Exam.Code:0005
Sub. Code: 0450

2012
B.A./B.Sc. (General) Fifth Semester
Physics
Paper – C: Nuclear and Particle Physics – I

Time allowed: 3 Hours | Max. Marks: 44

NOTE: *Attempt five questions in all, including Question No. VII (Unit-III) which is compulsory and selecting two questions each from Unit I - II.*

x-x-x

UNIT – I

I. What are nuclear magic numbers? What is their experimental evidence? How the number shall model accounts for their existence? (9)

II. Explain liquid drop model of nucleus. What are the assumptions made in this model? (9)

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

b) Discuss atleast five causes for failure of proton-electron hypothesis of nuclear construction. (3,6)

UNIT – II

IV. a) Give Geiger-Nuttal law of radioactive decay.

b) Explain neutrino hypothesis of β-decay. (3,6)

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

b) Discuss the theory of successive decay of radioactive substance and obtain the conditions for transient and secular equlibrium. (3,6)

VI. a) Explain what do you mean by compound nucleus?

b) Explain the term nuclear-reaction cross section and differential cross section. (3,6)

UNIT - III

VII. Attempt any eight of the following:-

a) What are the two units of intensity of radioactivity?

b) What is meant by electron capture?

c) What are the main differences between fission and nuclear fusion?

d) Compare the energy of 1 a.m.v. in MeV.

P.T.O.

e) What is relation between mass number and nuclear radius?

f) What do you mean by endothermic and exoergic reaction?

g) What do you mean by tunnel effect 1m α-decay?

h) What is parity?

i) Define decay constant.

j) What is the difference between +β decay and -β decay? (8x1)

x-x-x