

**B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MARCH 2017****Sixth Semester****Core Course—NUCLEAR AND PARTICLE PHYSICS**

(Common for Model I B.Sc. Physics, Model II B.Sc. Physics, B.Sc. Physics EEM and Physics EEM)

[2013 Admission onwards]

Time : Three Hours

Maximum : 60 Marks

**Part A (Objective Type)**

*Answer all questions.*

*Each question carries 1 mark.*

1. Isotopes are atoms of a given element that have ——— masses.
2. The most stable nuclei are in the ——— number range from 30 to 63.
3. The ——— energy per nucleon in  ${}^7_3\text{Li}$  nuclide is 5.43 MeV.
4. Nuclei produced in the laboratory through nuclear reactions exhibit ——— radioactivity.
5. The ——— produced by one gram of U-235 by fission in 22.8 MWb.
6. The particles are classified accordingly to their ——— life period.
7. The intensity of cosmic ray is ——— at the poles.
8. Materials consisting of atoms of ——— atomic mass are used as moderators.

(8 × 1 = 8)

**Part B (Short Answer Questions)**

*Answer any six questions.*

*Each question carries 2 marks.*

9. What is binding energy per nucleon?
10. Differentiate between Isotopes and Isobars.
11. State and explain proton-neutron hypothesis.
12. What is carbon dating? Explain.
13. What is meant by orbital electron capture?
14. Explain electron positron annihilation.
15. What is a breeder reactor?
16. How radiation hazards can be avoided?

Turn over

17. What is quark ? Explain.
18. What is East West Effect ?

(6 × 2 = 12)

**Part C (Short Essay/Problems)**

*Answer any four questions.  
Each question carries 4 marks.*

19. Bring out the shell model for nucleus.
20. Determine the atomic mass of  $^{10}\text{Ne}_{20}$  if the binding energy of neon is 160.647 MeV.
21. Discuss the radioactive decay in detail.
22. Explain Gamow theory of  $\beta$  decay.
23. Bring out Tokamak nuclear waste disposal scheme.
24. Distinguish between latitude effect and altitude effect in cosmic rays.

(4 × 4 = 16)

**Part D (Essays)**

*Answer any two questions.  
Each question carries 12 marks.*

25. Discuss the meson theory of nuclear forces. Describe mass spectrograph method for nuclear mass determination.
26. Discuss the theory for alpha decay and describe an experiment to demonstrate it.
27. Briefly discuss fission and chain reaction. Describe the construction and working of a nuclear reactor.
28. Describe the classification of elementary particles.

(2 × 12 = 24)