

E 7519

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Reg. No.....

Name.....

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MARCH 2014

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 B.Sc. Physics-Instrumentation)

Time : Three Hours

Maximum Weight : 25

Part A

Answer all questions.

Objective type questions-Weight 1 for each bunch.

BUNCH I

1. Isomers are the atoms having :
(a) Different atomic number. (b) Different mass number.
(c) Different energy. (d) Both (a) and (b).
2. Binding energy per nucleon is more for :
(a) Nitrogen. (b) Oxygen.
(c) Uranium. (d) Iron.
3. The strongest force in the universe is :
(a) Gravitational force. (b) Quantum force.
(c) Nuclear force. (d) Electrostatic force.
4. In which decay mass number does not change.
(a) Alpha decay. (b) Beta decay.
(c) Gamma decay. (d) Both (b) and (c).

BUNCH II

5. Which one of the following is not a magic number ?
(a) 20. (b) 50.
(c) 62. (d) 82.
6. Packing fraction is positive for mass number.
(a) Less than 82. (b) Less than 200.
(c) Greater than 200. (d) All of the above.

Turn over

7. Which gas is used in ionization chamber when it is used to detect neutron.

- (a) Sulphur dioxide.
- (b) Methyl bromide.
- (c) Boron trifluoride.
- (d) All of the above.

8. Geiger-Nuttall law is associated with :

- (a) Alpha decay.
- (b) Beta decay.
- (c) Gamma decay.
- (d) Both (b) and (c).

BUNCH III

9. The mass of the neutrino is :

- (a) Less than electron.
- (b) Equal to electron.
- (c) Zero.
- (d) None.

10. Electron emitted during internal conversion has :

- (a) Line spectrum.
- (b) Band spectrum.
- (c) Continuous spectrum.
- (d) None.

11. Which one of the following is not conserved in a nuclear reaction ?

- (a) Charge.
- (b) Parity.
- (c) Magnetic dipole moment.
- (d) Mass.

12. Liquid drop model supports :

- (a) Nuclear fission.
- (b) Nuclear fusion.
- (c) Both (a) and (b).
- (d) Pair production.

BUNCH IV

13. The intensity of the cosmic rays are maximum at :

- (a) Poles.
- (b) Equator.
- (c) Neither poles nor equator.
- (d) Either poles or equator.

14. Which one of the following is not a Lepton ?

- (a) Muon.
- (b) Omega.
- (c) Neutrino.
- (d) None.

15. Which one of the following particle annihilate quickly.

- (a) Proton.
- (b) Antiproton.
- (c) Neutron.
- (d) Antineutron.

16. The spin value of mesons are :

- (a) $1/2$.
- (b) $-1/2$.
- (c) $3/2$.
- (d) Zero.

(4 × 1 = 4)

Part B (Short Answer questions)

*Answer any five questions.
Weight 1 each.*

17. Give the magic numbers.
18. What is proton-neutron hypothesis ?
19. Mention the properties of nuclear forces.
20. Define half-life.
21. State Goiger-Nuttal law.
22. Define pan production. Give *one* example.
23. What is a breeder reactor ?
24. Give the quark model for a neutron.

(5 × 1 = 5)

Part C (Short Essay/Problems)

*Answer any four questions.
Weight 2 each.*

25. Find the density of ${}^7\text{N}_{14}$ nucleus.
26. Calculate the mean life of a radioactive nucleus having half-life 13 days.
27. Explain about radio carbon dating.
28. Describe a thermo nuclear reaction.
29. Give the latitude and altitude effect of cosmic rays.
30. How you handle radiation hazards ?

(4 × 2 = 8)

Part D (Essays)

*Answer any two questions.
Weight 4 each.*

31. Describe the working of a ionization chamber, what are its merits.
32. Write in detail about internal conversion also explain pair production and annihilation.
33. Explain nuclear fission on the basis of liquid drop model also write a note on chain reaction.

(2 × 4 = 8)