



**J-0863**

**Second Year B. Sc. Examination**

**March / April – 2013**

**Physics : Paper - III**

**(For Electronics Special)**

**(Old Course)**

Time : Hours]

[Total Marks : 70

**Instructions :**

(1)

नीचे दृष्टावेव निशानीवाणी विगतो उत्तरवही पर अवश्य लपनी. Fillup strictly the details of signs on your answer book.	Seat No.:
Name of the Examination :	<input type="text"/>
Second Year B.Sc.	<input type="text"/>
Name of the Subject :	<input type="text"/>
Physics : Paper - III (Old Course)	<input type="text"/>
Subject Code No. : <input type="text"/> 0 <input type="text"/> 8 <input type="text"/> 6 <input type="text"/> 3	Section No. (1, 2,.....): <input type="text"/> Nil
Student's Signature	

- (2) Draw neat and clean diagram wherever necessary,.  
(3) Symbols used in the paper have their usual meaning.  
(4) Figures to right indicate full marks.  
(5) Constants :

$$\text{Rest mass of electron} = m_e = 9.1 \times 10^{-31} \text{ kg}$$

$$\text{Charge of electron} = e = 1.6 \times 10^{-19} \text{ C}$$

$$\text{Speed of light} = C = 3 \times 10^8 \text{ m/s}$$

$$\text{Planck's constant} = h = 6062 \times 10^{-24} \text{ Js.}$$

1 Answer the following questions in short. Each question carries **two** marks :

- (1) What is Monochromatic Aberration ?
- (2) What is meant by Normal Modes ?
- (3) How the quarter wave plate and half wave plates are made ?
- (4) State the condition to get circularly polarised light.
- (5) What is meant by rotor ? Give two examples.
- (6) What is meant by analytical function ?
- (7) State the general form of orthogonal curvilinear coordinates.

- 2 (a) What is meant by rigid body ? Deduce Euler's equation of motion about the principal axis, for a rigid body. 8
- (b) Explain principal axis transformation. 3
- OR**
- (a) Distinguish between free and forced vibrations. Derive the equation for amplitude of forced vibrations and discuss the conditions of resonance. 8
- (b) Explain Q factor. 3
- 3 (a) What is moment of Inertia ? Prove that moment of inertia of a rigid body is related to the mass and distance of a particle from its axis of rotation. 8
- (b) The focal lengths of two lenses of crown and flint glass are 10 cm and  $-15$  cm respectively, what should be the ratio of dispersive power of these glasses used in an achromatic object lens of 30 cm focal length ? 3
- OR**
- (a) Write the condition for achromatic combination of two thin lenses in contact. Derive a condition of achromatic combination for two thin lenses separated by a distance. 8
- (b) A harmonic force  $F = 10 \sin \pi t$  is applied on a particle of 5 unit mass. the restoring force is  $5x$  unit and resistive force is  $0.1(dx/dt)$ . Calculate amplitude and Q-factor. 3
- 4 (a) Give Fresnel's explanation for optical rotation in optically active crystal. Obtain the expression for optical rotation. 8
- (b) How to analyze the given light to know its polarizing status. 3
- OR**
- (a) Find the angle between reflected ray and refracted ray when a light ray is incident on a transparent media at its angle of polarisation. 8
- (b) State the applications of phase retardation plates. 3

- 5 (a) State and prove Gauss's Theorem. 8  
(b) Prove that cylindrical coordinate system is orthogonal. 3
- OR**
- (a) Write and prove Cauchy's integral formula. 9  
(b) Obtain the residue of  $(z \sin z) / (z-x)^3$  at  $z=\pi$ .
- 6 Write short notes : (any three) 12
- (1) Coma and Astigmatism
  - (2) Lorentz half shade polarimeter.
  - (3) Absorption Spectra
  - (4) Infrared Spectrometer
  - (5) Di-Chroic crystal and Polaroid.
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