**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI**
**(END SEMESTER EXAMINATION)**

**CLASS: BTECH** **SEMESTER : VI**
**BRANCH: BT/CHEMICAL/MECH/PROD/CSE/EEE/ECE** **SESSION : SP/2023**

**SUBJECT: PH318, INTRODUCTION TO NUCLEAR AND PARTICLE PHYSICS (OPEN ELECTIVE)**
**TIME: 3 Hours** **FULL MARKS: 50**

**INSTRUCTIONS:**
**1. The question paper contains 5 questions each of 10 marks and total 50 marks.**
**2. Attempt all questions.**
**3. The missing data, if any, may be assumed suitably.**
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
**5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.**

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|---|---|---|---|---|
| Q.1(a) | Discuss the general characteristic of the Nuclear forces. | [5] | I | VI |
| Q.1(b) | A narrow beam of singly charged $B^{10}$ and $B^{11}$ ions of energy 3.2 keV passes through a slit of width 1mm into a uniform magnetic field of 1200 gauss and after a deviation of $180^0$ the ions are recorded on a photographic plate. (1) What is the spatial separation of the images? (2) What is the mass resolution of the system? | [5] | I | I |
| Q.2(a) | Discuss the salient features of the ß ray spectra. | [5] | II | VI |
| Q.2(b) | Explain how Paulis hypothesis of neutrino ß-particle emission solved the anomalies in the ß-ray spectra? | [5] | II | II |
| Q.3(a) | What do you understand by Range and stopping power? | [5] | III | I |
| Q.3(b) | Develop an expression for the stopping power of a charged particle while passing through a thin foil. | [5] | III | VI |
| Q.4(a) | Explain the principle and working of cyclotron. | [5] | IV | II |
| Q.4(b) | A cyclotron has magnetic field of 1.5 $Wb/m^2$. The extraction radius is 0.5 m. Evaluate the frequency of the radio beam necessary for accelerating deutrons and the energy of the extracted beams. | [5] | IV | V |
| Q.5(a) | Write a note on the classifications of elementary particle. | [5] | V | IV |
| Q.5(b) | What are bosons and fermions? | [5] | V | I |

**:::::01/05/2023 M:::::**