# FE SEM-I (2025-26)

## Sub: Applied Physics

# QUESTION BANK FOR TERM TEST-II

### TOPICS: ELECTRODYNAMICS, QUANTUM PHYSICS, SEMICONDUCTOR PHYSICS

1) Define a field of physical quantity? What is scalar field and vector field?
2) Explain the physical significance of gradient of a scalar field?
3) Explain divergence & curl of vector field?
4) What is divergence & curl of vector field? Show that divergence of the curl of a vector is zero?
5) State and explain Divergence and Stokes theorem used in electrodynamics?
6) Derive the Maxwell's first equation in differential (point) form and integral form? Give its physical significance?
7) Derive the Maxwell's third equation in differential (point) form and integral form? Give its physical significance?
8) Write properties of matter wave?
9) State De' Broglie's hypothesis & Show that De' Broglie's wavelength of electron is inversely proportional to square root of accelerating potential?
10) Explain the term phase velocity and group velocity?
11) State and explain Heisenberg's uncertainty principle? Give its one experimental illustration?
12) State Heisenberg's uncertainty principle? Show that electron cannot exist in the nucleus of an atom?
13) What is wave function? Derive one dimensional Schrodinger time dependent equation?
14) Write short note on quantum computing?
15) Differentiate between direct and indirect band gap semiconductors:
16) What is Fermi level in metal? Write Fermi-Dirac distribution function and explain the term used in it?
17) Show that in intrinsic semiconductor, Fermi level always lies at the middle between the valence and conduction band?
18) Explain the variation of Fermi level with temperature & impurity concentration in N-type semiconductor?
19) Define drift current and diffusion current? What is mobility of charge carriers? Give its SI unit?

## Question paper format for TT2

**Q.1 Solve any 2  (3 marks each)**

**a)**

**b)**

**c)**

**Q.2 Solve any 1 (5 marks)**

**a)**

**b)**

**Q.3 Solve any 1(4 marks)**

**a)**

**b)**