, 1993

**BARC4012 Architectural Journalism (Elective II-B)**

**Unit I**

**Introduction to Architectural Journalism**

What is Journalism and its importance?? Relation between Architectural Journalism. Reading contemporary and historical writings by Journalists and critics, study their approaches.

**Unit II**

**Introduction to Architectural writing**

Writing on different articles, on buildings and social issues

Reports on building under construction

Learn how to gather info and do research for stories

**Unit III**

**Structure of Architectural Journalism and Photo Journalism**

Learning of documentation of collected info, content writing, formatting, Page composition

Learning the technique of how the photographs are supporting the write-ups about built environment, to help them understand the expression of pictorial, verbal and visual relationship of architecture journalism

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
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**Sem 8**

<b>Subject Code</b>	<b>Subject Name</b>	<b>Assigned Credits</b>
BARC 4001	Professional Training	22

<b>Module 36 ARMO 4006</b>		<b>M36: Professional Training</b>	
<b>Contacts Hours</b>		<b>22 Weeks)</b>	
<b>Assigned Credits</b>		<b>22</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC4008	Professional Training	100	-

**COURSE OUTCOMES**

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Test the theories taught	K5 in Cognitive domain	Rubric/Viva
2	Appraise the relation between the site work and drawings	K5 in Cognitive domain	Rubric/Viva
3	Inculcate teamwork	A4 in Affective domain	Rubric/Viva
4	Devise a procedure for accomplishing a task	K6 in Cognitive domain	Rubric/Viva
5	Display self-reliance, work ethics in an office	A5 in Affective domain	Rubric/Viva

**COURSE OBJECTIVES**

- 1.
- 2.

**Project: Training portfolio**

**BARC4008 Professional Training**

<b>NOTE:</b>	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
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**Semester 9**

Subject Code	Subject Name	Assigned Credits
BARC5001	Architectural Design-IX	12
BARC5002	Professional Practice-I	2
BARC5006	Disaster Mitigation & Management*3	2
BARC5007	Sustainable Cities & Energy Compliance*3	2
BARC5008	Transport Planning*4	2
BARC5009	Urban & Regional Planning*4	2

<b>Module 37 ARMO 5001</b>		<b>M37: AMENABLE</b>	
<b>Contacts Hours</b>		<b>50 (2 Weeks)</b>	
<b>Assigned Credits</b>		<b>2</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC5006	Disaster Mitigation & Management*3	85	45
BARC5007	Sustainable Cities & Energy Compliance*3	-	-
BARC5002	Professional Practice-I	15	05

**COURSE OUTCOMES**

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Apply basic concepts of the Sustainable Cities & Energy Compliance	K3 in Cognitive domain	Rubric/Viva
2	Appreciate the role of Sustainable Cities & Energy Compliance in global scenario	K3 in Cognitive domain	Rubric/Viva
3	Internalize the values of the Sustainable Cities & Energy Compliance	A5 in Affective domain	Rubric/Viva
4	Conduct the surveys related to the Sustainable Cities & Energy Compliance	P5 in psychomotor domain	Rubric/Viva
5	Present research work through seminar	K6 in Cognitive domain	Rubric/Viva

**Project:****COURSE CONTENT****BARC5006 Disaster Mitigation & Management (Elective III-A)****Unit-1 Introduction to Hazards & Disasters**

Introduction to disaster management, Indian scenario, Understanding of disaster, Hazard and its classification, Vulnerability, Capacity, Risk. Various types of disasters. To understand in detail for the causes, adverse effects, distribution patterns, mitigation measures of Earthquake, Tsunami, Cyclone, Flood and Landslide. Disaster management cycle.

**Unit -II Case Studies**

Studies to understand above mentioned disasters (National as well as International) occurred in past and their inferences.

**Unit -III Disaster Preparedness**

Disaster Management Act, Guidelines, NDMA. Vulnerability Assessment & Warning systems for above said disaster types.

**Unit -IV Disaster Response**

Programmes and strategies for disaster reduction. Communications.

**Unit -V Disaster Mitigation**

Pre disaster, emergency, transition, and recovery. Disaster management plan, Natural crisis management committee, State crisis management group.

**Unit -VII Disaster Resistant Construction Techniques**

Risk reduction measures through land use control, site planning and land management, design and construction of structures for above mentioned disasters.

**Unit-VI: DISASTER RISK MANAGEMENT IN INDIA**

1. Evolution of Disaster Management in India
2. To understand the institutional and legal framework for India

3. Policy and Programmers for Disaster In India
4. Roles and Responsibilities of Panchayat, urban and Local bodies in Disaster Management
5. community participation, public awareness
6. Indian Case Studies

**BARC5007 Sustainable Cities & Energy Compliance (Elective III-B)**

**People, Environment & Buildings**

Relationship between people and environment, impact of people on environment and vice versa, extent of the energy and environmental crises facing the world , Need for implementing energy efficiency on an international, national and individual basis in the context of the building industry & environmental issues. Introduction to Indoor environment – spatial environment, Thermal environment, visual environment, sonic environment and olfactory environment.

**Climate and Built form Responses**

Global climate factors, elements of climate, classification of climate zones, desirable conditions, principals of thermal conditions and STI, body heat exchange, thermal balance, psychometric chart, sun path, sun angles ,SAP, sunshine hours, and solar noon, declination, extraterrestrial radiation, solar constant, radiation on different of different directions with different inclination of walls. Radiation spectrum, spectral sensitivity of eye, visual cone and comfort, daylight assessment, types of reflection, glare and quality and spread of light in buildings. Sound waves, audible range of sounds, equal loudness controls, noise reduction systems, sound transmission path.

Emphasis on responses related to cultural, strategic, technological, social and physical with specific reference to climate and built forms.

**Traditional Wisdom and Sustainable Concepts**

Socio-cultural aspects in the spatial formation of traditional buildings under different climate zones in India. Concepts of ‘Sacred build-up and Landscape’, An Architectural and Theological Interface, Indigenous knowledge, antiquity, Indian vernacular architecture concepts covering informal, functional architecture of structures, built of local materials and designs to meet the needs of the local people and the intricate variations in local social customs, craftsmanship and climate.

The Architectural concepts may have to emphasize local conditions, geography of region and peoples mind to emphasize traditional wisdom and sustainable concepts.

**Sustainable Built Environment, Issues and approaches**

Building on the general appreciation of this area in the core studies, students will be required to have a greater insight into matters relating to specific issues concerning the environment and the ecology. An appreciation of particular issues relating to urban and rural morphological sensitivity will be expected. Scarce material/physical resources should be discussed in the context of (a) choice of materials and (b) diminishing natural resources as should eco-friendly and 'safe' materials with specific reference to thermal, visual comforts. Besides, Students should have an appreciation of aesthetic issues in the built environment. The participants should also have knowledge of the principal considerations involved in the evaluation or survey of built up environment intended for sustainable concepts. They should be familiar with safety considerations relating to the built environment.

**Water and Built Forms, Land and Vegetation**

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Introduction, water demand, growing water misuse, pollution, threat to environment, social implications, sustainability of water resources, ground water management, issues related to urban water supply. Running water and underground water; channel networks and drainage basins, hill slope geomorphology.

Introduction, land forms, Grazing lands, soil erosion, deforestation, air pollution.

Growing concerns of vegetation due to excessive usage, impact of vegetation on soil erosion, prevention of erosion, livestock management, sustainability of urban landscape, wet lands, and sustainable agriculture.

### **BARC5002 Professional Practice-I**

#### **Unit I - Role of Professional Bodies**

The Indian Institute of Architects, its working constitution and byelaws, categories of membership, election procedures. The Uttar Pradesh Architects Association.

<b>Module 38 ARMO 5002</b>		<b>M38: Smart Cities</b>	
<b>Contacts Hours</b>		<b>50 (2 Weeks)</b>	
<b>Assigned Credits</b>		<b>2</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC5006	Disaster Mitigation & Management*3	15	05
BARC5007	Sustainable Cities & Energy Compliance*3	-	-
BARC5001	Architectural Design-IX	10	30
BARC5002	Professional Practice-I	35	15

**COURSE OUTCOMES**

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Illustrate basic concepts of smart city	K3 in Cognitive domain	Rubric/Viva
2	Illustrate basic concepts of resilient city	K3 in Cognitive domain	Rubric/Viva
3	Illustrate the contemporary trends in urban development	K3 in Cognitive domain	Rubric/Viva
4	Apply basic concepts of internet of things related to urban context	K3 in Cognitive domain	Rubric/Viva
5	Internalize the values of vision/ mission of govt. policies related to urban fabric	A5 in Affective domain	Rubric/Viva

**COURSE OBJECTIVES**

**Project:**

**COURSE CONTENT**

**BARC5006 Disaster Mitigation & Management (Elective III-A)**

**Project Work: (Field Work, Case Studies)**

The project /fieldwork is meant for students to understand vulnerabilities and to work on reducing disaster risks and to build a culture of safety. Projects are conceived creatively based on the geographic location and hazard profile of given region

**BARC5007 Sustainable Cities & Energy Compliance (Elective III-B)**

**Solar Passive Design (Concepts, Strategies & Services)**

Introduction of passive solar architecture, appreciation of Built form for different climates, building clusters and solar exposure, thermal environment. Types of passive systems, direct gain, thermal storage wall, attached green house, thermal storage roof and convective loop.

Modern and postmodern passive architecture, methods, strategies, systems, and construction details emphasizing the passive architecture and non-active services.

**BARC5001 Architectural Design-IX**

**BARC5002 Professional Practice-I**

**Unit I Architects’ Act 1972**

Detail study of the Act, Council of Architecture; Procedures of membership.

**Unit II**

**Scale of charges** Conditions of engagement of an architect – Duties; Responsibilities and liabilities of a professional architect; Scale of charges, mode of payment etc.

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<b>Module 39 ARMO 5003</b>		<b>M39: Urban Design</b>	
<b>Contacts Hours</b>		<b>150 (6 Weeks)</b>	
<b>Assigned Credits</b>		<b>6</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC5001	Architectural Design IX	40	130
BARC5002	Professional Practice-I	50	20

**COURSE OUTCOMES**

Architectural Graduate will be able to:		Knowledge domain and level	Evaluation Method
1	Appreciate basic concepts of urban design	K3 in Cognitive domain	Rubric/Viva
2	Value the role of urban systems in society	A3 in Affective domain	Rubric/Viva
3	Illustrate history of urban design	K3 in Cognitive domain	Rubric/Viva
4	Illustrate concepts of professional practice	K3 in Cognitive domain	Rubric/Viva
5	Design intervention in a bazaar street	K6 in Cognitive domain	Rubric/Viva

**COURSE OBJECTIVES**

**Project:**

**COURSE CONTENT**

**BARC5001 Architectural Design IX**

**Project: Urban Space Analysis**

**Unit 1: STUDY AND ANALYSIS OF URBAN SPACES, MODERN CONCEPTS IN URBAN DESIGN**

A brief study and analysis of urban space.

Study of Urban design theories of Christopher Alaxander, Jane Jacob, Gordon Cullen and Kevin Lynch. Relevance of historic concepts of urban design in the present context-Critical analysis of Indian cities & understanding the urban design projects of Singapore, China & United States.

**Unit 2: BASIC PRINCIPLES & TECHNIQUES IN URBAN DESIGN**

Components in urban design composition. Urban scale, mass and space, definition of urban fabric, visual surveys and their influence for urban design, various methods of conducting a visual survey.

Definition and purpose of open spaces and their hierarchy in urban design-hierarchy of utility spaces for residential, commercial, recreational and industrial use. Special focus on streets-Expressive quality of built forms, spaces in public domain.

**UNIT 3: RENEWAL, RE-DEVELOPEMENT AND FORMULATING URBAN DESIGN**

Definition and need for urban renewal and re-developement, scope for urban renewal in India challenges and implementation methods of urban renewal for Indian historic towns and cities, impact of public participation. Analysis and formulation of urban design guidelines for new developments.

National and international case studies for urban renewal.

**BARC5002 Professional Practice-I**

**Unit -I Code of Professional conduct & Architectural Competition**

Clauses governing conduct of professional architect. Types of competitions; need and procedure for conducting competitions.

**Unit -II Tender and Contract**

Type of building contracts, their demands. Preparation of tender documents, method of inviting tenders, opening of tenders, preparation of comparative statement recommendation and award of projects, preparation of contract documents, general conditions of contract, interim certificates, defect liability period, retention amount and virtual completion.

**Unit -III Easements**

Introduction to various easement process and precautions to protect easement rights.

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.



<b>Module 40 ARMO 5004</b>		<b>M40: Mixed Use Development</b>	
<b>Contacts Hours</b>		<b>150 (6 Weeks)</b>	
<b>Assigned Credits</b>		<b>6</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC5001	Architectural Design IX	45	140
BARC5008	Transport Planning*4	15	10
BARC5009	Urban & Regional Planning*4		-

**COURSE OUTCOMES**

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Illustrate concepts of various Land Uses and land planning	K3 in Cognitive domain	Rubric/Viva
2	Apply basic concepts of town planning	K3 in Cognitive domain	Rubric/Viva
3	Design intervention in transit oriented development	K6 in Cognitive domain	Rubric/Viva
4	Develop a vision document for mixed land use	K6 in Cognitive domain	Rubric/Viva
5	Integrate social, ecological and economic concerns	A4 in Affective domain	Rubric/Viva

**COURSE OBJECTIVES**

**Project:**

**COURSE CONTENT**

**BARC5001 Architectural Design IX**

**Project: Urban Design Intervention**

Design intervention into an existing urban precinct. Creating proposal document, drawings, maps and 3D physical model for proposed project. Urban outdoor lighting, urban green infrastructure, acoustic consideration for urban fabric, air quality at street level.

**BARC5008 Transport Planning (Elective IV-A)**

**Unit I- Introduction:**

Transport and Socioeconomic Activities, Historical Development of Transport, Transportation in the Cities, Freight Transportation, Future Developments

**BARC5009 Urban & Regional Planning (Elective IV-A)**

<b>NOTE:</b>	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.

<b>Module 41 ARMO 5005</b>		<b>M41: Sprawl</b>	
<b>Contacts Hours</b>		<b>50 (2 Weeks)</b>	
<b>Assigned Credits</b>		<b>6</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC5001	Architectural Design IX	05	10
BARC5008	Transport Planning*4	85	40
BARC5009	Urban & Regional Planning*4	-	-

**COURSE OUTCOMES**

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Apply basic concept of the elective topic	K3 in Cognitive domain	Rubric/Viva
2	Appreciate the role of Elective topic in global scenario	K3 in Cognitive domain	Rubric/Viva
3	Internalize the values of the elective	A5 in Affective domain	Rubric/Viva
4	Conduct the surveys related to elective	P5 in psychomotor domain	Rubric/Viva
5	Present research work through seminar	K6 in Cognitive domain	Rubric/Viva

**COURSE OBJECTIVES**

**Project:**

**COURSE CONTENT**

**BARC5001 Architectural Design IX**

**BARC5008 Transport Planning (Elective IV-A)**

**Unit I**

**Urban Transportation System Planning- Conceptual Aspects:**

Transport Planning Process, Problem Definition, Solution Generation, Solution Analysis, Evaluation and Choice, Implementation, Sequence of Activities Involved in Transport analysis.

**Unit II**

**Trip Generation Analysis:** Trip Production Analysis, Category Analysis, Trip Attraction Modelling. Mode Choice Modelling: Influencing Factors, Earlier Modal Split Models, Trip-End Type Modal Split Model, Trip-Interchange Modal Split Model, Disaggregate Mode-Choice Model, Logit Model of Mode Choice, Binary Choice Situations, Multinomial Logit Model, Model calibration, Case studies.

**Unit III**

**Route Assignment:**

Description of transport network, Route Choice Behaviour, The Minimum Path, Minimum Path Algorithm, Route Assignment Techniques, All-or-Nothing Assignment, Multipath Traffic Assignment, Capacity-Restrained Traffic Assignment

**Unit IV**

**Transportation Surveys**

Definition of Study Area, Zoning, Types of Movements, Types of Surveys, Home- Interview Survey, Commercial Vehicle Survey, Intermediate Public Transport Survey, Public Transport Survey, Roadside-Interview Survey, Cordon-Line Survey, Post-Card Questionnaire Survey, Registration-Number Survey, Tag-on- Vehicle Survey.

**Unit V**

**Transport Related Land-Use Models:**

Development of Land - Use models, The Lowry Model, Application of Lowry Model.

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**Unit VI**

**Urban Structure:**

Urban Activity Systems, Urban Movement Hierarchies, Types of Urban Structure, Centripetal-Type Urban Structure, Grid- Type Urban Structure, Linear-Type Urban Structure, Directional Grid Urban Structure.

**BARC5009      Urban & Regional Planning (Elective IV-A)**

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**Semester 10**

<b>Subject Code</b>	<b>Subject Name</b>	<b>Assigned Credits</b>
BARC9999	Architectural Thesis	24
BARC5005	Professional Practice-II	2

<b>Module 42 ARMO 5006</b>		<b>M42:Architectural Thesis</b>	
<b>Contacts Hours</b>		<b>936 (26 Weeks)</b>	
<b>Assigned Credits</b>		<b>26</b>	
<b>Subject Code</b>	<b>Subject Name</b>	<b>Max Marks</b>	<b>Contact Hours</b>
BARC9999	Architectural Design X	100	874
BARC5005	Professional Practice-II	100	72

**COURSE OUTCOMES**

<b>Architectural Graduate will be able to:</b>		<b>Knowledge domain and level</b>	<b>Evaluation Method</b>
1	Design architectural project in totality	K6 in Cognitive domain	Rubric/Viva
2	Communicate the thesis proposal to expert jury	K3 in Cognitive domain	Rubric/Viva
3	Write thesis report	K6 in Cognitive domain	Rubric/Viva
4	Make scale model of the design thesis	K6 in Cognitive domain	Rubric/Viva
5	Value the role of time management in architectural project	A3 in Affective domain	Rubric/Viva

**COURSE OBJECTIVES**

1. To prepare a student to independently handle and present all aspects of an architectural design, from its evolution to final solution in totality.
2. To understand the importance of the evolutionary stages of a design process and various techniques required for a successful presentation of an architectural design.
3. To develop in students the ability to handle specific aspects / thrust area of design relevant to the topic2.

**Project: Thesis**

**BARC9999 Thesis (400 Contact Periods)**

**BARC5005 Professional Practice-II**

**Units I-Valuation** Valuation of immovable properties, elements of valuation and factors affecting valuation; Techniques of valuation of landed and building property; Value classification and types of valuation.

**Units II-Arbitration** Arbitration, Arbitrator, Umpire, Nature of arbitration. Appointment, Conduct, Powers, and duties of arbitrators and umpires; Procedure of arbitration and preparation of awards.

**Units IV-Law related to Land**

The land acquisition Act, UP Urban Development Act 1973

**Units IV-Law of Control**

The Partnership Act, 1932

**Units V-Law related to Conservation**

The elements of the Ancient monument,(site remains) Act 1956

NOTE:	Internal and external exams shall be carried out by a Jury of Internal or External Examiners which would be marked on the basis of the approved evaluation rubric
	S / P Internal Marks shall be awarded on students' work in the form of Case Study / Design Sheets / Reports / Models / Presentations / Seminars, which shall be evaluated by approved evaluation rubric by concerned faculty.