

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (2011 to 2017) (Sem.-1,2)

ENGINEERING PHYSICS

Subject Code : BTPH-101

M.Code : 54105

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION 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

Q1. Write briefly :

- a) Give the physical significance of divergence and curl of a field.
- b) Write all for Maxwell's equations in integral form for free space.
- c) Explain Meissner effect.
- d) Define Unit Cell and basis in a crystal.
- e) Discuss any two pumping mechanisms.
- f) Explain pulse broadening in optical fibres.
- g) Discuss the concept of Ether.
- h) Differentiate between group and phase velocities of waves.
- i) What do you mean by eigenfunctions and eigenvalues?
- j) Why nanomaterials exhibit unusual properties?

SECTION-B

- Q2. Derive all Maxwell's equations in free space and explain their physical significance.
- Q3. a) What are Type I and Type II superconductors?
b) Explain BCS theory of superconductivity.
- Q4. a) What is Laue equation for diffraction of X-rays by a crystalline solid? Show that the Bragg's equation is a special case of Laue equation.
b) For fcc iron obtain the diffraction angle for the (220) set of planes. The lattice parameter for Fe is 0.2866nm. The wavelength of X-ray is 0.1790nm. The order of diffraction is one.
- Q5. a) Differentiate between three & four level laser systems.
b) Discuss the construction and working of CO₂ laser giving its neat energy diagram and explaining its advantages and disadvantages over other lasers.

SECTION-C

- Q6. a) Define terms: Acceptance angle, Numerical aperture and normalized frequency.
b) Discuss different modes of propagation in fibres.
- Q7. a) Derive Lorentz transformation equations.
b) Show that $x^2 + y^2 + z^2 - c^2 t^2$ is invariant under Lorentz transformation.
- Q8. a) Explain the significance and normalization of wave function.
b) Derive the expression of time-dependent Schrodinger wave equation for a given wave function.
- Q9. a) What are Carbon nanotubes? Discuss how various types of carbon nanotubes can be formed from graphene?
b) Discuss in short various techniques for the synthesis of nanoparticles.

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.