R—82—2017

FACULTY OF SCIENCE

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

MARCH/APRIL, 2017

PHYSICS

Paper XIV (PHY-304)

(Atomic, Molecular and Nuclear Physics)

(Wednesday, 5-4-2017)　　　　　　　　　　　**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.

1.　Solve any *four* :　　　　　　　　　　　　　　　　　　　　　　　　8

　　(a)　Give the permissible values of total quantum number and orbital quantum number.

　　(b)　State Pauli's exclusion principle.

　　(c)　Give the selection rule for L&S for the appearance of spectral line in an atomic spectra.

　　(d)　Explain elastic scattering in a nuclear reaction. Give *one* example.

　　(e)　State the law of conservation of nucleons in a nuclear reaction.

　　(f)　State four factor formula used in designing of a reactor.

2.　(a)　Give the experimental study of Stark effect.　　　　　　　　　8

　　(b)　Explain L-S and J-J coupling.

Or

　　(x)　Explain spatial quantization in vector atom model.

　　(y)　Explain quantum numbers associated with vector atom model.

3.　(a)　Give the theory of rotation vibration spectra.　　　　　　　　8

　　(b)　Explain the discovery of nuclear fission.

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Or

(*x*) State Raman effect and explain the occurrence of Stokes' and antistokes lines in Raman spectra.

(*y*) Explain how nuclear fission can be used as a source of energy.

4. (*a*) Derive Q value equation in nuclear reaction kinematics. 8

Or

(*x*) State and explain various conservation laws used in nuclear interactions.

5. Write notes on (any *two*) : 8

(*a*) Zeeman effect

(*b*) Pure rotational spectra

(*c*) Classification of nuclear reactors

(*d*) Controlled thermonuclear reactions.