

***B. Tech Degree I Semester (Supplementary) Examination in
Naval Architecture and Ship Building December 2011***

ST 01 S2 APPLIED PHYSICS

Time : 3 Hours

Maximum Marks : 100

- I. (a) Explain the colour of thin films. How will you determine the wavelength of light by Newton's rings. (10)
- (b) Green light of wavelength 5100 \AA from a narrow slit is incident on a double slit. If the overall separation of 10 fringes on a screen 200cm away is 2cm, find the slit separation. (5)
- (c) A shift of 100 circular fringes is observed when the movable mirror of the Michaelson interferometer is shifted by 0.0295 mm. Calculate the wavelength of light. (5)
- OR**
- II. (a) Derive Bragg's law of X-ray diffraction. Describe how Bragg's spectrometer is used to determine wavelength of an X-ray beam. (12)
- (b) Explain Moselay's law and mention any two applications. (4)
- (c) Calculate the wavelength of X-rays scattered at 180° from carbon block if the frequency of incident rays is $1.8 \times 10^{18} \text{ S}^{-1}$. (4)
- III. (a) Derive an expression for zone plate focal length. (5)
- (b) Define and derive expressions for dispersive power and resolving power of a grating. (10)
- (c) What is the diameter of the objective of a telescope required to resolve two stars separated by an angle 0.001 degree with λ of 5000 \AA ? (5)
- OR**
- IV. (a) Discuss the salient features of double refraction. (6)
- (b) Write short notes on:
(i) Quarter wave plate (ii) Half wave plate (8)
- (c) A 20cm long tube containing sugar solution rotates the plane of polarization by 11° . If the specific rotation of sugar is 66° , calculate the strength of the solution. (6)
- V. (a) Explain the theory of LASER taking a 3 level system. (12)
- (b) Write a short note on Ruby Laser. (8)
- OR**
- VI. (a) Explain recording and reconstruction technologies of hologram. (8)
- (b) Write any four applications of hologram. (4)
- (c) Discuss the production and any two applications of ultrasonic waves. (8)
- VII. (a) Derive an expression for the numerical aperture and hence define numerical aperture and acceptance angle. (12)
- (b) Distinguish between step index fibre and graded index fibre. (4)
- (c) What are single mode and multimode fibres? (4)

OR

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- VIII. (a) Derive the relation between refractive index and numerical aperture of an optical fibre. (6)
- (b) Write short notes on:
(i) Optical fibre sensor (8)
(ii) Integrated optics (8)
- (c) Discuss important applications of fibre optics communication. (6)
- IX. (a) Write short notes on:
(i) Miller indices
(ii) Powder method to study crystal structure (8)
- (b) Obtain the values of atomic radius and packing fraction for
(i) simple cubic
(ii) body centred cubic
(iii) face centred cubic (12)
- OR**
- X. (a) Explain Meissner effect and isotope effect of super conductors. (8)
- (b) Write short notes on:
(i) High temperature super conductors (8)
(ii) Josephson effect (8)
- (c) Discuss qualitative ideas of BCS theory. (4)
