

April-2016

B. Sc. (Physics) Semester – V

Sub Code 4296 : Atomic Physics and Nuclear Instrumentation

Time: 2:30 Hours]

[Total Marks 70

- Instructions:
1. Symbols have their usual meaning.
 2. Figures on right hand side show marks of that question.

Q:1:

- (a) Explain the results of Stark effect. [10]
- (b) With given $^{10}\text{H}_{1/2}$ spectral term, how would you obtain L, S & J components. [04]

OR

Q:1:

- (a) Draw the energy transition diagram of $^2\text{P}_{3/2} \rightarrow ^2\text{S}_{1/2}$ line of Anomalous Zeeman effect with tabulation. [10]
- (b) Calculate the change in energy for the sodium source emitting the light of wavelength 5890 Å in the presence of magnetic field of 1T strength. [04]

Q:2:

- (a) What is Paschen-Back effect? Derive an expression for change in energy with an example of principal series of lithium. [09]
- (b) Calculate Lande's "g" splitting factor for the terms $^2\text{F}_{7/2}$ and $^{10}\text{G}_{1/2}$ [05]

OR

Q:2:

- (a) Discuss about the Orbital and Spin magnetic moment of an atom. [07]
- (b) Explain experimental verification of Lande's "g" splitting factor. [07]

Q:3:

- (a) Derive Weizsacher's semi-empirical Binding Energy formula in the case of liquid drop model. [10]
- (b) Write a short on binding energies of nuclei. [04]

OR

Q:3:

(a) Explain magic numbers for protons with diagram. [07]

(b) Explain in short: Predictions of the Shell model. [07]

Q:4:

(a) Discuss evidences that support the existence of magic numbers. [07]

(b) Write a note on “ Leptons and Hadrons “ . [07]

OR

Q:4:

(a) Discuss the fundamental interactions and conservation laws in Physics. [08]

(b) Justify why neutron possess little magnetic moment though it doesn't have net charge. [06]

Q:5:

(a) Explain in detail the technique of NMR. [09]

(b) Explain applications of NMR in chemistry. [05]

OR

Q:5:

(a) What is Mossbauer effect ? Explain the Mossbauer effect with experimental setup. [08]

(b) Explain one of the applications of Mossbauer effect in Physics. [06]

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