

Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (CSE/IT) (2018 & Onwards)/(CE)/(ME) (Sem.-1,2)

SEMI-CONDUCTOR PHYSICS

Subject Code : BTPH-104-18

M.Code : 75360

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

Write briefly :

1. What are the basic assumptions of free electron gas model?
2. What is the origin of the energy gap?
3. What do you mean by occupation probability?
4. What is the basic difference between metal and semiconductor?
5. What do you mean by optoelectronic devices?
6. What do you mean by spatial coherence?
7. Write a short note on Photovoltaic effect.
8. What do you mean by density of states for phonons?
9. What do you understand by resistivity?
10. Write a short note on divergence.

SECTION-B

11. What do you mean by Fermi energy? Obtain an expression for the Fermi energy of a free electron gas in three dimensions.
12. Explain the periodicity character of the potential in crystals. State and prove Bloch theorem in this reference.
13. What is the difference between intrinsic and extrinsic semiconductors? Discuss in detail the dependence of Fermi level on carrier concentration and temperature.
14. a) What do you mean by metal-semiconductor junction? Discuss in detail Schottky metal-semiconductor junction.
b) Explain the mechanism of diffusion and drift in detail.

SECTION-C

15. a) Discuss stimulated emission, absorption, and spontaneous emission in detail.
b) Derive the Einstein coefficients describing the probabilities of stimulated absorption and stimulated emission.
16. a) What is population inversion? How is it achieved?
b) Write a note on Fermi's golden rule.
17. a) Discuss van der Pauw method for resistivity measurement in detail.
b) Discuss Hot-point probe measurement method.
18. 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.