



NCE-0030-492004 Seat No. _____

B. Sc. / M. Sc. (Sem. II) (CBCS) Examination

April / May - 2017

Applied Physics : Paper - VII

(Modern Physics - I)

Faculty Code : 0030

Subject Code : 492004

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

[Total Marks : 70

- Instructions :** (1) All questions are compulsory.
(2) Figures on right side shows full marks.
(3) Symbols have their usual meanings.

1 Answer any seven : (out of ten) 14

- (1) Write equations for wavelength for Lyman series and Bracket series.
- (2) Explain : Continuous spectra.
- (3) Write applications of fluorescence.
- (4) What is Bohr magneton (μ_B) ?
- (5) Prove that spin magnetic moment (μ_S) of the electron is equal to the Bohr magneton (μ_B).
- (6) What are photoelectrons?
- (7) What is the effect of frequency of incoming radiation on the photoelectric current?
- (8) Compare photoelectric effect and Compton effect.
- (9) What is a photon?
- (10) Write uncertainty principle with necessary mathematical equation.

- 2** (a) Answer the following questions in short : **4**
- (1) Write Rutherford's assumptions about nuclear atom model.
 - (2) Define emission spectra.
- (b) Describe various spectral series of Hydrogen atom : **5**
- (c) Derive an expression for the radius of Bohr orbit (r_n). **5**

OR

- 2** (a) Answer the following questions in short : **4**
- (1) Explain : Band spectra.
 - (2) What is Phosphorescence?
- (b) Describe Rutherford's nuclear atom model with appropriate figure. **5**
- (c) Write postulates of Bohr's model and hence derive expression for the energy E_n of electron in n^{th} orbit. **5**
- 3** (a) Answer the following questions in short : **4**
- (1) What is spin orbit interaction?
 - (2) What is L-S coupling for electrons?
- (b) Describe magnetic quantum numbers m_l and m_s . **5**
- (c) Explain electron configuration. **5**

OR

- 3** (a) Answer the following questions in short : **4**
- (1) Explain Orbital angular momentum in short.
 - (2) Write down selection rules for the spectral lines to be observed.
- (b) Describe: Coupling Schemes. **5**
- (c) Write a detailed note: Angular momenta and Magnetic momenta **5**

- 4 (a) Answer the following questions in short : 4
- (1) What is the Raman effect?
 - (2) What is Photoelectric effect? Draw a figure for the experimental arrangement to study the photoelectric effect.
- (b) Derive Planck's radiation law for a black body. 5
- (c) Write a detailed note on Electromagnetic waves. 5

OR

- 4 (a) Answer the following questions in short : 4
- (1) What are the stokes' and antistokes' lines in Raman spectra?
 - (2) What are the important facts which can be revealed by the study of black body radiation curves?
- (b) Explain : Photoelectric effect. 5
- (c) Write a detailed note: Compton Effect. 5

- 5 (a) Answer the following questions in short : 4
- (1) Draw a well labelled diagram of experimental arrangement of Franck-Hertz experiment.
 - (2) What are drawbacks of Bohr model?
- (b) Explain : Davison and Germer experiment. 5
- (c) Explain : Stern and Gerlach experiment. 5

OR

- 5 (a) Answer the following questions in short : 4
- (1) What is uncertainty principle?
 - (2) What are the matter waves?
- (b) Describe Franck-Hertz experiment and write its importance. 5
- (c) Give the drawbacks of Bohr model and how they were overcome in Sommerfeld's atomic model? 5