(i) Printed Pages : 4]

(ii) Questions : 7]

Roll No. ....

Sub. Code : $\boxed{0}\boxed{4}\boxed{5}\boxed{0}$

Exam. Code : $\boxed{0}\boxed{0}\boxed{0}\boxed{5}$

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

1127

PHYSICS

(Nuclear and Particle Physics-I)

Paper : C

Time : 3 Hours]   **[Max. Marks : 44**

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

Section–I

1. (a) Explain binding energy of nucleus. Explain how does average binding energy per nucleon vary with mass number.   6

(b) Calculate the energy carried by an electron in MeV. **3**

2. Discuss briefly experimental evidendence for nuclear magic numbers. How does nuclear shell model explain them ? **9**

3. (a) Explain the terms :

    (i) Nuclear magnetic moment

    (ii) Electric quadrupole moment of nucleus **6**

(b) Explain the assumptions made in liquid drop model. **3**

Section–II

4. (a) One gram of Ra^{226} has an activity of nearly one Curie. Determine half life of Ra^{226} **3**

(b) Discuss the theory of successive decay of radioactive substance and obtain the conditions for transcent and secular equilibrium. **6**

5. (a) Discuss Geiger-Nuttal law. **3**

(b) What are different modes of β-decay ? Under what conditions do they take place ? **6**

6. (a) What do you mean by Q value of reaction ? Derive an expression for it in terms of Kinetic energies of product and incident particles and their masses. 6

(b) Find the age of death of an organism from the following data :

Half life of $_{6}^{14}C$ = 5600 years

Rate of amt. of $_{6}^{14}C$ at the death and present time is 10^8. 3

Section–III

(Compulsory Question)

7. Do any *eight* parts :

(i) What was the function of carbon rods in the nuclear reactors ?

(ii) What are main difference between fission and nuclear fusion ?

(iii) What are thermal neutrons ?

(iv) What is nuclear cross-section ?

(v) What is concept at compound nucleus ?

(vi) What is internal conversion ?

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

(viii) Name the *four* radioactive series.

(ix) Define the *two* unit of intensity of radio activity.

(x) What is parity ?   1×8