



- Notes : 1. All questions are compulsory.
2. Draw neat labelled diagram wherever necessary.

1. EITHER

- a) i) Describe the principle and working of GM counter. 4
 ii) What is plateau region? What are the advantages of working in this region? 3
 iii) What is quenching? state advantages of GM counter. 3
OR
 b) i) State assumptions of shell model of nucleus? 4
 ii) What are magic numbers? Give its evidence. 2
 iii) State achievement of shell model. 2
 iv) Explain Geiger - Nuttall law of α day. 2

2. EITHER

- a) i) State difference between Nanomaterials and bulk materials. 2
 ii) State different method of synthesis of Nano materials. 1
 iii) Explain sol gel technique for synthesis of Nano Materials. 4
 iv) What are advantages and limitations of this method? 3
OR
 b) i) What is an ECG? How does the ECG work? 4
 ii) State different applications of ECG. 2
 iii) Describe 10-20 international system for recording of EEG. 4

3. EITHER

- a) Calculate the Binding energy of ${}_{26}\text{Fe}^{56}$ if its mass is 55.975 a.m.u. Also calculate binding energy per nucleon. Mass of fe=55.975amu, Mass of proton = 1.007825 a.m.u. Mass of neutron = 1.008665 a.m.u and 1 a.m.u. = 931 Mev. 2½
 b) What is range of α - particle? Explain how it can be determined? 2½
 c) Why properties of Nano materials are different in terms of surface area to volume ratio? 2½
 d) Explain compound action potential of human body. 2½
OR
 e) Explain working of scintillation counter. 2½

- f) Calculate energy released during 19 m of U^{235} , If energy released per fission of U^{235} atom is 200 mev. 2½
- g) Distinguish between SEM and TEM. 2½
- h) State three types of Bio potential in human body and explain mechanism behind it. 2½
- 4. EITHER**
- a) What are exothermic and endothermic nuclear reaction? Give example. 2½
- b) Explain carbon-nitrogen cycle. 2½
- c) Explain the phenomenon of formation of quantum dots. 2½
- d) What do you understand by nano sensing? 2½
- OR**
- e) Draw and explain the graph of binding energy per nucleon versus mass number. 2½
- f) Give the main assumptions of liquid drop model. 2½
- g) What are carbon Nanotubes? Discuss its characteristics and its applications. 2½
- h) Discuss the application of Nanotechnology in medicine. 2½
- 5. Attempt any ten.**
- a) Define Q value of nuclear reaction? 1
- b) Find the packing fraction of ${}_{30}Zn^{64}$, whose mass is 63.9291 a.m.u. 1
- c) What is nuclear fission? 1
- d) What is critical mass? 1
- e) What is α - particle tunneling? 1
- f) What are cosmic rays? 1
- g) What do you mean by Top - down and Bottom -up approach? 1
- h) What is Nanoscience? 1
- i) Who is the father of Nanotechnology? 1
- j) What are the major waves on a single normal ECG pattern? 1
- k) What is EEG? 1
- l) What is biophysics? 1
