



Reg. No. :

Name :

**Combined First and Second Semester B.Tech. Degree
Examination, April 2014
(2013 Scheme)
13.102 : ENGINEERING PHYSICS (ABCEFHMNPRSTU)**

Time : 3 Hours

Max. Marks : 100

PART – A

Answer **all** questions. **Each** question carries **2** marks.

1. Define Simple Harmonic motion. Obtain differential equation for a simple harmonic motion.
2. Define divergence of a vector. Explain its physical significance.
3. Define space lattice and unit cell.
4. Explain relativistic mass.
5. Write any four applications of superconductors.
6. Interference fringes are formed in a thin air wedge using sodium light of wavelength 5893 \AA . When observed normally, 10 fringes are found in a distance of 1 cm. Calculate the angle of the wedge.
7. What is Kerr effect ?
8. What is magnetostriction ?
9. Explain the physical significance of wave function.
10. Describe the recording of hologram.



PART – B

Answer **one full** question from **each** Module. **Each** question carries **20** marks.

MODULE – I

11. a) Considering transverse vibrations of a stretched string derive the one dimensional wave equation. 10
- b) Frame and solve the differential equation of forced harmonic motion. 10



12. a) Write down Maxwell's equations in free space. Prove that the velocity of electromagnetic wave in free space is equal to the velocity of light. 10
- b) Explain the inconsistency in Ampere's circuital law and show how it is modified by Maxwell. 5
- c) Compare conduction current and displacement current. 5

MODULE – II

13. a) Define the terms co-ordination number and packing factor for cubic crystals. Obtain their values for SC, BCC and FCC lattices. 10
- b) What are Miller indices ? Explain how Miller indices of a crystal plane can be determined. 5
- c) Calculate the lattice parameter of NaCl crystal, which has fcc structure, given density of NaCl is $2.18 \times 10^3 \text{ kg/m}^3$. Atomic weight of sodium and chlorine are 23 and 35.5 respectively. 5
14. a) Describe Meissner effect in superconductivity. 6
- b) Derive Einstein's mass-energy relation. 8
- c) Explain the phenomenon of Length contraction. 6

MODULE – III

15. a) Describe Newton's Rings experimental set up. Obtain the expression for radius of n^{th} dark ring. 10
- b) Derive cosine law is reflected system. 6
- c) Describe interference filter. 4
16. a) Describe with theory, production and detection of elliptically and circularly polarized lights. 10
- b) Explain polaroids and its application. 5
- c) Describe briefly the detection of ultrasonic waves. 5

MODULE – IV

17. a) Derive the time dependent Schrodinger equation for a moving particle and hence derive the time independent Schrodinger equation. 10
- b) Explain Heisenberg's Uncertainty principle. How does the uncertainty principle account for the absence of electrons in the nucleus. 5
- c) Write a note on Quantum mechanical tunneling. 5
18. a) Compare M-B, B-E and F-D statistics. 10
- b) Describe the construction and working of He-Ne Laser. 10