Exam. Code : 209004
Subject Code : 4798

M.Sc. Physics Semester—IV
PHY-563 : REACTOR PHYSICS

Time Allowed—3 Hours]   [Maximum Marks—100

Note :— Section A is compulsory. Attempt **ONE** question from each of the Sections B, C, D and E. All questions carry equal marks.

SECTION–A

1. (a) What are the orders of energies of thermal and fast neutrons ?

   (b) What do you mean by mean free path ?

   (c) How is diffusion different from drift ?

   (d) In nuclear reactors what is the need of moderation of neutrons ?

   (e) How is the interaction of neutrons different from charged particles ?

   (f) Name the factors of four factor formula.

   (g) Name different fuels used in nuclear reactors.

   (h) What do you mean by super critical size of a nuclear reactor ?

   (i) Name any five nuclear reactors in India.

   (j) In fission which are the prompt neutrons ?

SECTION–B

2. Discuss thermal neutron diffusion and then derive steady state equation.

3. In diffusion process of neutrons obtain the solution of diffusion equation for an infinite plane source in a finite medium.

SECTION–C

4. Discuss slowing down density and slowing down time of neutrons.

5. What is fast neutron diffusion ? Derive Fermi age equation ?

SECTION–D

6. What do you mean by neutron cycle ? On the basis of this cycle derive four factor formula.

7. What is the difference between material and geometrical buckling ? Discuss geometrical buckling taking the case of any type of geometry.

SECTION–E

8. What do you mean by delayed neutron ? Discuss the role of delayed neutrons in nuclear reactors.

9. Discuss the use of coolants and control rods.