Roll No. _____

Total No. of Questions : 09

Total No. of Pages : 02

B.Tech. (2011 Onwards)   (Sem.–1,2)
ENGINEERING PHYSICS
Subject Code : BTPH-101
Paper ID : [A1102]

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 any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1.   Write briefly :

a)   Which type of magnetic materials have permanent magnetic dipole moment associated to them?

b)   What is Bohr-magneton?

c)   Which laser gives output radiation having frequency in the visible as well as IR region?

d)   What is the physical significance of divergence of a vector field?

e)   Why a three level laser normally provide a pulsed output?

f)   What do you understand by "10.5dB/Km@850nm"?

g)   How you define proper length and proper time interval as per special theory of relativity?

h)   Why $n = 0$ state is not allowed for particle confined to an infinite potential box?

i)   What do you mean by a primitive unit cell?

j)   What is a Cooper pair?

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SECTION-B

2. a) State and prove Gauss's law and express it in the differential form. (4)

   b) Briefly discuss different dielectric polarization mechanisms. Also specify temperature dependence in each case. (4)

3. a) How ultrasonic waves are produced using magnetostriction? (4)

   b) How you distinguish between coordination number and number of atoms per unit cell? Explain with help of an example. (4)

4. a) Discuss different types of possible transitions between two atomic energy states. (3)

   b) Explain the construction and working of He-Ne laser with help of energy level diagram showing laser transitions and specify corresponding wavelengths. (5)

5. a) Derive London equations for a superconductor and use these to define penetration depth for a superconductor. (6)

   b) The first maxima for Bragg's diffraction of x-rays from KCl crystal (d=0.314 nm) appears at 14°. Calculate energy of the incident x-rays. (2)

SECTION-C

6. a) Describe-construction of an optical fiber with help of diagram. Further, describe the factors responsible for pulse dispersion in optical fiber and its consequences. (6)

   b) Find acceptance cone for an optical fiber for which refractive index of core and cladding are 1.62 and 1.52, respectively. (2)

7. a) Define time dilation and derived the expression relating the time interval as observed in two inertial frames of references. (4)

   b) Calculate the de-Broglie wavelength of an electron having KE = 1 MeV. (4)

8. a) Establish time dependent Schrodinger wave equation and further deduce time independent form of this equation. (5)

   b) Find the probability of finding the particle in the region 0.4L to 0.6L, trapped in an infinite one-dimensional potential well of width L. (3)

9. a) Discuss briefly different methods used to synthesize the nanoparticles. (4)

   b) State and explain the uncertainty principle. (2)

   c) How you interpret the negative result of the Michelson Morely experiment? (2)