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

P. Pages : 2

Time : Three Hours

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GUG/S/23/11412

Max. Marks : 80

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Note :   1.   All the questions are compulsory.

Either :-

1. a) Explain how the inclusion of spin-orbit potential gives the proper separation of sub-shell and verify all the magic numbers.   **8**

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

OR

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

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

Either :-

2. a) Explain forbidden and allowed states in β -decay process.   **8**

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

OR

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

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

Either :-

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

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

OR

   e) Explain the working principle of Betatron. Obtain Betatron equation.   **8**

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

Either :-

4. a) Give the classification scheme of elementary particles. **8**

b) State elementary ideas of CP and CPT invariance. Explain in detail. **8**

OR

e) Discuss the unification scheme of Electro-weak interaction. **8**

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

5. Attempt all the following.

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

b) Explain binding energy curve. **4**

c) What are Higgs bosons? Explain in short. **4**

d) What are advantages of semiconductor detector? **4**

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