

35131

MSc. DEGREE EXAMINATION – OCTOBER 2015
THIRD SEMESTER

Material Science & Nano Technology

Paper I –SEMICONDUCTING MATERIALS AND DEVICES

Time: 3 Hours

Max. Marks: 75

PART – A (5 X 3 = 15 Marks)

Answer any FIVE questions.

Each Question carries Three (3) marks.

Each Answer should not exceed One (1) page.

1. Locate the position of Fermi level in extrinsic p and n type semiconductors with neat diagram and explain.
2. Distinguish between direct and indirect band gap semi conductors by drawing E versus K diagram.
3. Discuss the origin of resistance in solid conductors.
4. Write about Lorentz number.
5. Is the J_p equal to J_n at equilibrium state of the junction and explain.
6. What are real diodes? Discuss generation and recombination of charge carriers at junction depletion region of real diodes.
7. Discuss why the BJT s named as current controlled device.
8. Write four regions of operation of BJT.

PART-B (4x15=60 Marks)

Answer ALL questions

Each Question carries Fifteen (15) marks

Each Answer should not exceed Six (6) pages

9. Obtain the expression for carrier concentration in the valence band of a intrinsic semiconductor. Discuss charge carrier neutrality.
(OR)
10. Obtain diffusion (continuity) equation. Explain drift and diffusion.
11. Obtain Boltzmann transport equation. Discuss relaxation time approximation.

(OR)

12. Write the Somerfield model of electrical conductivity and discuss its consequences.
13. Obtain the expression for depletion layer capacitance. Discuss the static I-V characteristics of p-n junction diodes.

(OR)

14. Write the working of Zener and Avalanche diodes. Write the applications of break down diodes.

15. Obtain the expressions for terminal currents in BJT and deduce DC parameters.

(OR)

16. Write the principle and operation of JFET. Discuss Static I-V characteristics and obtain trans conductance.

