

M.Sc. II Semester Degree Examination, Sept./Oct. - 2024**PHYSICS****Nuclear Physics****(NEP)**

Time : 3 Hours

Maximum Marks : 70

Note : Answer **any five** of the following questions with Questions **No.1 (Q1)** is **Compulsory**, each question carries **equal** marks.

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| 1. | (a) | Describe the method of estimating the nuclear radius by Rutherford alpha particle scattering experiment. | 9 |
| | (b) | Explain the significance of nucleon quantum numbers. | 5 |
| 2. | (a) | Derive an expression for the threshold energy and Q-value of a nuclear reaction. | 9 |
| | (b) | Write a note on liquid drop model of the nucleus. | 5 |
| 3. | (a) | Outline the Gamow's theory of alpha decay. | 9 |
| | (b) | Explain the term double beta decay. | 5 |
| 4. | (a) | Give an account of interaction of gamma rays with matter. | 9 |
| | (b) | Brief on solid state nuclear track detectors. | 5 |
| 5. | (a) | Discuss in detail the process of fission reaction. | 9 |
| | (b) | Explain the quark model of elementary particles. | 5 |
| 6. | (a) | List out the evidences for magic numbers in shell model. | 5 |
| | (b) | Explain in detail the multipole character of gamma radiation by applying selection rules. | 9 |
| 7. | (a) | Discuss the energy loss and stopping power of heavy charged particles interacting with matter. | 9 |
| | (b) | Explain the conservation laws in elementary particle decays. | 5 |
| 8. | (a) | Write a note on Pauli's neutrino hypothesis. | 5 |
| | (b) | Write a note on Cerenkov radiation. | 5 |
| | (c) | Give a brief account of stellar nucleosynthesis. | 4 |