

ELECTRONIC DEVICES & CIRCUITS

(Common to EEE, ECE and EIE)

Time: 3 hours

Max. Marks: 70

PART – A
(Compulsory Question)

1 Answer the following: (10 X 02 = 20 Marks)

- Differentiate between intrinsic and extrinsic semiconductors.
- A HWR is used to supply 24 V dc to a resistive load of 500 Ω and the diode has a forward resistance of 50 Ω . Calculate the maximum value of the ac voltage required at the input.
- Specify the relation between α and β factors with respect to a transistor.
- Write any two differences between N-channel JFET to a P-channel JFET.
- What is the need for biasing a transistor?
- Define: (i) Thermal resistance. (ii) Thermal runaway.
- Compare CB, CE and CC configurations of a transistor.
- Sketch a simplified CE Hybrid model of a transistor.
- Why Schottky diode is also called as hot carrier diodes?
- Define Latching current and holding currents of a SCR.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

2 What is Fermi Level? By indicating the position of Fermi level in intrinsic, N-type and P-type semiconductor, explain its significance in semiconductors.

OR

- Compare the performance of Inductive, L-section and π -section filters used with rectifiers.
- In a FWR using an LC filter, $L = 10$ H, $C = 100$ μ F, and $R_L = 500$ Ω . Calculate I_{dc} , V_{dc} , and ripple factor for an input of $V_i = 30 \sin(100\pi t)$ V.

UNIT - II4 With reference to a BJT, explain the following terms in detail.
(i) Emitter efficiency. (ii) Base transportation factor. (iii) Large signal current gain.**OR**

5 Detail the construction of an n-channel MOSFET of depletion type. Draw and explain its characteristics.

UNIT - III

- Explain how biasing is provided to a transistor through potential divider bias.
- An NPN transistor with $\beta = 50$ is used in Common Emitter configuration with $V_{CC} = 10$ V and $R_C = 2.2$ k Ω . Biasing is done through a 100 k Ω resistance from collector-to-base. Assuming V_{BE} to be zero volts. Find: (i) The quiescent point. (ii) The stability factor S.

OR

7 Describe the significance of operating point, DC and AC load lines to ensure active region operation of a BJT in CE configuration

UNIT - IV

- List out the typical values of h-parameters in the three BJT configurations (CE, CB and CC).
- Describe how h_{ie} and h_{fe} can be determined from BJT characteristics.

OR

9 Draw the basic circuit and small-signal model of Common drain FET amplifier. Derive the expressions for voltage gain and output resistance.

UNIT - V

10 Draw the basic structure and equivalent circuit of UJT, explain how the UJT can be used as negative-resistance device with the aid of static characteristics.

11 Describe the following briefly:
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- Principle of operation of a Photodiode
- Energy band structure and V-I characteristics of a Tunnel diode.
