



**J-0864**

**Second Year B. Sc. Examination**

**March / April – 2013**

**Physics : Paper - IV**

**(For Electronics Special)**

**(Old Course)**

Time : 3 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"/>
<input type="text" value="Second Year B.Sc."/>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="text" value="Physics : Paper - IV (Old Course)"/>	<input type="text"/>
Subject Code No. : <input type="text" value="0"/> <input type="text" value="8"/> <input type="text" value="6"/> <input type="text" value="4"/>	<input type="text" value="Student's Signature"/>
Section No. (1, 2,...): <input type="text" value="Nil"/>	

- (2) Draw neat 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 : **14**

- (1) Define spin of nucleons.
- (2) Define black body.
- (3) State full form of LASER.
- (4) Distinguish between soft and hard magnetic materials.
- (5) State Wein's displacement law.
- (6) State the selection rules for atomic spectra.
- (7) Define unit cell in crystal structure.

2 (a) Discuss the principle of relativity and invariance of Speed of Light. Use this principle to deduce Lorentz transformation equations of space and time co-ordinates. **8**

- (b) A rocket is 150 m long on the ground. When it is in flight, its length 99 m to a ground state stable; observe what is its speed. 3

OR

- (a) Define inertial frame of reference. Describe the Michelson-Morley's experiment with important conclusions. 8

- (b) A 40 m long rod is moving along its length, at that time stationary observer on earth shows its apparent length 10 m; find the velocity of rod. 3

- 3 (a) What do you understand by photoelectric effect? How this effect can be explained by Einstein's theory and describe the method to find Planck's constant. 8

- (b) Photoelectrons are emitted with a maximum speed of  $5 \times 10^7$  m/s from a surface when a light frequency  $6 \times 10^{14}$  Hz falls on it. Calculate the threshold frequency of the surface. 3

OR

- (a) Deduce the Schrodinger's time dependent and time independent wave equations for free particle. 8

- (b) Explain the Bohr's quantization of angular momentum. 3

- 4 (a) Describe the various types of liquid crystals. State the applications of the liquid crystals. 8

- (b) Explain Wigner Seitz cell and unit cell in crystal structure. 3

OR

- (a) Explain the diamagnetism, paramagnetism and ferromagnetism with example and discuss Hysteresis effect. 8

- (b) Sketch the plane (100), (010), (111) and [100], [010], [111] direction in a simple cubic cell. 3

- 5 (a) State the properties of nucleus and derive the expression for binding energy per nucleon. Discuss how it changes with mass number. 9

- (b) Explain p-p and n-p scattering. 3

OR

- (a) Distinguish between spatial coherence and time coherence. Discuss the conditions for LASER action and explain population inversion.. 8
- (b) Explain energy distribution of  $\beta$ -ray spectrum. 3
- 6** Write short notes : (any **three**) 12
- (1) L – S Coupling and j – j coupling.
  - (2) Construction and working of He–Ne LASER.
  - (3) Domain structure of atom
  - (4) Failure of classical mechanics.
  - (5) Ritz combination principle.
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