



***B.Tech. Degree I & II Semester Examination in
Marine Engineering May 2014***

MRE 1103 ENGINEERING PHYSICS

Time: 3 Hours

Maximum Marks: 100

(5 x 20 = 100)

- I. (a) With a neat diagram and giving necessary theory explain, how a thin transparent film exhibits alternate dark and bright fringes when viewed in monochromatic light. (12)
- (b) Explain why an oil film on water exhibits different colours when viewed in an extended source of white light. (4)
- (c) Newton's rings are observed in reflected light of wavelength 5900\AA . The diameter of the 12th dark ring is 0.5cm. Find the radius of curvature of the lens and the thickness of the air film at the position of the 12th dark ring. (4)

OR

- II. (a) Sketching a neat diagram explain how X-rays are produced. (8)
- (b) Giving diagram, state and derive Bragg's law of X-ray diffraction. (5)
- (c) Explain Compton effect. (3)
- (d) How much should be the voltage of an X-ray tube so that the electron emitted from the gun may give X-ray of 1\AA after striking the target. $e=1.6 \times 10^{-19}\text{C}$, $c = 3 \times 10^8\text{m/s}$ and $h = 6.6 \times 10^{-34}\text{Joule.Sec}$. (4)

- III. (a) Give Rayleigh's criterion for resolution. Explain with the help of diagrams the cases of (i) well resolved (ii) not resolved (iii) just resolved (10)
- (b) Explain what is a plane transmission grating? Giving a neat diagram explain how diffraction pattern is obtained in the case of a plane transmission grating illuminated with monochromatic light. (6)
- (c) The first order maximum for light of wavelength $6 \times 10^{-5}\text{cm}$ occurs at an angle of 20° when the light is incident normally on the grating. Calculate the number of lines/cm. (4)

OR

- IV. (a) Explain the production and detection of plane polarized and circularly polarized light. (10)
- (b) Write short notes on (10)
- (i) optical activity (ii) positive and negative crystals

- V. (a) Explain the following: (4)
- (i) spatial coherence
- (ii) temporal coherence
- (b) Explain the working (with the help of energy level diagram) of a Ruby laser with a neat diagram. (12)
- (c) Explain briefly any two methods of optical pumping. (4)

OR

- VI. (a) Explain the principle of holography. (3)
- (b) Sketching neat diagrams explain the recording and re-construction of a hologram. (12)
- (c) What is a magnetic tape? Explain any one method of sound recording in cine films. (5)

(P.T.O.)

- VII. (a) Explain the differences between a step index and a graded index optic fibers with help of diagrams. Compare their advantages and disadvantages. (10)
(b) Explain numerical aperture of the optic fibre and hence derive an expression for the same in terms of refractive indices, giving a neat diagram. (10)
- OR**
- VIII. (a) Explain in detail any five important advantages of optical fibre communication. (10)
(b) Write notes on (with diagrams): (10)
(i) optical fibre displacement sensor
(ii) optical fibre temperature sensor
- IX. (a) With the help of magnetization curves, explain Type-I and Type –II superconductors. (6)
(b) Briefly explain BCS theory of superconductivity. (6)
(c) Write notes on: (i) High temperature superconductivity (ii) SQUIDS (8)
- OR**
- X. (a) What is a gyroscope? Explain. (4)
(b) With required diagrams explain how ultra sound can be employed in (10)
(i) Flaw detection (ii) Depth measurement
(c) What is a dielectric material? Give a brief account of applications of this material. (6)
