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***B.Tech. Degree I & II Semester Supplementary Examination in
Marine Engineering May 2017***

MRE 103 ENGINEERING PHYSICS

(Prior to 2013 Scheme)

Time : 3 Hours

Maximum Marks : 100

(5 × 20 = 100)

- I. (a) Explain with a neat diagram, how Newton's rings are formed in a laboratory. (12)
In Newton's rings experiment, derive the expression for wavelength in terms of diameters of rings measured.
- (b) Deriving necessary equations, explain how the refractive index of the given liquid is formed by Newton's rings experiment. (8)
- OR**
- II. (a) With a neat diagram, derive the conditions for constructive and destructive interferences in the case of interference in a thin film due to reflected light. Explain, with the help of necessary equations how the minimum of the reflected system in this case is of zero intensity. (15)
- (b) Interference fringes are formed when a monochromatic light fall normally on a wedge shaped transparent film whose refractive index is 1.4. The angle of the wedge is 40 seconds of an arc and the distance between successive fringes is 0.125 cm. Calculate the wavelength of light. (5)
- III. (a) Explain why light exhibit the phenomenon of diffraction hence distinguish between Fresnel and Fraunhofer diffraction. (5)
- (b) What is meant by plane diffraction grating? Derive the conditions for maxima and minima in the case of a plane transmission grating and hence explain the formation of diffraction pattern. (6)
- (c) With neat diagrams, explain the Rayleigh's criteria for the following resolving of images : (9)
(i) well resolved (ii) not resolved (iii) just resolved.
- OR**
- IV. (a) What is double refraction? With required diagrams, explain the construction and working of a Nicol Prism. (7)
- (b) Briefly explain the production and analysis of circularly polarized light. (6)
- (c) Calculate the specific rotation if the plane of polarization is rotated through 26.4° in traversing a 20 cm length of 20% sugar solution. (3)
- (d) Explain Fresnel's theory of optical activity. (4)

(P.T.O.)

- V. (a) Explain spatial and temporal coherence. (3)
 (b) With a neat diagram explain the working of a semiconductor laser. (7)
 (c) Write short notes on : (10)
 (i) Application of Lasers
 (ii) Spontaneous emission and stimulated emission.
- OR**
- VI. (a) Write short notes with neat diagrams required on : (10)
 (i) Recording of hologram.
 (ii) Reconstruction of image in holography.
 (b) Give a brief account on applications of holograph. (4)
 (c) Sketching a neat diagram, explain the principle of sound recording in magnetic tapes. (6)
- VII. (a) With diagrams explain : (7)
 (i) Step index fibres.
 (ii) Graded index fibres.
 (b) Explain single mode and multimode fibres. (6)
 (c) With a block diagram, explain an optical fibre communication system. (7)
- OR**
- VIII. (a) Giving appropriate diagrams explain how optic fibre can be used as a displacement sensor. (8)
 (b) Compare advantages of optical fibre communication to conventional methods. (6)
 (c) Write a note on integrated optics. (6)
- IX. (a) Write a note on Dielectrics, its types and applications. (6)
 (b) What is an echo sounder? Giving a neat diagram, explain any one application of it. (8)
 (c) Explain the principle used in flow detection using ultrasound waves. (3)
 (d) What is a gyroscope? Explain. (3)
- OR**
- X. (a) Explain type I and type II superconductors. (6)
 (b) Write a note on high temperature super conductivity and its applications. (6)
 (c) Briefly explain BCS theory of super conductivity. (6)
 (d) What are SQUIDS? (2)