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Total No. of Pages : 03

Total No. of Questions : 09

B.Tech. (Sem.-1st,2nd) (2011 & 12 Batch)

ENGINEERING PHYSICS

Subject Code : BTPH-101

Paper ID : [A1102]

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

1. Write short notes on :

- i. What do you understand by electromagnetic spectrum?
- ii. Define Poynting vector.
- iii. What do you understand by crystallography?
- iv. Explain the concept of population inversion.
- v. What do you mean by unit cell?
- vi. What do you mean by fibre optic cable splicing?
- vii. Does ether exist? Comment.
- viii. Define time dilation.
- ix. Differentiate between phase velocity and group velocity.
- x. What is electron confinement?

SECTION - B

2. a) Differentiate between conduction current and displacement current by taking some suitable example(s).
- b) Show that equation of continuity, $\text{div } J + \frac{\partial \rho}{\partial t} = 0$ is contained in Maxwell's equations. (3,5)
3. a) A magnetic circuit is made of a ferromagnetic material of $\mu = 7.3 \times 10^{-3}$ henry/m. The average length of the circuit is 1 m and the area of cross-section is 90 cm². If the magnetic binding has 90 turns, calculate the magnetizing current in order to produce a magnetic flux density 0.2 weber/m².
- b) Define magnetic permeability and magnetic susceptibility and develop a relation between them. (4,4)
4. a) Discuss the importance of excitation and absorption limit in X-ray spectra.
- b) The electrons are accelerated by 350 volts and are reflected from a crystal. The first reflection maxima occur when the glancing angle is 30°. Determine the spacing of the crystal.
Given $h = 6.62 \times 10^{-34}$ J.s, $e = 1.6 \times 10^{-19}$ C and $m = 9 \times 10^{-31}$ Kg. (4,4)
5. a) What are Einstein coefficients? Discuss their significance in context of Laser operations.
- b) He-Ne laser is superior to Ruby laser. Comment (5,3)

SECTION - C

6. a) A step index fibre with a core diameter of 30 μm and $n_1 = 1.530$ and $n_2 = 1.515$ shows absorption of 0.00002% of the incident power at each reflection at the core boundary. Find the attenuation in dB/km for such a fibre for a ray entering just below the acceptance angle. Assume that there are no other losses.
- b) Elaborate the concept of material dispersion. (4,4)

7. a) A flashing bulb is located 40 km from an observer. The bulb is fired and the observer sees the flash at 5.00 pm. What is the actual time when the bulb is fired?
- b) Develop a relation between relativistic momentum and energy. (4,4)
8. a) Obtain Bohr's condition of quantization of angular momentum using deBroglie's idea of matter waves.
- b) Develop energy time uncertainty relation and discuss some relevant application. (3,5)
9. a) "*Surface to volume ratio gets enhanced at nanoscale*". Comment.
- b) Discuss some important applications of carbon nanotubes. (4,4)