

Roll No.

1086

Printed Pages : 3

GSQ / D-18
PHYSICS
Paper-X
Nuclear Physics

Time allowed : 3 hours] [Maximum marks : 40

Note : Attempt five questions in all, selecting at least one question from each unit. Question No. 1 is compulsory.

Use of scientific calculator is allowed.

- 1. (a) Find the energy equivalent to 1 amu. 2
- (b) Differentiate between β^+ -decay and electron capture. (2)
- (c) Why electron can not be accelerated using cyclotron? (2)
- (d) What is Q-value of a reaction? (2)

Unit-I

- 2. (a) Why proton-electron theory could not explain the structure of a nucleus? How proton-neutron theory solved those difficulties? 4
- (b) What is binding energy? Explain the significance of binding energy per nucleon curve. 4 (3)
- 3. (a) What are continuous and characteristic X-rays? 3

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[Turn over

(2)

- (b) What were the outcomes of Rutherford α -scattering experiment? Discuss the estimation of radius of a nucleus using this experiment. 5

Unit-II

- 4. (a) How a light charged particle loses its energy while traversing through a medium? 5
- (b) In absorption experiment of 1.14 MeV γ -rays from Zn^{65} , it is found that 1.96 cm of lead sheet reduce the intensity of beam to 25%. Find the absorption coefficient, half value thickness. 3
- 5. (a) What is β -decay? Discuss the neutrino hypothesis for β -decay. http://www.kuonline.in 4
- (b) What is Geiger Nuttal law? Discuss the energetics of α -decay. 4

Unit-III

- 6. (a) Write principle, construction and working of linear accelerator. (5) 5
- (b) Discuss the necessary condition for a Betatron to work. (3) 3
- 7. Write principle, construction and working of GM counter. 8

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(3)

Unit-IV

8. What are nuclear fission and fusion? Discuss Breeder reactor in detail. (8)
9. (a) Write short note on following :
- (i) Direct reactions
 - (ii) Compound reactions
 - (iii) Spallation reactions
 - (iv) Transfer reactions. 4
- (b) Discuss various conservation laws in nuclear reactions. 4

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