

Roll No.

3003

**B. Tech. 2nd Semester (CSE)
(G Scheme) (Re-Appeal)
Examination – October, 2020**

SEMICONDUCTOR PHYSICS

Paper : BSC-Phy-103-G

Time : 1.45 hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any *three* questions. All questions carry equal marks.

1. (a) Explain the term effective mass.
(b) What do you mean by intrinsic and extrinsic semiconductor ?
(c) What is the main difference between metals, semiconductors and insulators ?
(d) Write a short note on photovoltaic effect.
(e) What is Quantum dot ?
(f) Define the term Fermi energy.
2. (a) Drive the expression for density of states in solid.

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- (b) What is Fermi energy and calculate its value for free electron gas at 0°K ?
3. Discuss the origin of energy bands in solid on the basis Kronig penny model.
4. Derive an expression for the carrier concentration in extrinsic semiconductors. What would be the position of Fermi level ? Explain.
5. (a) Explain the mechanism of formation of depletion layer in p-n junction diode.
(b) Explain drift and diffusion current.
6. (a) Discuss Einstein's coefficients. Derive relation between them.
(b) What is the difference between spontaneous and stimulated emission ?
7. Derive an expression for joint density of state.
8. Describe *four* probe methods with neat diagrams to determine resistivity of a semiconductor crystal.
9. (a) Derive the expression for density of states in 2D, 1D and 0D.
(b) Explain the concept of quantum well, wire and dot.