

**UNIVERSITY OF PETROLEUM
AND ENERGY STUDIES**



End Semester Examination – May, 2017

Program/course: MBA – Power Management

Semester – 2

Subject: Hydro Nuclear Power Resource Management

Max. Marks : 100

Code : MDSP 862

Duration : 3 Hrs

No. of page/s: 03 pages

- **Assume any data if not available.**

Section – A (1 x 20) = 20 marks)

Question 1: State whether the following statements are **true or false**:

(Each question carries **1 mark**)

- i. The inventory of enriched uranium in the world is about 2000 ton
- ii. Gamma rays emits from outer electron orbit of an atom.
- iii. The cost of fuel is about 12% in the case of electricity power in a nuclear power station.
- iv. Nuclear Power Plants are well suited for varying load conditions.
- v. Neutron Mass is more than Proton Mass.
- vi. Thorium can also be used directly in Nuclear Power Reactors as a fuel in Indian Nuclear Reactors.
- vii. Heavy Water is found in ordinary water in the ratio of 1:166.
- viii. Plutonium (Pu)²³⁹ Nuclear fuel is available in Australian Uranium Mines.
- ix. The Hydro Power Plants are highly reliable and its maintenance and operation charges are very low.
- x. The Output of a Hydro Power Plant is always constant.
- xi. Mechanical Efficiency of Pelton wheel decreases faster with wear and tear than Francis Turbine.
- xii. Candu Type of nuclear power reactor require enrichment of fuel uranium (235).
- xiii. Uranium (238) isotope is available 100 times of uranium (235) isotope in uranium.
- xiv. Reprocessing of used fuel in a nuclear reactor is a chemical process.
- xv. The weight of fission products produced in a big nuclear reactor is only about 15 ton per year.
- xvi. Beta particle is lighter than a proton.
- xvii. The energy produced in a breeder reactor is about 100 times more than the present nuclear power reactor.
- xviii. Kaplan turbine has fixed blades in place of moving blades.

- xix. The overall cost of Hydro Power Plant is lower if Specific Speed (N_s) is high for a given head and output.
- xx. Pelton Turbine is used for Low heads.

Section – B

(4 x 5 = 20 marks)

Attempt any four questions. Each question carries **5 Marks**.

- Q. 2. Critically evaluate the Chernobyl nuclear accident in Ukraine (the than U.S.S.R) in 1986, what is the present status of radiation and human habitation in the area
- Q. 3. Analyze all seven types of nuclear power reactors with their pro and cons.
- Q. 4. How many techniques are presently available for enrichment of uranium? Evaluate them with suitable figures.
- Q. 5. Analyze the various forms of natural radiations and manmade radiations
- Q. 6. Analyze the engineering points of selecting a type of a turbine.

Section – C

30 Marks

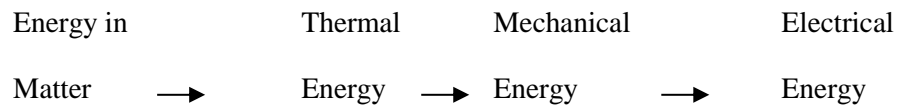
Attempt any **Six questions**. Each question carries **5 Marks**.

- Q. 7 Analyze advantage & disadvantages of nuclear power reactors
- Q. 8. Critically analyze the advantages and disadvantages of nuclear fusion. What are the technical challenges involved in development of nuclear fusion reactor for electricity generation.
- Q. 9. Analyze the details design, special features and other provision etc. provided in Narora atomic power plant in U, P,
- Q. 10. Evaluate the Advantage & Dis-Advantage of Underground Power House
- Q. 11 Analyze the role of prime mover in hydro power plant and how they are classified depending upon the action of water. Compare the Pelton, Francis and Kaplan water turbines
- Q. 12. Critically analyze Fukushima, Japan Nuclear Accident details with future recommendations.
- Q. 13. a) Compare a nuclear power plant with a steam power plant.
b) Analyze the safety majors required at a nuclear power plant.

Section – D

Attempt any **two questions**. Each question carries **15 marks**.

Q. 14. (a) A nuclear fission reaction power plant converts energy in matter to electrical energy by following energy chain



Neglecting losses, how much matter is converted into electrical energy per day by a 10 M.W. power plant?

- (b) What is the thermal energy equivalent in terms of coal to the complete fissioning of one Kg of uranium 235
- (c) The fissioning of one atom of Uranium 235 has an energy 200Mev. What is the energy per fission in (i) Joules (ii) KWH?
- Q. 15 (a) what is critical mass, describe nuclear fission, and nuclear fusion.
- (b) Evaluate the energy from fission and full burn up equation with mass balance etc.
- (c) Calculate the energy per megawatt-day by burning one gram of fissionable uranium material.
- Q. 16. (a) How DPR is prepared of a Hydro Power Project & Explain the various important points for Submitting poor quality of DPR by the projects developers causing delays in projects.
- (b) Analyze nuclear power plant impact on environment with the diagram of a nuclear fuel cycle and describe the process involved.
- (c) Analyze all the three types of nuclear waste generated in Nuclear power reactors in detail.

The End