GOVT. BRENNEN COLLEGE CENTRAL LIBRARY THALASSERY

M 26099

Reg. No. : .....

Name : .....

Third Semester M.A./M.Sc./M.Com. Degree (Reg./Sup./Imp.) Examination, November 2014

(2009 Admn. Onwards)

PHYSICS

PH 303 : Nuclear Physics

Time: 3 Hours Max. Marks : 50

SECTION – A

Answer **any two** questions. **Each** question carries **10** marks.

1. Using a square Nuclear potential well for a deuteron derive the relationship between the range of nuclear force and depth of potential well.
2. Using Fermi's theory of β decay deduce and expression for the probability of β-particle emission.
3. Explain compound nucleus reactions. List and explain the different conservation laws in nuclear reaction. Define Q value and threshold in nuclear reaction. Obtain their quantities in nuclear masses.
4. Explain diffusion of thermal neutrons from a plane surface. Derive an expression for the diffusion length. **(2×10=20)**

SECTION – B

Answer **any five** questions. **Each** question carries **3** marks.

5. What are magic numbers ? What is the magicity about magic numbers ?
6. What are stripping reactions ? What are pick-up reactions ?
7. Explain the basic principle of the working of a GM counter.
8. Why is it that alpha decay cannot be explained on classical grounds ?

P.T.O.

9. What is reactor buckling ?

10. Give the statistical model of fission.

11. Explain internal conversion. What is an isomer ?

12. What is nuclear fusion ? What are the major hindrances in the design of controlled fusion reactor ? **(5×3=15)**

SECTION – C

Answer **any three** questions. **Each** question carries **5** marks.

13. Discuss the Meson theory of nuclear forces. Define Yukawa potential and its variation with distance.

14. Explain the basic nuclear properties. Calculate the density of $_6C^{12}$ nucleus given radius of carbon nucleus = 2.7×10^{-15} m.

15. Explain the construction and working of a Scintillation counter.

16. What are the factors that contribute to the semi empirical mass formula ? Using the semi-empirical mass formula find the most stable isobar for a nucleus having odd A.

17. Discuss the essential difference between the scattering by neutron-proton system and proton-proton system. **(3×5=15)**
