Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (ECE) (2018 & Onwards) (Sem.–1,2)

SEMI-CONDUCTOR AND OPTOELECTRONICS PHYSICS

Subject Code : BTPH-105-18

M.Code : 75363

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. Write briefly :

a) How does free electron gas in metals differ from ordinary gas in some respects?

b) What do you mean by periodic potential?

c) What is knee voltage in p-n junction?

d) What do you mean by ohmic contacts?

e) What do you understand by majority and minority carriers?

f) What is radiative recombination mechanism in semiconductors?

g) What do you mean by spatial coherence?

h) What is the working principle of semiconductor LASER?

i) What is Hail mobility?

j) Why semiconductor laser is used to measure the divergence?

SECTION-B

2. What do you understand by the term density of states? Derive an expression for the density of states for electrons in metals.

3. Discuss the Kronig-Penny model and show how it explains the forbidden bands.

4. What do you understand by Fermi Level? Discuss in detail the dependence of Fermi level on carrier concentration and temperature.

5. a) What is p-n junction? Explain the formation of potential barrier in a p-n junction.

   b) Explain the mechanism of diffusion and drift in semiconductors.

SECTION-C

6. a) What do you mean by semiconductor light emitting diodes (LEDs)? Discuss different characteristics of LEDs.

   b) What is stimulated emission, absorption and spontaneous emission?

7. What do you understand by photo detector? Discuss the working principle and characteristics of PIN photo detector.

8. a) What is population inversion? How is it achieved?

   b) How carrier concentration and resistivity can be measured using four-point probe method?

9. a) Write a note on Hot-point probe measurements.

   b) How can we extract different parameters from I-V characteristics of diode?

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.