B.Tech. Degree I Semester Examination in
Marine Engineering December 2019

19-208-0102 ENGINEERING PHYSICS
(2019 Scheme)

Time : 3 Hours

Maximum Marks : 60

$(5 \times 15 = 75)$

I.   (a) Explain the formation of Newton's rings. (4)
    (b) Explain with necessary theory, how to determine the wavelength of a monochromatic light, using Newton's rings set-up. (8)
    (c) Two optically plane glass plates of length 0.1 m are placed one over the other with a thin wire at one end separating the two. The fringes formed with light of wavelength 589.3 nm are of width 3 mm. Calculate the radius of the wire. (3)

OR

II. (a) What are the characteristics of X-rays? Discuss an experimental arrangement to produce X-rays. (4)
    (b) Describe the Braggs spectrometer and explain how it is used to determine wavelength of X-rays. (8)
    (c) If the potential difference applied across an X-ray tube is 10 kV and current through it is 113 mA, calculate the velocity of electrons at which they strike the target. (3)

III. (a) Explain the Rayleigh's criterion of resolution. (4)
    (b) What is a plane diffraction grating? Discuss the theory of a plane transmission Grating. (8)
    (c) Light of wavelength 589.3 nm is incident normally on a grating having 6000 rulings per cm. Find the angular separation between the first and second order spectra. (3)

OR

IV. (a) Explain the phenomenon of double refraction. (4)
    (b) Define specific rotation of an optically active substance. Describe an experiment to determine specific rotation by using half shade polarimeter (8)
    (c) Calculate the thickness of a calcite plate that converts linearly polarized light into elliptically polarized light. Given that refractive indices for ordinary and extra ordinary rays are 1.485 and 1.656 respectively and wavelength of light 589.3 nm. (3)

V.   (a) Distinguish between the spontaneous and stimulated emissions. (4)
    (b) Discuss the construction and working of a Ruby Laser. (8)
    (c) Explain the principle, recording and reconstruction of a hologram. (3)

OR

VI. (a) What are the properties and applications of electronic waves? (4)
    (b) Describe the method of recording and reproducing sound signals. (8)
    (c) How is sound recorded in cine films? (3)

VII. (a) Distinguish between step index and graded index fibre. (4)
    (b) Discuss the fibre optic communication system. (8)
    (c) Calculate the maximum fibre acceptance angle of a step index fibre having refractive indices, n1 = 1.6, n2 = 1.5. Assume that the outside medium is air. (3)

OR

VIII. (a) Explain the single mode and multimode fibres. (4)
    (b) Obtain an expression for the numerical aperture of an optical fiber. (8)
    (c) If the maximum angle of incidence is 45 degree for a fibre placed in air, calculate the numerical aperture and acceptance angle? (3)

IX. (a) Explain the working and applications of echo sounder. (4)
    (b) Describe the production, properties and uses of ultrasonic waves. (8)
    (c) Give a description of gyroscope. (3)

OR

X.   (a) Differentiate between type I and type II superconductors. (4)
    (b) What is the principle and application of SQUID? (8)
    (c) What is Meissner effect? State its applications? (3)

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