M.Sc.(Physics) (CBCS Pattern) Fourth Semester CBCS

PSCPHYT13 - Core-II-Paper - 13 - Nuclear and Particle Physics

P. Pages : 1 **GUG/W/18/11412**

Time : Three Hours * 3505 * Max. Marks : 80

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1. Either:-

a) Discuss basic nuclear properties and binding energy of the nucleus. Also drive semi-Empirical mass formula for Binding Energy of the nucleus. **8**

b) Describe in detail liquid drop model. **8**

OR

c) Discuss the mass parabola for odd and even isobaric nuclei. What are magic numbers. **8**

d) Explain the shell model of nucleus. **8**

2. Either:-

a) Describe the Fermi theory of beta decay and explain the selection rules regarding allowed and forbidden transitions in beta decay. **8**

b) Explain and arrive at the disintegration energy for alpha and gamma decay. **8**

OR

c) Discuss the Gamow's theory of alpha decay. **8**

d) What are nuclear reactions? Give their conservation laws and mechanism of nuclear reaction. **8**

3. Either:-

a) Explain the interaction of charged particles and electromagnetic radiation with matter. **8**

b) Stating the principles of nuclear radiation detectors, explain construction and working of a G-M counter. **8**

OR

c) Give a brief account of principle of particle accelerator. And explain in detail linear accelerators. **8**

d) Discuss about cyclotron and synchrocyclotron accelerator. **8**

4. Either:-

a) Give the broad classification of elementary particles. **8**

b) Discuss the quark model of elementary particles. **8**

OR

c) Explain about charge conjugation, parity and time reversal and the combination of them with suitable examples. **8**

d) What are strong, weak and electromagnetic interactions? Explain. **8**

5. Solve.

a) Explain the ground and excited state of Deuteron. **4**

b) What are fission and fusion reactions? **4**

c) Give an account of semiconductor detectors. **4**

d) What are Higgs bosons. Explain in short. **4**

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