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BF—83—2016

FACULTY OF SCIENCE

B.Sc. (Sixth Semester) EXAMINATION

OCTOBER/NOVEMBER, 2016

PHYSICS

Paper XIV (Phy-304)

(Atomic Molecular and Nuclear Physics)

(Friday, 21-10-2016) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—10+30=40

N.B. :—(*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. Attempt any *four* :

(*a*) State Pauli's exclusion principle. 2

(*b*) Give the mathematical expressions for the selection rule for L, S and J for the appearance of a spectral line. 2

(*c*) Give the general location of pure rotation bands and electronic bands of a diatomic molecule in the electromagnetic spectrum. 2

(*d*) Draw the schematic well labelled diagram for the experimental study of Raman effect. 2

(*e*) Explain inelastic scattering. 2

(*f*) Give the Q value equation for a nuclear reaction. 2

2. (*a*) Explain normal Zeeman effect. Comment on longitudinal and transverse Zeeman effect. 4

(*b*) Give the theory of pure rotational spectra of a diatomic molecule. 4

Or

(*x*) Explain in detail L-S coupling. 4

(*y*) Explain rotation-vibration spectra of a diatomic molecule. 4

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3. (*a*) Explain any *four* types of nuclear reaction. 4

(*b*) Explain how nuclear reactors are classified according to the characteristics of chain reacting system. 4

Or

(*x*) Explain any *four* conservation laws used in nuclear reaction kinematics. 4

(*y*) Give the schematic diagram of a chain reaction based on the Fission of uranium nuclei by thermal neutrons. 4

4. Explain in detail Stark effect. 8

Or

Explain in detail how nuclear fission reaction is discovered. 8

5. Write notes on any *two* :

(*a*) Quantum numbers associated with vector atom model 4

(*b*) Electromagnetic spectrum 4

(*c*) Fission products of U^{235} 4

(*d*) Proton-proton chain reaction occurring in the sun. 4