K21U 1548

Reg. No. : .....

Name : .....

V Semester B.Sc. Degree (CBCSS – Sup./Imp.) Examination, November 2021
(2015-'18 Admns.)
CORE COURSE IN PHYSICS
5B10PHY : Atomic, Nuclear and Particle Physics

Time : 3 Hours

Max. Marks : 40

SECTION – A

(Answer **all** – Very short answer type. **Each** question carries **1** mark.)

1. Lyman series contain wavelengths in the _____ region of electromagnetic spectrum.
2. Particles which do not obey exclusion principle are called _____
3. Write SI unit of activity.
4. Write the isotope of hydrogen present in heavy water. **(1×4=4)**

SECTION – B

(Answer **any seven** – Short answer type. **Each** question carries **2** marks.)

5. Write about Balmer series in Hydrogen spectra.
6. What is the procedure of Frank-Hertz experiment ?
7. Write the possible wavefunctions of a system of two particles have two states. Also write possible symmetric and antisymmetric wavefunctions.
8. What is L-S coupling ?
9. Explain the instability of nucleus with an example.
10. Write semi empirical mass formula. Write the name of each term.

P.T.O.

11. Define half-life of a radioactive nuclei. Derive the relation between half life and decay constant.

12. Define disintegration energy.

13. Prove that pair production obeys conservation laws.

14. Draw eightfold way of spin 0 mesons. **(7×2=14)**

SECTION – C

(Answer **any four** – Short essay/problem type. **Each** question carries **3** marks.)

15. Find out density of C^{12} nuclei.

16. Check whether the reactions are possible or not ?

    a) $K^+ \rightarrow \pi^- + \pi^+ + \pi^+$

    b) $K^- + p \rightarrow \Sigma^+ + \pi^-$

17. What are the different beta decay processes ? Explain.

18. Explain Bohr atom.

19. Define cross section. What is the significance of narrow peak at 0.176 eV of $^{113}Cd(n, \gamma)^{114}Cd$?

20. Half life of Rn^{222} is 3.8 days. Calculate the time taken for a sample of Rn^{222} to decay 70% of its initial no. of nuclei. **(4×3=12)**

SECTION – D

(Answer **any two** – Essay type. **Each** question carries **5** marks.)

21. Explain nuclear fission reactors.

22. Explain spin orbit coupling and total angular momentum of atoms.

23. Explain meson theory.

24. Write a note on :

    a) Hadrons.

    b) Quarks. **(2×5=10)**