

Roll No. ....

(12/24)

**5238**

**B.Sc. EXAMINATION**

(For Batch 2011 & Onwards)

(Fifth Semester)

**PHYSICS**

**PH-502**

**Nuclear Physics**

*Time : Three Hours*

*Maximum Marks : 40*

**Note :** Attempt *Five* questions in all, selecting *one* question from each Section. Question No. 1 is compulsory. All questions carry equal marks and symbol have their usual meaning. Simple calculator is allowed.

1. (a) What is Moseley's law ? 2
- (b) What is straggling for alpha particle ? 2



- (c) A G.M. counter wire collects  $10^8$  electrons per discharge. When the counting rate is 500 counts/min., what will be the average current in the circuit ?

2

- (d) In a nuclear reactor explain the role of moderator and control rods.

2

### Unit I

2. (a) Discuss in detail the determination of size of nucleus by Rutherford Back Scattering.

6

- (b) What is the nuclear radius of  $^{125}\text{Fe}$  if that of  $^{27}\text{Al}$  is 3.6 fermi ?

2

3. Write short notes on the following :

8

(i) Nuclear spin

(ii) Nuclear Quadrupole moment

(iii) Parity.

### Unit II

4. (a) Explain the Neutrino hypothesis and process of  $\beta$ -decay.

6

- (b) Find the change in wavelength of X-ray photon when it is scattered through an angle of  $90^\circ$  by a free electron.

2

5. (a) What is pair production ? How is it explained by Dirac theory ?

6

- (b) What is Geiger-Nuttal law ? Explain.

2

### Unit III

6. Explain the principle, construction, working and uses of ionisation chamber.

8

7. Explain construction and working of Drift type linear accelerator with necessary theory.

8



#### Unit IV

8. (a) Discuss the conservation laws which hold in a nuclear reaction. Define Q-value of a nuclear reaction. 6
- (b) Define fission and chain reaction. 2
9. (a) Discuss general aspects of a design of a nuclear reactor. 6
- (b) Can nuclear reaction be induced by photon ? Explain giving example. 2