Code No: R2021022 **R20** SET - 1

II B. Tech I Semester Supplementary Examinations, July - 2023
ELECTRONIC DEVICES AND CIRCUITS
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions, each Question from each unit
All Questions carry **Equal** Marks

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UNIT-I

1 a) Explain energy band diagram of insulator, semiconductor and conductor. [8M]

b) The current flow through a PN-junction germanium diode is 40 mA for a forward biased voltage of 0.5V at 300K. Calculate the static and dynamic resistances of the diode. [6M]

Or

2 a) Explain about drift and diffusion currents in semiconductors. [8M]

b) The current flow through a PN-junction diode is 0.65 mA at forward-biased voltage 350 mV and 20 mA at forward-biased voltage 450 mV. Determine the value of η if the junction operates at 295K. [6M]

UNIT-II

3 a) With a neat sketch explain the construction and working of SCR. [8M]

b) Draw and explain the V-I characteristics of the UJT. [6M]

Or

4 a) With neat sketch explain the operation of full wave rectifier with capacitor filter and derive the expression for ripple factor. [10M]

b) Give the comparison of various filter circuits in terms of ripple factors. [4M]

UNIT-III

5 a) Define α, β and γ of a transistor. Show how they are related to each other. [7M]

b) Explain the various current components in a transistor. [7M]

Or

6 a) Explain the principle of operation of enhancement MOSFET. [7M]

b) A self-biased p-channel JFET has a pinch-off voltage of Vp=5V and I_{DSS}=12mA. The supply voltage is 12V. Determine the values of R_D and R_S so that I_D=5mA and V_{DS}=6V. [7M]

UNIT-IV

7 a) Explain about DC Load line and the significance of Q-point. [5M]

b) Design a self-bias circuit using silicon transistor to achieve a stability factor of 10, with the following specifications: V_{CC}=16V, V_{BE}=0.7V, V_{CEQ}=8V, I_{CQ}=4 mA and β=50. [9M]

Or

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8 a) Derive an expression for the condition to avoid thermal runaway. [7M]

b) Design a voltage divider bias circuit for specified condition V_{CC} = 12V, V_{CE} = 6V, I_C = 1 mA, S = 20, β = 100 and V_E = 1V. [7M]

UNIT-V

9 a) Explain the principle of operation of CS amplifier with the help of circuit diagram. [6M]

b) Determine the current gain, input impedance and voltage gain when the transistor is connected in CB configuration with a load R_L=10KΩ, V_{CB}=10V, I_C=1mA, h_{ib}=20Ω, h_{rb}=5x10^{-4}, h_{fb}=-0.98, h_{ob}=10^{-7} ℧. [8M]

Or

10 a) Derive the expressions for input impedance, output impedance and voltage gain of JFET Common Drain amplifier. [9M]

b) Define the various h-parameters and give their units. [5M]