



PART – B

(5×13=65 Marks)

11. a) Discuss about the forward bias and reverse bias characteristics of a diode and derive the current equation for a PN diode. (13)
(OR)
- b) Derive the transition and diffusion capacitances in PN diode. (13)
12. a) Explain the input and output characteristics of common base and common emitter configuration in BJT. (13)
(OR)
- b) Derive the current gain, voltage gain, input impedance and output impedance in terms of hybrid parameters for a BJT. (13)
13. a) Illustrate the construction and characteristics of N-channel JFET. (13)
(OR)
- b) Illustrate the construction and characteristics N-channel D-MOSFET. (13)
14. a) i) Explain the construction and working of Schottky barrier diode. (7)
ii) Explain the working of varactor diode with its characteristic graph. (6)
(OR)
- b) i) Explain the construction and working of MESFET with its characteristic graph. (7)
ii) Explain the construction and working of LASER diode with its characteristic graph. (6)
15. a) Illustrate the working of SCR with equivalent circuit and characteristic graph. (13)
(OR)
- b) Illustrate the working of UJT with equivalent circuit and characteristic graph. (13)

PART – C

(1×15=15 Marks)

16. a) The phosphorous (donor) concentration in a region of a silicon crystal varies linearly from a concentration of $n_0 = 10^{14} \text{ cm}^{-3}$ at $x = 0 \text{ mm}$ to a concentration of $n_1 = 10^{17} \text{ cm}^{-3}$ at $x = 1 \text{ mm}$. The diffusion constant for electrons is $D_n = 22.5 \text{ cm}^2/\text{s}$, the diffusion constant for holes is $D_p = 5.2 \text{ cm}^2/\text{s}$, and the temperature is 300 K. What is the diffusion current density in the positive x-direction? (15)
(OR)
- b) The reverse gate voltage of JFET, when changes from 4.4V to 4.2V, the drain current changes from 2.2 mA to 2.6 mA. The device parameters of JFET are Maximum current $I_{DSS} = 10 \text{ mA}$, Pinch off voltage, $V_p = -4\text{V}$. Find out the value of transconductance of the transistor and drain current for $V_{GS} = -4\text{V}$. (15)