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

Total No. of Questions : 09

B.Tech. (AI&ML/AI&DS/CSE(AI&ML)/CSE(DS)/DS/R&AI/CSE(IOT & Cyber Security with block chain Tech./CSE/IT/CE/ME) (Sem.–1,2)

SEMI-CONDUCTOR PHYSICS

Subject Code : BTPH-104-18

M.Code : 75360

Date of Examination : 13-12-2023

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) What do you understand by term density of states?

b) What do you mean by periodic potential?

c) What do you mean by effective mass?

d) What do you understand by a semiconductor?

e) What is the difference between diffusion and drift of electrons?

f) What is the basic principle of laser?

g) Write a short note on Photovoltaic effect.

h) What do you mean by exciton?

i) What is Hall mobility?

j) Write a short note on hot-point probe measurement.

SECTION-B

2. a) What is meant by the free-electrons gas model of metals?

   b) Derive an expression relating Fermi energy and electron concentration.

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

4. Discuss in detail the dependence of Fermi level on carrier concentration and temperature.

5. a) What do you mean by metal-semiconductor junction? Discuss in detail Ohmic metal-semiconductor junction in detail.

   b) Explain the mechanism of carrier generation and recombination.

SECTION-C

6. What do you mean by Einstein coefficients? Derive the Einstein coefficients describing the probabilities of stimulated absorption and stimulated emission.

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

   b) What do you mean by phonon? Discuss Drude model.

8. How Hall mobility can be measured using four-point probe and van der Pauw method?

9. a) Write a note on capacitance-voltage 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.