Hall Ticket No | | | | | | | | | | | Question Paper Code: AECB06

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Four Year B.Tech III Semester End Examinations(Regular) - November, 2019

Regulation: IARE – R18

ELECTRONIC DEVICES AND CIRCUITS

Time: 3 Hours **(ECE)** **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Draw the V-I characteristics of a semiconductor diode and discuss the effect of temperature on Cut-in voltage and reverse saturation current. Define static and dynamic resistances **[7M]**

   (b) Design a full wave rectifier with C filter to provide 10V DC at 100 mA with a maximum ripple of 2% , input frequency is 50Hz. **[7M]**

2. (a) Illustrate the working of bridge full wave rectifier with circuit diagram and waveforms and obtain expression for ripple factor . **[7M]**

   (b) Draw a diode clipping circuit to convert 1 KHz sine-wave of 20V peak to peak, to a symmetric square-wave of 4 volt peak to peak amplitude. **[7M]**

UNIT – II

3. (a) Draw and explain the input and output characteristics of Common emitter configuration and mention various parameters there in. **[7M]**

   (b) A transistor has $\beta = 150$. Calculate the approximate collector and base currents if the emitter current is 10mA. **[7M]**

4. (a) Define operating point. Explain the DC and AC load line analysis of a BJT. **[7M]**

   (b) Determine the parameters h_{fe}, h_{oe}, h_{ie} and h_{re} from the characteristic curves of CE transistor. **[7M]**

UNIT – III

5. (a) Explain the method of thermistor and sensistor compensation technique in transistor bias compensation. **[7M]**

   (b) Calculate the quiescent current and voltage of collector to base bias arrangement using the following data: V_{CC}= 10V, R_B=100KΩ, R_C = 2KΩ, β=50 and also specify a value of R_B so that V_{CE} = 7V. **[7M]**

6. (a) Explain the small signal equivalent of CB amplifier using accurate h-parameter model. Obtain the expression for A_V, A_I, R_I and R_0 **[7M]**

   (b) The emitter follower has the following circuit parameters: $R_S = 500\Omega$, $R_1 = R_2 = 50K\Omega$, $R_L = 2K\Omega$, $h_{fe} = 100$ and $h_{ie} = 1.1K\Omega$. Determine the input resistance, output resistance, current gain and voltage gain. **[7M]**

UNIT – IV

7. (a) Draw and explain the drain and transfer characteristics of enhancement n channel MOSFET with neat sketch. **[7M]**

   (b) A common source MOSFET amplifier is to be constructed using a n-channel MOSFET which has a conduction parameter of 50mA/V and a threshold voltage of 2.0 volts. If the supply voltage is +15 volts and the load resistor is 470 Ohms, calculate the values of the resistors required to bias the MOSFET amplifier at 1/3(V_{DD}). Draw the circuit diagram and Values given: $V_{DD} = +15v$, $V_{TH} = +2.0v$, k = 50mA/V and $R_D = 470\Omega$. **[7M]**

8. (a) Define JFET parameters and establish the relations between them. Explain the operation of JFET with a neat diagram and also draw drain and transfer characteristics. **[7M]**

   (b) The following information is included on the data sheets for an N-channel JFET. $I_{DSS} = 25mA$, $V_P = -10V$ and $g_{m0} = 4000\mu s$. Determine the values of transconductance at $V_{GS} = -5V$. **[7M]**

UNIT – V

9. (a) Explain the small signal equivalent circuit of common drain amplifier with necessary diagrams. **[7M]**

   (b) The CS amplifier has the following components: $R_D = 5K\Omega$, $R_G = 10M\Omega$, μ=50 and $r_d = 35K\Omega$. Evaluate A_v, Z_i and Z_0. **[7M]**

10. (a) Explain the V-I Characteristics of Zener diode and analyze its breakdown mechanisms. **[7M]**

    (b) A 5.0V stabilized power supply is required to be produced from a 12V DC power supply input source. The maximum power rating PZ of the zener diode is 2W. Using the zener regulator circuit above calculate:

    i) The maximum current flowing through the zener diode.

    ii) The minimum value of the series resistor, R_S.

    iii) The load current I_L if a load resistor of 1kΩ is connected across the zener diode.

    iv) The zener current I_Z at full load. **[7M]**