M.Sc.(Physics) CBCS Pattern Semester-IV

PSCPHYT13 - Core-II - Paper-XIII : Nuclear and Particle Physics

P. Pages : 2 **GUG/W/23/11412**

Time : Thre Hours * 6 4 1 3 * Max. Marks : 80

Either:

1. a) With the help of liquid drop model, obtain the condition for stability of nucleus. **8**

b) Explain the single particle shell model of nucleus. **8**

OR

e) Explain the terms:

i) Magnetic moment. **4**

ii) Electrical quadrupole moment for the nucleus. **4**

f) What are Schmidt lines? Explain Schmidt diagrams separately for odd proton and odd neutron nuclei. **8**

Either:

2. a) Show that the nuclear reaction cross-section may exceed the geometrical cross-section of nucleus. **8**

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

OR

e) What are the assumptions made in compound nucleus hypothesis? Give suitable examples of nuclear reactions to support your answer. **8**

f) Discuss the elementary idea of alpha, beta and gamma decays. **8**

Either:

3. 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

e) Explain the working principle of cyclotron in detail. **8**

f) Explain with neat diagram the working of scintillation detector. **8**

Either:

4. a) Explain each terms of Gell Mann- Nishijima formula. **8**

b) Discuss the conservation laws for elementary particles in detail. **8**

OR

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

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

5. Answer the followings.

a) What are the properties of nuclear forces? **4**

b) Explain the fission and fusion reactions? **4**

c) What are the advantages of semiconductor detector? **4**

d) Discuss the properties of hadrons. **4**

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