

Total No. of Questions: 09

B.Tech. (2010 Batch) (Sem. – 1, 2)

ENGINEERING PHYSICS

M Code: 54016

Subject Code: PH-101

Paper ID: [A0122]

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 **FIVE** questions from **SECTION B & C** carrying **EIGHT** marks each.
4. Select at least **TWO** questions from each **SECTION - B & C**.

SECTION A

1. a) State Gauss's law in electrostatics.
b) Explain the term 'electric susceptibility'. How it is related to dielectric constant?
c) Define the term 'magnetostriction'.
d) Define the term 'ferrimagnetism'.
e) Define the term 'optical pumping'.
f) Describe the term 'holography'.
g) Write the postulates of special theory of relativity.
h) Why only x-rays are used for the crystal structure studies?
i) Describe 'Normalization of wave function'.
j) What do you mean by London penetration depth?

SECTION B

(8 Marks each)

2. a) Write Maxwell's four equations of electromagnetic theory and briefly interpret each of them. (4)
- b) What do you mean by dielectric and dielectric polarization? Define D, E and P and establish relation between them. (4)
3. a) What is meant by 'hysteresis'? Explain hysteresis loss. How would you use hysteresis curve to select materials for the construction of permanent magnets? (5)
- b) Explain the difference between ferromagnetism and antiferromagnetism. (3)
4. a) Describe Einstein's coefficients and the significance of relation between them. (3)
- b) Describe the working of Ruby laser with proper energy level diagram. (5)
5. a) Derive the expression for numerical aperture of an optical fibre. Discuss the relation between numerical aperture and acceptance angle. (4)
- b) Describe the principle of graded index fiber and its advantages. (4)

SECTION C

(8 Marks each)

6. a) A rocket is chasing enemy's space ship. An observer on the earth observes the speed of rocket to be 2.5×10^8 m/s and that of space ship 2×10^8 m/s. Calculate (i) the velocity of enemy's ship as seen by rocket. (ii) The velocity of rocket as seen by enemy's ship. (4)
- b) Derive the relativistic relation for variation of mass with velocity. (4)
7. a) Describe Mosley's law and its significance. (3)
- b) What do you mean by X-ray spectra? Describe the production of continuous x-ray's. (5)
8. a) Derive the expression for time dependent Schrodinger's equation. (4)
- b) Write down Schrodinger's wave equation for harmonic oscillator. Solve it to obtain eigen functions and show that the eigen functions are discrete. (4)
9. a) Give a quantitative explanation of BCS theory of superconductors. How does this theory explain major characteristics of superconductors? (4)
- b) Derive the London equations for superconductors and discuss how they explain Meissner effect. (4)