

12. (a) (i) Explain NPN transistor common-emitter configuration and draw a circuit for determining its input and output characteristics. (10)
- (ii) Define α, β and λ of a transistor. Show how are they related to each other. (6)

Or

- (b) (i) Briefly explain CE transistor hybrid- π model. (8)
- (ii) Draw the Ebers-Moll model for NPN transistor and give the equation for emitter and collector current. (8)
13. (a) (i) With the help of neat sketches and characteristics curves explain the operation of the junction FET. (8)
- (ii) Define and explain the parameters transconductance g_m , drain resistance r_d and, amplification factor μ of a JFET. Establish the relation between them. (8)

Or

- (b) (i) With the help of a suitable diagram explain the working of E-MOSFET and D-MOSFET. (12)
- (ii) What is channel length modulation in MOSFET? (4)
14. (a) (i) Draw the structure of a metal-semiconductor junction and explain the energy band structure before and after contact. (8)
- (ii) Explain the principle behind the laser diode with a neat sketch. (8)

Or

- (b) (i) What is Schottky diode? Explain the flow of carriers across its junction during forward and reverse biased conditions with energy band diagrams. (8)
- (ii) Explain the principle behind the varactor diode and list out its applications. (8)
15. (a) (i) Draw the V-I characteristics of a UJT and explain its working principle. (8)
- (ii) Draw the two transistor model of an SCR and explain its breakdown operation. (8)

Or

- (b) (i) Explain the operation of a DMOS and VMOS transistor. (8)
- (ii) Describe the operation of LED and CCD and list out its applications. (8)