Reg. No. : ....

Name : ....

Combined First and Second Semester B.Tech. Degree Examination, April 2013
(2008 Scheme)
08-102 : ENGINEERING PHYSICS

Time : 3 Hours

Max. Marks : 100

PART – A

Answer **all** questions. **Each** question carries **4** marks.

1. What are spherical waves ? A wave is represented by

   $\psi = 3.0 \times 10^{-3} \cos(8.4 \times 10^{13} t + 2.8 \times 10^5 z) \, Vm^{-1}$

   Compute i) amplitude, ii) frequency, iii) wavelength and iv) wave velocity, when z and t are in metre and second respectively ?

2. What are Miller indices ? How they are obtained ?

3. Explain interference filter.

4. In Newton's rings experiment, diameter of 4th and 12th dark rings are 0.4 cm and 0.7 cm respectively. Deduce the diameter of 20th dark ring.

5. Compare grating spectra and prism spectra.

6. What is a quarter wave plate ? Plane polarised light of wavelength 6000 Å is incident on a quartz crystal cut parallel to the axis. Calculate the least thickness for which ordinary and extra ordinary combine to form plane polarised light.

   $\mu_0 = 1.544$, $\mu_e = 1.553$

7. Explain the phenomenon of length contraction.

8. What are matter waves ? Write down an expression for wavelength of matter waves.

9. State the postulates of quantum mechanics.

10. Distinguish between step index and graded index fibre.

PART – B

Answer **any 2** questions from **each** Module. **Each** question carries **10** marks.

Module – I

11. Write down 3 dimensional wave equation and obtain its solution.

12. From basic laws of electricity and magnetism, derive Maxwell's electromagnetic equations.

13. a) Explain super conductivity. What are Type I and Type II super conductors ?

    b) Describe Meissner effect.

Module – II

14. Derive Cosine Law. Explain colours of thin films.

15. Derive Bragg's law of X-ray diffraction. Calculate the glancing angle on a plane (100) of a cubic crystal of lattice constant 2.814 A°, corresponding to second order diffraction maximum for X-rays of wavelength 7.1×10^{-11} m.

16. Deduce relativistic velocity addition formula from Lorentz transformation equations.

Module – III

17. a) What are operators in Quantum Mechanics ? Obtain the operators for momentum, energy and total energy.

    b) Explain linear operators.

18. a) Compare Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics.

    b) What are bosons and fermions ?

19. a) Explain construction and working of a He – Ne gas laser.

    b) What are the advantages of a gas laser ?

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