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***B.Tech. Degree I & II Semester Supplementary Examination in  
Marine Engineering May 2018***

**MRE 103 ENGINEERING PHYSICS**  
(Prior to 2013 Scheme)

Time: 3 Hours

Maximum Marks: 100

(5 × 20 = 100)

- I. (a) Obtain the condition for constructive and destructive interference in the case of light reflected from a thin film. Explain why a soap bubble seen in day light is coloured. (12)
- (b) Explain the principle of interference filters. (4)
- (c) A glass plate having reflective index 1.5 is illuminated by parallel beam of monochromatic light ( $\lambda = 628 \text{ nm}$ ). If the angle of refraction is 60 degree, find the smallest thickness of the plate which will make it appear dark by reflection. (4)
- OR**
- II. (a) Explain what is Newton's rings? Explain how the Newton's ring experiment can be used to find the wavelength of monochromatic light. (15)
- (b) Newton's rings are formed with reflected light of sodium lamp of wavelength 593 nm with a liquid between the plane and curved surface. The diameter of the 10<sup>th</sup> ring is 0.6 cm and radius curvature is 100 cm. Find the refractive index of the liquid. (5)
- III. (a) Distinguish between Fresnel and Fraunhofer diffraction. (4)
- (b) What is Zone plate? Obtain an expression for the focal length of zone plate. (12)
- (c) Calculate the minimum number of lines per centimeter in 5 cm wide grating which can resolve 600 nm and 601 nm. (4)
- OR**
- IV. (a) Distinguish between quarter wave plate and half plate. (5)
- (b) Explain how quarter wave plate can be used for production and detection of circularly polarized light. (11)
- (c) Calculate the specific rotation if the plane of polarization is turned through 30 degree on traversing 20 cm length of 20% sugar solution. (4)
- V. (a) Explain what is spatial and temporal coherence. (5)
- (b) Distinguish between spontaneous emission and stimulated emission. (5)
- (c) With energy level diagram explain the construction and working of Nd:YAG laser. (10)
- OR**
- VI. (a) Explain the principle of recording and reconstruction of hologram. (7)
- (b) What are white light holograms? (5)
- (c) Explain the principle of recording and reproduction of sound using magnetic tapes. (8)

- VII. (a) What is critical angle and total internal reflection? (5)  
(b) Distinguish between single mode fiber and multi mode fiber. (5)  
(c) What is numerical aperture? Obtain an expression for numerical aperture in terms of refractive indices of the core and cladding of the fiber. (10)
- OR**
- VIII. (a) Discuss with the help of block diagram the principle of fiber optic communication system. What are the advantages over conventional communication systems? (10)  
(b) Discuss the principle and working of any one of the fiber based sensor. (6)  
(c) Briefly-explain the salient features of integrated optics. (4)
- IX. (a) Explain what is a Gyroscope? (5)  
(b) What is SONAR? Give some of the applications. (7)  
(c) Explain how ultra sound is used measure the depth and for flaw detection. (8)
- OR**
- X. (a) What is Meissner effect? (5)  
(b) Distinguish between type I and type II super conductors. (6)  
(c) What is Josephson effect? (5)  
(d) What are high temperature superconductors? (4)

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