# Engineering Physics
## (PH-101, May 2006)

Time: 3 Hours                                                                                              Max. Marks: 60

**Note:** Question No. 1 is compulsory. Attempt five questions from section A and B, taking at least two questions from each section.

## Section-A

1.  (a) State Ampere's circuital law?
    (b) Explain magnetic anisotropy.
    (c) Name four methods of pumping a laser.
    (d) What is difference between stimulated and spontaneous emission?
    (e) Why the information capacity of an optical fiber is very much greater than the conventional radio waves and microwaves?
    (f) Find the speed that a proton must be given if its mass is to be twice its rest mass $1.67 \times 10^{-27}$. What energy must be given to proton to achieve this speed?
    (g) Explain Mosley's law.
    (h) Explain de-broglie concept of matter waves.
    (i) What are orthogonal wave functions?
    (J) What is Meissner effect?

## Section-B

2.  (a) What do you understand by electric displacement, susceptibility and permittivity? Obtain an expression for potential at a point due to an electric dipole.
    (b) Using Gauss's law to find the electric field due to a uniformly charged solid sphere at a point; which lies outside the sphere?

3.  (a) What are magnetic materials? Distinguish between hard and soft magnetic materials? Name the factors on which shape of B-H curve for different types of magnetic materials depend.
    (b) What are ferrites?

4.  What are three level and four level lasers? Describe the construction and action of Ruby.

5.  (a) What is numerical aperture? Explain material dispersion and pulse dispersion in optical fiber.
    (b) What are splicers and couplers?

## Section-C

6.  (a) Discuss in detail Michelson Morley experiment.
    (b) Calculate the expected fringe shift in Michelson Morley experiment if the distance from each path is 2 meters and light has wavelength 6000 Å given $V = 3 \times 10^4$ m/s.

7.  (a) Differentiate between continuous and characteristic X-ray spectra. How is Bragg's law used in crystallography?
    (b) What is the origin of X-rays?

8.  (a) Write Schrodinger wave equation for a particle in box and solve it to obtain the eigenvalues and eigenfunctions.
    (b) Explain briefly uncertainly principle.

9.  (a) What do you understand by Type-I and Type-II superconductor?
    (b) Discuss London's theory of superconductivity.