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

Question Paper Code : 52904

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Second Semester

Electronics and Communication Engineering

EC 6201 — ELECTRONIC DEVICES

(Regulation 2013)

(Common to PTEC 6201 — Electronic Devices – for B.E. (Part-Time) First Semester – Electronics and Communication Engineering – Regulation 2014)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is meant by Barrier Potential?

2. Calculate the thermal equilibrium hole concentrations, Consider silicon at T = 300 K doped with phosphorous at a concentration of $N_d = 10^{16}$ cm^{-3} and $n_i = 1.5 \times 10^{10}$ cm^{-3}.

3. Draw the Common Base Configuration Circuit of an NPN Transistor

4. The transistor has a Common Base current gain of 0.97, Find the Common Emitter current gain.

5. Compute the maximum value of transconductance (g_m) for a JFET with $I_{DSS} = 8$ mA, $V_P = -4$ V and $V_{GS} = -0.5$ V.

6. Define channel length modulation.

7. Write about MESFET.

8. Provide the expansion of LASER and LDR.

9. Compare SCR with TRIAC.

10. Provide your understanding on the safe operating area of a power BJT.

PART B — (5 × 16 = 80 marks)

11. (a) Derive the expression for drift current density.

Or

(b) Discuss the V-I characteristics of forward and reverse bias of PN junction diode.

12. (a) Explain in detail about the Eber's Moll model of BJT.

Or

(b) (i) Draw the minority carrier distribution of NPN transistor in all the regions of operations. (6)

(ii) Consider a bipolar transistor with $N_E = 10^{17}/cm^3$, $N_B = 10^{15}/cm^3$, $D_E = 10\ cm^2/S$, $D_B = 20\ cm^2/S$, $x_B = 0.8\ \mu m$, $x_E = 0.6\ \mu m$, $L_B = 10\ \mu m$. The minority carrier lifetime in the base is 10 ns. Calculate the emitter efficiency, the base transport factor, and the current gain of the transistor biased in the forward active mode, Assume there is no recombination in the depletion region. (10)

13. (a) Explain in detail about the construction, operation and device characteristics of N-channel JFET.

Or

(b) (i) Describe the working principle and characteristics of D-MOSFET and E-MOSFET. (6)

(ii) Explain the CV characteristics of two terminal MOS structure. (10)

14. (a) Describe the working principle and the qualitative characteristics of the Schottky barrier diode.

Or

(b) (i) Draw the V-I Characteristics of Zener diode with its operation. (6)

(ii) Determine the required current, voltage, and power rating of a power BJT. Consider the common emitter circuit in Figure 1. The parameters are $R_L = 10\ \Omega$ and $V_{CC} = 35\ V$. (10)

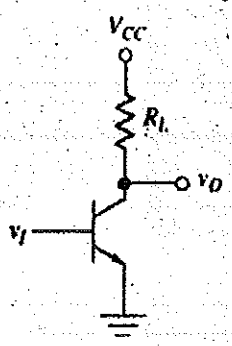

Figure 1

15. (a) Describe the working principle and operation mechanism of SCR. Also explain how it can serve as a switch.

Or

(b) Write short notes on :

(i) Opto coupler (8)

(ii) CCD. (8)