(i) **Printed Pages : 2** **Roll No. .....**

(ii) **Questions : 7** **Sub. Code :** 0 4 5 0

Exam. Code : 0 0 0 5

B.A./B.Sc. (General) 5th Semester

(1129)

PHYSICS

Paper—C : Nuclear and Particle Physics—I

Time Allowed : Three Hours] **[Maximum Marks : 22**

Note :— Attempt **two** questions each from Sections I and II. Attempt any **eight** parts from Section III which is compulsory. The use of non-programmable calculator is allowed.

SECTION—I

I. What are magic numbers ? Give experimental evidence for their existence. What are the achievements for shell model ? 4½

II. (a) Explain the assumptions made in liquid drop model. 1½

(b) What are nuclear forces ? Discuss the various properties of nuclear forces. 3

III. (a) Calculate the energy carried by an electron in MeV. 1½

(b) Discuss at least five causes for failure of proton-electron hypothesis of nuclear construction. 3

SECTION—II

IV. (a) Explain neutrino hypothesis of β-decay. 3

(b) Give Geiger-Nuttal law of radioactive decay. 1½

V. (a) Calculate the activity of 10 mg of Ra^{226} which has a half life of 1620 years. 1½

(b) Discuss the theory of successive decay of radioactive substance and obtain the conditions for transient and secular equilibrium. 3

VI. (a) Explain the term nuclear-reaction cross-section and differential cross-section. 3

(b) Explain what do you mean by compound nucleus. 1½

SECTION—III

(Compulsory)

VII. Do any **eight** parts :

(i) Which is more, atomic binding energy or nuclear binding energy ?

(ii) What is the relation between mass number and nuclear radius ?

(iii) What are the limitations of liquid drop model ?

(iv) Define the two units of intensity of radioactivity.

(v) What is meant by electron capture ?

(vi) Does a neutron possess any magnetic dipole moment ?

(vii) What do you mean by endothermic endoergic and exoergic reaction ?

(viii) What is the difference between $+\beta$ decay and $-\beta$ decay ?

(ix) What do you mean by tunnel effect in α-decay ?

(x) What are the main differences between fission and nuclear fusion ? ½×8=4