

B.Tech Degree I & II Semester Examination in Marine Engineering June 2011

MRE 103 ENGINEERING PHYSICS

Time : 3 Hours

Maximum Marks : 100

- I. (a) Explain the formation of Newton's rings and show that the radii of dark rings are proportional to the square root of natural numbers. (9)
 (b) How can Newton's rings experiment determine refractive index of a liquid? (8)
 (c) In a Newton's rings experiment, the diameter of the 5th ring was 0.356cm and the diameter of 20th ring was 0.618 cm. Find the radius of curvature of the plano convex lens if the wavelength of light used is 593.3 nm. (3)

OR

- II. (a) Obtain an expression for fringe width in the interference pattern of wedge shaped film. How this arrangement is used to determine the thickness of this wire? (12)
 (b) Explain how the phenomenon of interference is used in testing the optical planeness of a glass plate. (5)
 (c) Light of wavelength 600 nm falls normally on a thin wedge shaped film of refractive index 1.4, forming fringes that are 2mm apart. Find the angle of the wedge. (3)

- III. (a) What is a zone plate? Explain its construction and theory. (10)
 (b) Explain Rayleigh's Criterion of resolution. Derive an expression for the resolving of a grating. (7)
 (c) Find the separation of two points on the moon that can be resolved by a 500 cm telescope. The distance of the moon is 3.8×10^5 km. The eye is most sensitive to light of wavelength 5500 \AA . (3)

OR

- IV. (a) Describe the construction and working of a Nicol prism. (9)
 (b) Discuss the production and detection of circularly polarized light. (8)
 (c) Calculate the specific rotation if the plane of polarization is turned through 26.4° , traversing 20cm length of 20% sugar solution. (3)

- V. (a) Explain in brief the characteristics of a laser beam. (5)
 (b) Distinguish between spontaneous emission and stimulated emission. (8)
 (c) Explain the construction and working of a ruby laser. (7)

OR

- VI. (a) Describe the recording and reconstruction process in holography with the help of suitable diagrams. (8)
 (b) Write any two applications of holography. (2)
 (c) Explain Piezo electric effect. How can it be applied for producing ultrasonic waves? (10)
- VII. (a) Give general description of an optical fibre. Explain how an optical fibre function as a wave guide. (4)
 (b) What is meant by Numerical aperture? Derive an expression for NA. (10)
 (c) A glass clad fibre is made with core glass of refractive index 1.5 and the cladding is doped to have a fractional index difference of 0.0005. Find (i) the cladding index (ii) the critical internal reflection angle (iii) acceptance angle (iv) the numerical aperture. (6)

OR

- VIII. (a) Explain the difference between a step index fibre and graded index fibre. (8)
 (b) What is meant by modes? Compare single mode and multimode fibres. (4)
 (c) Draw the block diagram of an optical fibre communication system and explain the advantages of an optical fibre communication system over the conventional ones? (8)

- IX. Writes notes on:
 (a) SONAR (b) NDT (c) Echo Sounder (d) Polar and non-polar dielectrics (4 x 5 = 20)

OR

- X. (a) Explain Meissner effect and isotope effect of superconductors. (6)
 (b) Discuss type I and type II superconductors. (8)
 (c) Explain briefly the salient points of BCS theory. (6)