

2. Zeeman effect is splitting of spectral lines due to _____.
- (a) Magnetic field (b) Electric field
(c) Gravitational field (d) None
3. The nucleus of ${}^4_2\text{He}$ is _____ nucleus.
- (a) even – even (b) odd – odd
(c) odd – even (d) even – odd
4. The nuclear force is _____ and _____.
- (a) strong, attractive (b) weak, attractive
(c) strong, repulsive (d) none
5. β – particle is equivalent to _____.
- (a) proton (b) electron
(c) neutron (d) none
6. The expression for half life period of a radioactive nucleus is _____.
- (a) $\frac{\lambda}{6.93}$ (b) $\frac{\lambda}{0.693}$
(c) $\frac{0.693}{\lambda}$ (d) none

7. The nuclear fusion is due to _____ of _____ nucleus.
- (a) joining, light
 - (b) splitting, heavy
 - (c) joining, heavy
 - (d) none
8. The controlled thermo nuclear reaction is achieved in _____.
- (a) Cyclotron
 - (b) G.M. Counter
 - (c) Nuclear Reactor
 - (d) None
9. The idea of elementary particles is proposed by _____.
- (a) Dalton
 - (b) J.J. Thomson
 - (c) Yukawa
 - (d) None
10. Positron is a positive _____.
- (a) proton
 - (b) neutron
 - (c) electron
 - (d) none

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain L – S coupling.

Or

- (b) State and explain Stark effect.

12. (a) Give the general properties of nucleus.

Or

- (b) What are the characteristics of nuclear force?

13. (a) State and explain Geiger – Nuttal law.

Or

- (b) Write short note on nuclear isomers.

14. (a) Calculate the energy released during the fusion of $4\text{ }^1_1\text{H}^1$ into $^4_2\text{He}^4$.

Or

- (b) Explain the principle and action of atom bomb.

15. (a) Explain the latitude effect of cosmic rays.

Or

- (b) What are Van – Allen belts? What are their uses?

PART C — ($5 \times 8 = 40$ marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain in detail the fine structure of sodium D line.

Or

- (b) Explain the theory and experiment for Zeeman effect.

17. (a) Explain the meson theory of nuclear forces.

Or

- (b) Explain the Shell model of a nucleus.

18. (a) (i) Derive expression for half life period
(ii) Explain Radio carbon dating.

Or

- (b) Explain the theory of alpha decay.

19. (a) Explain the construction and working of nuclear reactor.

Or

- (b) Explain the construction and working of Scintillation Counter.

20. (a) Explain Cosmic ray showers.

Or

- (b) Explain briefly the quark model about elementary particles.
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