

Total No. of Questions : 10] [Total No. of Printed Pages : 4

Roll No.

EC-304

B. E. (Third Semester) EXAMINATION, Dec., 2011
(Grading/Non-Grading System)

(Electronics & Communication Engg. Branch)

ELECTRONIC DEVICES

(EC-304)

Time : Three Hours

Maximum Marks : $\begin{cases} 100 \text{ (Non-Grading)} \\ 70 \text{ (Grading)} \end{cases}$

Note : Attempt *five* questions in all selecting *one* question from each Unit. All questions carry equal marks. Assume any suitable data if necessary. Answer-to-the point.

Unit-I

1. Discuss in detail carrier concentration in an intrinsic semiconductor clearly stating density of states and density of carriers with schematic diagram under the following points :

- (a) Number of electrons in conduction band
- (b) Number of holes in valence band
- (c) Intrinsic concentration of charge carriers

The Hall experiment is used for a silicon bar known to be *p*-type. The resistivity of the bar is $220 \times 10^3 \Omega\text{-cm}$. Width of the bar is 2 mm and distance between the two surfaces of the bar is 2.2 mm. The magnetic field used an intensity

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of 0.1 Wb/m^2 . If measured value of current and Hall voltage are $5 \mu\text{A}$ and 28 mV respectively, calculate the mobility of holes.

Or

2. Discuss in detail quantitative theory of P-N diode currents. What are the current components in a P-N diode ? By considering equations of diode current, draw V-I characteristics of a diode and explain them. A diode operating at 300°K has V (forward) of 0.4 V across it when the current through it is 10 mA and 0.42 V when the current is twice as large. What values of I_0 and η allow the diode to be modelled by diode equation ?

Unit – II

3. Write notes on (a) Varactor diode (b) Tunnel diode with all necessary equations and diagrams.

Or

4. Discuss the following :
- (a) V-I characteristics of a Zener diode
 - (b) Breakdown mechanism
 - (c) Zener diode specifications
 - (d) Temperature coefficient

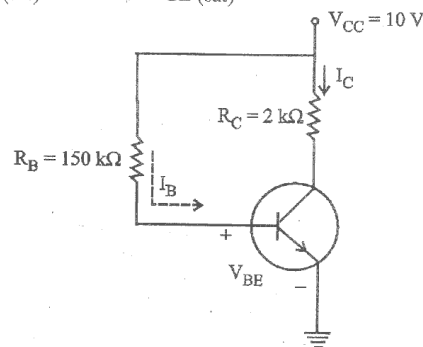
Unit – III

5. Explain the following for a Common-Base configuration :
- (a) Input characteristics
 - (b) Output characteristics
 - (c) Early effect

- (d) Punch-through effect
- (e) Transfer characteristics
- (f) Features of C-B configuration

Or

6. What are the various methods of Transistor Biasing ? Explain in brief with suitable circuit diagram. Determine region of operation and values of I_B and I_C for the circuit shown in figure. For $R_B = 150 \text{ k}\Omega$. The transistor used has $\beta = 100$. Assume $V_{BE(\text{active})} = 0.7 \text{ V}$, $V_{BE(\text{sat})} = 0.8 \text{ V}$, $V_{CE(\text{sat})} = 0.2 \text{ V}$.



Unit-IV

7. Explain the construction, operation of n -channel JFET. Draw V-I characteristics and explain it. Define parameters of JFET. Pinch off voltage.

Or

8. Explain n -channel depletion type MOSFET with a suitable schematic diagram.

Unit-V

9. Briefly explain IGBT under the following :
- (a) Basic structure and working

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- (b) IGBT characteristics
- (c) Switching characteristics
- (d) Applications of IGBT

Or

10. Explain the following :

- (a) Series and parallel combination of SCR.
- (b) Turn-on and turn-off mechanism.