Hall Ticket No | | | | | | | | | | | Question Paper Code: AEC001

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Four Year B.Tech III Semester End Examinations (Supplementary) - July, 2018

Regulation: IARE – R16

ELECTRONIC DEVICES AND CIRCUITS

Time: 3 Hours **(Common to ECE | EEE)** **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) Explain the static and dynamic resistance of a diode with relevant expressions. Illustrate the two breakdown mechanisms in a diode with relevant example and figure. **[7M]**

   (b) Determine the germanium PN junction diode current for the forward bias voltage of 0.2V at room temperature 24^0C with reverse saturation current equal to 1.1mA. Take η =1 **[7M]**

2. (a) What is a Zener diode? Explain the construction, working and VI characteristics of Zener diode. Illustrate how Zener diode is used a voltage regulator with example and relevant figure **[7M]**

   (b) Determine the forward resistance of a silicon PN junction diode when the forward current is 5 mA at room temperature. **[7M]**

UNIT – II

3. (a) Calculate the ripple factor for the half wave rectifier with a shunt capacitor filter. **[7M]**

   (b) A half wave rectifier is used to supply 24V D.C power to a resistive load of 500Ω and the diode has a forward resistance of 50Ω. Calculate the maximum value of the A.C. voltage required at the input. **[7M]**

4. (a) A full-wave rectifier is connected with capacitive filter. Derive expression for the ripple factor and draw relevant waveforms **[7M]**

   (b) A full wave rectifier has a center tapped transformer 100-0-100 V. Each one of the diode is rated at Imax of 400 mA and Iav of 150 mA. Neglecting the voltage drop across the diodes, find

   i. The value of the load resistance that give the largest DC power output **[7M]**
   ii. DC output voltage
   iii. DC load current and
   iv. PIV of each diode

UNIT – III

5. (a) Highlight the need and importance of JFET. Compare the salient features of JFET and bipolar junction transistor(BJT). **[7M]**

   (b) Compare and contrast JFET with MOSFET? Draw the symbols of MOSFETs. **[7M]**

6. (a) Illustrate the common base configuration of BJT with relevant figures and explain its input and output characteristics. **[7M]**

   (b) A transistor operating in CB configuration has $I_C = 2.98$mA, $I_E = 3.0$mA and $I_{co} = 0.01$mA. What current will flow in collector circuit of that transistor when connected in CE configuration and base current is $30\mu A$ **[7M]**

UNIT – IV

7. (a) Explain the two important factors to be considered while designing the biasing circuit which are responsible for shifting the operating point. Also list the requirements of a biasing circuit. **[7M]**

   (b) Explain the construction and operation of N-channel enhancement type MOSFET with the help of its(ID-VDS) and (ID-VGS) characteristics. **[7M]**

8. (a) Discuss the need to fix the operating point of a transistor and illustrate the DC load line analysis of common emitter output characteristics of BJT. **[7M]**

   (b) A collector to base circuit shown in Figure 1 has $V_{CC} = 24$ V, $R_B = 180$ KΩ, $R_C = 3.3$ KΩ and $V_{CE} = 10$ V. Calculate h_{FE}. Determine V_{CE} when a new transistor is replaced having $h_{FE} = 120$ **[7M]**

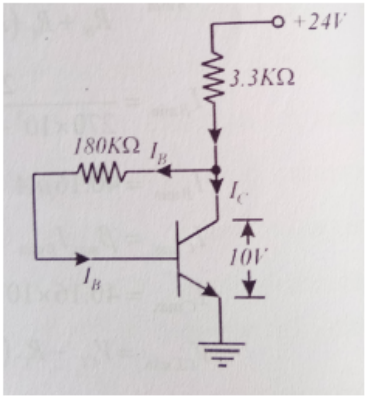

Figure 1

UNIT – V

9. (a) Draw the small signal equivalent circuit of the source follower circuit and derive the equations for voltage gain, input admittance and output admittance. **[7M]**

   (b) For the circuit shown in Figure 2 below, $V_{CC} = 20$ V, $R_C = 2$ kΩ, $\beta = 50$, V_{BE}act $= 0.2$ V, $R_1 = 100$ kΩ, $R_2 = 5$ kΩ and $R_E = 100\Omega$. Calculate I_B, V_{CE} and I_C. **[7M]**

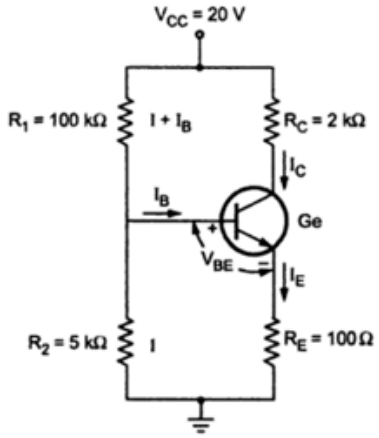

Figure 2

10. (a) Classify the amplifiers based on biasing conditions. **[7M]**

    (b) In the common gate amplifier, R_D = 2 KΩ, gm = 1.43 x 10^{-3} mho and r_d = 35 KΩ. Evaluate the voltage gain AV. **[7M]**

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