

7. (a) Explain the working principle of a Schottky diode. Mention its applications and advantages. **8**
- (b) What happens if the transistor is not biased properly ? Explain the C-V characteristics of a transistor. **7**

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Total Pages : 04

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May 2024

B. Tech. (IT/CSE-AIML) (Sixth Semester)
Electronic Devices (OEC-CS-601-IV)

Time : 3 Hours]

[Maximum Marks : 75

Note : It is compulsory to answer all the questions (1.5 marks each) of Part A in short. Answer any *four* questions from Part B in detail. Different sub-parts of a question are to be attempted adjacent to each other.

Part A

1. (a) How does the energy gap in a semiconductor vary, when doped with a trivalent impurity ? **1.5**
- (b) Why is collector region wider than emitter region in BJT ? **1.5**
- (c) Explain the switching characteristic of PN junction diode. **1.5**
- (d) What is the condition for thermal stability and thermal resistance ? **1.5**

- (e) Define cut-off, active and saturation regions in a transistor. 1.5
- (f) Why do the output characteristics of a CB transistor have a slight upward slope ? 1.5
- (g) In a BJT, the emitter current is 12 mA and the emitter current is 1.02 times the collector current. Find the base current. 1.5
- (h) Why the input impedance of FET is more than that of a BJT ? 1.5
- (i) Differentiate between LED and Solar cell. 1.5
- (j) Discuss the twin-tub CMOS process in detail. 1.5

Part B

2. (a) Derive an expression for total diode current starting from Boltzmann relationship in terms of the applied voltage. 8
- (b) Detail the construction of an n-channel MOSFET of depletion type. Draw and explain its characteristics. 7
3. (a) Discuss in detail the fabrication steps of a pMOS transistor. 8

- (b) Designate the charge carrier generation and separation mechanism in solar cells with respect to the solar light illumination. 7
4. (a) Sketch the static characteristics of a common base transistor and bring out the essential features of input and output characteristics. 8
- (b) Compare the following : 7
- (i) Ion implantation and Diffusion
- (ii) Dielectric and Poly-silicon film deposition.
5. (a) Illustrate the applications of PIN diode and photo detectors toward society in terms of medical, research and development and information technology. 8
- (b) Draw the hybrid- π equivalent of a CE transistor for high frequency and explain the significance of each parameter. 7
6. (a) What is photolithography ? Explain the photolithography process in detail. 8
- (b) Explain the formation of energy bands in solids. On the basis of energy bands distinguish between a metal, a semiconductor and an insulator. 7