

2020

Time : 3 hours

Full Marks : 80

The figures in the right-hand margin indicate marks.

Answer all questions.

1. (a) Define Binding Energy and Packing fraction of a nucleus. Draw the binding energy curve and explain its characteristics in low, medium and high mass number range.

2+3+10 = 15

- (b) Give reasons for the non-existence of electrons inside the nucleus.

5

OR

- (c) Define Q value of a nuclear reaction and state its significance. Derive an expression

for the threshold energy of an endoergic nuclear reaction.

5+10 = 15

- (d) How does the Nuclear radius vary with mass number ? Explain why the nuclear density is more than that of atoms.

5

2. (a) Explain, stopping power, impact parameter and range of charged particles.
- (b) Establish Bethe-Bloch formulae for the ionization loss of a charged particles. Write the assumptions on which it is based.

10+4 = 14

OR

Write short notes on the following :

5×4 = 20

- (a) Pair production
(b) Compton scattering
(c) Stellar nuclear synthesis
(d) Interaction of neutron with matter

3. (a) What are different gas filled Detectors ?
Give the construction and working of
ionization chamber. State the application of
ionization chamber. $3+10+2 = 15$

(b) Differentiate between external and internal
quenching in a GM tube. 5

OR

(c) Give the construction and working of the
photo multiplier tube. 14

(d) What are the factors, which limit the energy
resolution of the semi conductor detectors ?
 6

4. (a) Describe the construction and working of a
Linear Accelerator. What are its limitations ?
 $10+2 = 12$

(b) Write short notes on synchrotrons. 4

(c) Find out the time period of rotation of a
deuteron in a cyclotron comence magnetic
field of 4T is applied. 4

OR

(d) Explain with suitable examples, the
conservation laws of Baryon number, lepton
number, strangeness in particle interaction.

12

(e) Write short notes on isospin and quarks.

$4+4 = 8$



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