



MCB-003-0492004

Seat No. \_\_\_\_\_

**B. Sc. / M. Sc. (Applied Physics) (Sem. II) (CBCS)**

**Examination**

**April / May - 2018**

**Paper - VII : Modern Physics - I**

*(New Course)*

**Faculty Code : 003**

**Subject Code : 0492004**

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

- Instructions :** (1) All questions are compulsory.  
(2) Figures on the right indicate marks.

- 1** Attempt any **seven** short questions : **14**
- (1) What are the assumptions of Rutherford's model of atom?
  - (2) Write the postulates of Bohr's theory of atomic structure.
  - (3) Draw a well labelled diagram of Spectral lines of H-atom.
  - (4) Define elastic and inelastic collisions.
  - (5) Draw a well labelled diagram of Davison Germer experiment.
  - (6) What is photoelectric effect ? Draw a proper diagram showing this effect.
  - (7) How the X-rays are produced ?
  - (8) Write the uncertainty principle with necessary mathematical equation for uncertainty in position and time.
  - (9) Define Bohr Magneton. Write mathematical expression for it.
  - (10) What are different coupling schemes for L and S ?
- 2** (a) Write answers of any **two** : **10**
- (1) Derive an expression for energy of electron ( $E_n$ ) in Bohr's orbit.
  - (2) Explain the origin of various spectral lines in the emission spectra of H-atom using necessary diagrams.
  - (3) Differentiate between Fluorescence and Phosphorescence.
  - (4) Describe the Franck - Hertz experiment proving the existence of energy levels in atom.

- (b) Write answer of any **one** : 4
- (1) Explain the emission and absorption line spectra.
  - (2) Discuss various models of atom starting from Plum Pudding Model.
- 3** (a) Write answers of any **two** : 10
- (1) Write a detailed note on the Angular momenta and Magnetic momenta.
  - (2) Explain the concept of Spin-Orbit coupling.
  - (3) Derive Planck's radiation law for the black body.
  - (4) Describe Photoelectric effect using suitable diagram.
- (b) Write answer of any **one** : 4
- (1) Explain the significance of FOUR quantum numbers.
  - (2) Write a detailed note on Compton effect.
- 4** (a) Write answers of any **two** : 10
- (1) Describe various Selection rules for spectral lines to be observed.
  - (2) Describe Raman effect. What are Stokes and Anti Stokes lines ?
  - (3) Explain the electronic configuration of an atom and rules for filling up of various orbits.
  - (4) Explain the important facts which are revealed from black body radiation curves.
- (b) Write answer of any **one** : 4
- (1) Describe the significance of Magnetic quantum numbers.
  - (2) What are matter waves? Explain their physical significance.
- 5** (a) Write answers of any **two** : 10
- (1) Describe Stern-Gerlach experiment confirming space quantization.
  - (2) Explain the G.P Thomson's experiment proving the evidence of matter waves.
  - (3) Describe normal and anomalous Zeeman effect.
  - (4) Explain the Paschen- Back effect.
- (b) Write answer of any **one** : 4
- (1) Discuss the Stark effect with suitable diagram.
  - (2) Explain the Davison-Germer experiment to verify the wave nature of particles.