Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 97056

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

Second Semester

Electronics and Communication Engineering

EC 6201 — ELECTRONIC DEVICES

(Regulation 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define diffusion current and drift current.

2. Consider a Si PN junction at T = 300 K with doping concentrations of $N_a = 10^{16}\ cm^{-3}$ and $N_d = 10^{15}\ cm^{-3}$. Assume that $n_i = 1.5 \times 10^{10}\ cm^{-3}$. Calculate width of the space charge region in a PN junction, when a reverse bias voltage $V_R = 5$ V is applied.

3. Calculate the collector and emitter current levels for a BJT with $\alpha_{dc} = 0.99$ and $I_B = 20\ \mu A$.

4. What is the major difference between a bipolar and unipolar device?

5. Define Pinch — off voltage.

6. Draw the symbol for DUAL GATE MOSFET.

7. What are the differences between a Tunnel diode and an ordinary PN junction diode?

8. Mention the analog and digital applications of LDR.

9. Draw the two transistor equivalent circuit of an SCR.

10. Sketch the graph symbol for n – channel and p – channel MOSFET.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the operation of PN junction under zero voltage applied bias condition and derive the expression for built in potential barrier. (12)

(ii) Calculate the built in potential barrier in a PN junction. Consider a silicon PN junction at 300 K with doping densities $N_a = 1 \times 10^{18}$ cm^{-3} and $N_d = 1 \times 10^{15}$ cm^{-3}. Assume $n_i = 1.5 \times 10^{10}$ cm^{-3}. (4)

Or

(b) (i) Explain the basic structure of the PN junction. (8)

(ii) Write short notes on diode switching characteristics. (8)

12. (a) Define the hybrid parameters for a basic transistor circuit in CE configuration and give its hybrid model.

Or

(b) Write short notes on :
(i) Early effect (8)
(ii) Ebers — Moll model for BJT (8)

13. (a) Draw a circuit diagram for obtaining the drain and transfer characteristics for an N channel JFET.

Or

(b) Draw a circuit diagram of the cross section of a Enhancement MOSFET. Also discuss the Drain and transfer characteristics for EMOSFET.

14. (a) Explain the V-I characteristics of Zener diode and distinguish between Avalanche and Zener Break downs.

Or

(b) Explain the principle and operation of varactor Diode.

15. (a) Give the construction details of UJT & explain its operation with the help of equivalent circuits.

Or

(b) Write short notes on :
(i) Photo transistor (5)
(ii) Opto couplers (5)
(iii) CCD (6)
with necessary sketches.

———————