

Roll No. ....

Total No. of Pages : 02

Total No. of Questions : 09

**B.Tech. (Sem.-1st & 2nd)**

**ENGINEERING PHYSICS**

**Subject Code : BTPH-101 (2011 Batch)**

**Paper ID : [A1102]**

**Time : 3 Hrs.**

**Max. Marks : 60**

**INSTRUCTION TO CANDIDATES :**

1. **SECTION-A is COMPULSORY.**
2. **Attempt any FIVE questions from SECTION-B & C.**
3. **Selecting at least TWO questions from SECTION-B & C each.**

**SECTION-A**

**(2 Marks each)**

1. Write short notes on :
  - (a) What is utility of Maxwell equations in reference to EM waves?
  - (b) What do you mean by displacement current?
  - (c) What do you understand by magnetic anisotropy?
  - (d) What are type II superconductors?
  - (e) What do you mean by radiography?
  - (f) What are main components of a laser system?
  - (g) What do you mean by time dilation?
  - (h) Does ether exist? Comment
  - (i) What are matter waves?
  - (j) What is nanophysics.

**SECTION-B**

**(8 Marks each)**

2. (a) Deduce Maxwell equation using Faradays's law of electromagnetic induction.  
(b) In free space,  $E(x,t) = 50 \cos (wt - \beta x) a_y$  V/m. Find the average power crossing a circular area of radius 5m in plane  $x = \text{constant}$ . (5,3)

3. (a) What is the physical phenomenon behind super conductivity? How successful is this in today's context?  
(b) Elaborate the main features of BCS theory. (4,4)
4. (a) A beam of X-rays,  $\lambda = 0.842 \text{ \AA}$  is incident on a crystal at a grazing angle of  $8^\circ 35'$  when first order Bragg's reflection occurs. Calculate the glancing angle for 3<sup>rd</sup> order reflection.  
(b) What are X-rays? How are they produced ? (4,4)
5. (a) Draw energy level diagram and discuss working of He-Ne Laser.  
(b) What is the concept of Holography? (6,2)

### SECTION-B

(8 marks each)

6. (a) Find the core radius necessary for single mode operation at 800 nm in step index fibre with  $n_1 = 1.48$  and  $n_2 = 1.47$ . Also find the Numerical Aperture and maximum acceptance angle.  
(b) What do you understand by Material dispersion? (4,4)
7. (a) Elaborate the concept and utility of Lorentz transformations.  
(b) What do you mean by simultaneity in relativity? (5,3)
8. (a) Compute the de-Broglie wavelength of a proton whose kinetic energy is equal to the rest energy of an electron. Mass of proton is 1840 times that of the electron.  
(b) What do you mean by normalization of a wave function? (4,4)
9. (a) What are advantages of synthesizing nano materials?  
(b) *Synthesis of nanotubes is a challenge.* Comment. (4,4)