



**A-2996**  
**B. Sc. (Sem. III) Examination**  
**March/April – 2015**  
**Applied Physics : Paper - V**  
*(Modern Physics)*

Time : Hours]

[Total Marks : 50

**Instructions :**

(1)

<p>नीचे दृशावेक निशानीवाणी विगतो उत्तरवाडी पर अवश्य कपवी. Fillup strictly the details of signs on your answer book.</p> <p>Name of the Examination : <b>B. Sc. (Sem. III)</b></p> <p>Name of the Subject : <b>Applied Physics - 5</b></p> <p>Subject Code No. : <b>2 9 9 6</b> Section No. (1, 2,.....): <b>Nil</b></p>	<p>Seat No. : <input type="text"/><input type="text"/><input type="text"/><input type="text"/><input type="text"/><input type="text"/></p> <div style="border: 1px solid black; border-radius: 15px; height: 80px; display: flex; align-items: center; justify-content: center; margin-top: 10px;">Student's Signature</div>
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- (2) Draw neat and clean diagram wherever necessary.
- (3) Symbols used in the paper have their usual meaning.
- (4) Figures to right indicate full mark.
- (5) Constants:  
Rest mass of electron  $m_e = 9.1 \times 10^{-31} \text{kg}$   
Charge of electron  $e = 1.6 \times 10^{-19} \text{C}$   
Speed of light  $C = 3 \times 10^8 \text{ m/s}$   
Planck's constant  $h = 6.062 \times 10^{-34} \text{ J.s.}$

1 Answer the following questions in short. Each question carries one marks. 8

- (1) Define Compton wavelength.
- (2) Write the relativistic formula for kinetic energy.
- (3) State The fundamental laws of photoelectric emission.
- (4) State the basic postulates of special theory of relativity.
- (5) What do you understand by Complementary principle ?
- (6) What is the momentum of photon having frequency  $\nu$ .
- (7) State Planck's hypothesis.
- (8) Sketch the black body radiation curve.

2 (a) Discuss the principle of relativity and invariance of Speed of light. Use this principle to deduce Galilean transformation equations. 10

OR

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[Contd...

- (a) Define inertial frame of reference. explain the setup and working of Michelson – Morley's experiment with important conclusions. **10**
- (b) An electron moving with a speed of  $0.85c$ , in a direction of opposite to that of the moving photon. Calculate relative velocity of the electron with respect to the photon. **4**

**OR**

- (b) A 10 m long pole is moving along its length at that time an apparent length of pole of pole observed by an observer on earth is 6 m , find the velocity of pole. **4**

- 3** (a) Explain the failures of classical mechanics, Deduce the Planck's radiation law. **10**

**OR**

- (a) Define wave packet, Derive relation for wave velocity and group velocity for matter wave. **10**
- (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 to on it. Calculate the threshold frequency of the surface. **4**

**OR**

- (b) Explain the applications of the uncertainty principle. structure. **4**

**OR**

- 4** Write short notes : (any two) **14**
- (1) Davisson and Germer's experiment
  - (2) Photo electric effect.
  - (3) Lorentz transformation.
  - (4) Compton Effect.

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