Q.P. Code :10592

[Time: 3 Hours] [Marks:80]

Please check whether you have got the right question paper.

N.B: 1. **Question -1 is compulsory.**
2. **Solve any THREE from remaining questions.**
3. Assume suitable data it necessary.

1 a) Explain two terminal Mos structure. (05)
  b) Calculate width of the space charge region in a PN junction when a reverse bias voltage is applied consider a (05)
     P-N junction at T = 300 k, $N_a = 10^{16} cm^{-3}$ and $N_d = 10^{15} cm^{-3}$, $n_i = 1.5 \times 10^{10} cm^{-3}$ and $V_R = 5V$; $V_{bi} = 0.635V$, V_{bi} is
     the built in potential barier voltage.
  c) Write note on HBT. (05)
  d) Explain differences between FET and MESFET. (05)

2 a) Explain construction working and characteristics of Tunnel diode. (10)
  b) Draw and explain hybrid π (pi) model of BJT (10)

3 a) Calculate V_{bi} in a silicon P–N junction at T = 300 K for $N_d = 10^{15} cm^{-3}$ and $N_a = 10^{15} cm^{-3}$ and $n_i = 1.5 \times 10^{10} cm^{-3}$. (10)
  b) Explain constructions working and characteristics of E MOSFET (10)

4 a) Explain construction, working and characteristics of FET (10)
  b) Explain following effects in FET – (1) Channel length modulation (10)
                                          (2) Velocity saturation effects.

5 a) Draw and explain energy band diagram for MOSFET for different gate bias conditions. (10)
  b) Explain working and characteristics of SCR. (10)

6 Write notes on any four of the following (20)
     a) Zener diode voltage regulator.
     b) Triac
     c) Solar Cell
     d) Photo diode
     e) UJT relaxation oscillator

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