Seat No. _____

HP-003-0492004

B.Sc. / M.Sc. (Applied Physics) (Sem. IV) (CBCS) Examination

April – 2023

Modern Physics-I : Paper-VII

(New Course)

Faculty Code : 003
Subject Code : 0492004

Time : $2\frac{1}{2}$ Hours / Total Marks : **70**

Instructions :

(1) All questions are compulsory.

(2) Numbers in the right indicate marks.

1 (a) Write answers : **4**

(1) Who gave the first atomic model ?

(2) Which spectral series observed in visible light ?

(3) Which atomic model was suggested by Schrodinger ?

(4) List out the types of spectra.

(b) Write answers of any one : **2**

(1) Draw a well-labelled diagram of spectral lines of H-atom.

(2) Write equations for wavelength for Lyman series and Bracket series.

(c) Write answers of any one : **3**

(1) What are spectra ? Discuss different types of spectra.

(2) Define : Fluorescence

(d) Write answers of any one : **5**

(1) Describe the Frank-Hearts Experiment.

(2) Describe Rutherford's atomic model with appropriate figure.

2 (a) Write answers : **4**

(1) Define destructive interference with diagram.

(2) Draw diagram for photoelectric effect.

(3) Write types of atomic models.

(4) What is the frequency and wavelength of gamma rays ?

(b) Write answers of any one : **2**

(1) Draw diagram for X-ray production with every notation.

(2) What is photoelectric effect ?

(c) Write answer of any one : **3**

(1) Write a different property of EM waves.

(2) What is Plank Radiation ? Explain it.

(d) Write answers of any one : **5**

(1) Discuss Electromagnetic waves and its uses.

(2) Compare Compton effect and Photoelectric effect.

3 (a) Write answers : **4**

(1) What is precession ?

(2) Give name of different quantum numbers with symbol.

(3) What is the role of selection rule ?

(4) Enlist different coupling schemes.

(b) Write answers of any one : **2**

(1) Write spin-Spin interaction for $2s^1\ 2p^1$ configuration.

(2) What is Spin-Orbit interaction for j-j coupling ?

(c) Write answers of any one : **3**

(1) Discuss Spin Quantum number with example.

(2) Explain Electron Spin.

(d) Write answers of any one : **5**

(1) Explain Orbit-Orbit and Spin-Orbit interaction for L-S coupling.

(2) Discuss about Bohar Magneton.

4 (a) Write answers: **4**

(1) Draw diagram for Stern-Gerlach experiments.

(2) Give the statement for Zeeman effect.

(3) Draw Zeeman levels for $3p^1$ configuration.

(4) Write purpose of G.P. Thompsons experiments.

(b) Write answers of any one : **2**

(1) What is De-Broglie's hypothesis ?

(2) Draw the splitting diagram for Normal Zeeman Effect.

(c) Write answers of any one : **3**

(1) Compare Normal Zeeman effect and Pachen-Back effect with statement and diagram.

(2) Discuss Stark effect with diagram.

(d) Write answers of any one : **5**

(1) Explain Stern-Gerlach experiment.

(2) Explain Zeeman effect with electron transition diagram.

5 (a) Write answers : **4**

(1) Give the name of Schrodinger's atomic model.

(2) What are the frequency and wavelength ranger for microwave?

(3) Draw diagram for Pachen-Back effect.

(4) What is π and σ component in Anomalous Zeeman splitting ?

(b) Write answers of any one : **2**

(1) Define Phosphorescence.

(2) Write Kirchhoff statement for matter.

(c) Write answers of any one : **3**

(1) Describe Space Quantization.

(2) How many types of EM waves ? Discuss it.

(d) Write answers of any one : **5**

(1) Explain Somerfield's modifications.

(2) Discuss L-S coupling for electron.
