

**School of Basic Sciences****Bachelor of Science Honours in Physics  
Semester End Examination - Jun 2024****Duration : 180 Minutes  
Max Marks : 100****Sem IV - C1UD404B - Analog Electronics***General Instructions**Answer to the specific question asked**Draw neat, labelled diagrams wherever necessary**Approved data hand books are allowed subject to verification by the Invigilator*

- 1) Write a relation between current and drift velocity of electrons in a conductor. Use this relation to explain how the resistance of a conductor changes with the rise in temperature. K1(3)
- 2) With necessary diagram explain the input and output characteristics of CB configuration K2(4)
- 3) Explain the criteria for fixing operating point. (or) Explain the reasons for keeping the operating point of a transistor as fixed. K2(6)
- 4) Explain the stability factors S, Derive the expression for stability factor (s) of a voltage divider bias circuit / self bias circuit. K3(6)
- 5) List out the different types of biasing methods. Design a fixed biased circuit using a silicon transistor having  $\beta$  value of 100.  $V_{cc}$  is 10 V and dc bias conditions are to be  $V_{CE} = 5$  V and  $I_C = 5$  mA K3(6)
- 6) Sketch the input and output waveforms of half wave rectifier and full wave rectifier and obtain the expression for the ripple factor of a half wave rectifier. K3(9)
- 7) Draw the circuit diagram of a self bias BJT circuit and how to determine the values of R1 and R2. K3(9)
- 8) In a bridge rectifier the transformer is connected to 220V, 60Hz mains and the turns ratio of the step down transformer is 11:1. Assuming the diode to be ideal, find: i)  $I_{dc}$  ii) voltage across the load iii) PIV assume load resistance to be  $1k\Omega$  K4(8)
- 9) Draw the cascade amplifier circuit and derive expressions for voltage gain, current gain, input impedance and output impedance. K4(12)
- 10) A diode with potential barrier 0.6V across its junction, is connected in series with resistance of  $20 \Omega$  across source. If 0.25 Ampere K5(10)

current passes through resistance, calculate the source voltage. Also draw the circuit diagram and mention the biasing of the diode

- 11) A class A power amplifier has zero signal collector current of 100mA. If the collector supply voltage is 5V, determine . (a) Maximum a.c power output ( b) Power rating of transistor (c) Maximum collector efficiency. K5(15)

**OR**

Discuss the classification of amplifiers based on the operating point as per biasing condition. K5(15)

- 12) State and explain Barkhausen criterion of Oscillations. Draw the circuit diagram of RC phase shift Oscillator and Explain its working. Explain the concept of frequency stability of Oscillators. K6(12)

**OR**

Discuss the Barkhausen criterion as applied to electronic feedback oscillators. Why are LC oscillators not suitable for low frequency application ? K6(12)