

**B.Tech. – VIEP – MECHANICAL ENGINEERING
(BTMEVI)**

Term-End Examination

00316

June, 2015

BIMEE-017 : NUCLEAR POWER ENGINEERING

Time : 3 hours

Maximum Marks : 70

*Note : Attempt any **five** questions. All questions carry equal marks. Use of scientific calculator is permitted.*

1. (a) With the help of a neat sketch, show all the important parts of a nuclear reactor. Describe briefly the functions of each part. 7
- (b) "The source of future power generation will be only nuclear fuel" — Write your comment. 7
2. (a) Why is shielding of a nuclear reactor necessary ? What do you understand by thermal shielding ? 7
- (b) Draw a neat diagram and describe the working of a Pressurised Water Reactor (PWR) plant. 7

3. (a) What is a moderator in a nuclear reactor ? Explain the desirable properties of a good moderator. 7
- (b) Explain how control rods control the reactor. What are the materials generally used to make control rods ? 7
4. (a) Discuss the functions and materials for the following : 7
- (i) Reflector
- (ii) Biological shield
- (b) Describe with the help of a neat sketch the construction and working of a Pressurised Water Reactor (PWR). What are its advantages and disadvantages ? 7
5. (a) What is "Boiling Water Reactor (BWR) ? How does it differ from "Pressurised Water Reactor" (PWR) ? 7
- (b) A power of 6 MW is being developed in a nuclear reactor.
- (i) How many atoms of U^{235} undergo fission per second ?
- (ii) How many kg of U^{235} would be used in 1000 hours ? Assume that on an average 200 MeV is released per fission. 7

6. (a) What factors must be considered while selecting the materials for the various reactor components? 7
- (b) Calculate the following: 7
- (i) The fission rate of U^{235} for producing a power of 1 watt.
- (ii) The energy released in the complete fissioning of 1 kg of U^{235} .

Assume that 200 MeV are released per fission of the uranium nucleus.
