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GA—12—2023

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

APRIL/MAY, 2023

(CBCS/Old Course)

PHYSICS

Paper XIV (Old)

(Atomic Molecular and Nuclear Physics)

(Monday, 24-04-2023)

Time : 10.00 a.m. to 12.00 noon

Time— Two Hours

Maximum Marks—40

N.B. :— (i) *All questions are compulsory and carry equal marks.*

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

(iii) *Symbols carry usual meaning unless and otherwise stated.*

1. Attempt any *four* of the following : 8

(i) State the intensity rules for the transitions in a diatomic molecule according to vector atom model.

(ii) State Lande's interval rule.

(iii) Explain Stark effect.

(iv) Write down the expression for the frequency of a line in rotation vibration spectra of a diatomic molecule.

(v) Define nuclear fission.

(vi) Write down four factor formula used in the design of a nuclear reactor.

2. Attempt any *two* of the following : 8

(a) Derive the expression for the frequency of a rotational line in a diatomic molecule.

(b) Write a note on the quantum numbers n , l , s and j associated with the vector atom model.

(c) Explain L-S & J-J coupling schemes in vector atom model.

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3. Attempt any *one* of the following : 8
- (a) Explain Zeeman effect in detail.
 - (b) Explain Raman effect in detail.
4. Attempt any *two* of the following : 8
- (a) Write down any *two* reactions each of transmutation by neutron and deuterons.
 - (b) Explain any *four* conservation laws in nuclear reactions.
 - (c) Write a note on controlled thermonuclear reactions.
5. Attempt any *one* of the following : 8
- (a) Derive 'Q' value equation in nuclear reaction kinematics.
 - (b) Explain neutron chain reaction in a nuclear reactor.

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