Total No. of Questions : 8] *[Total No. of Printed Pages : 4*

Roll No .....

ME-602 (GS)

B.E. VI Semester

Examination, May 2018

Grading System (GS)

Power Plant Engineering

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions out of eight.

ii) All questions carry equal marks. **rgpvonline.com**

1. a) State the factors which go in favour of nuclear energy. 6

   b) Explain 'Small hydro' as a renewable energy system. Give its classification with respect to capacity and head? What is its importance concerning India? 8

   OR

   Explain how tidal energy is converted to electrical energy. What do you mean by schedule and range of a tidal wave? 8

2. a) What a Cooling tower? How are cooling towers classified? Explain any one of them with a neat sketch. 6

   b) What are the different methods of feed water treatment? Explain in detail any two methods. 8

   OR

A 15m long, 75mm diameter riser tube receiver saturated water at 160 bar and at velocity of 0.7 m/s. Heat is added to it uniformly. The slip ratio is 1.7. Estimate maximum heat added to the tube in kJ/m if the exit void fraction is not to exceed 0.8. 8

3. a) Explain the terms: 6

   i) breeding ratio

   ii) burner

   iii) converter

   iv) breeder

   b) Give the layout of a fast breeder reactor power plant and explain its salient features. 8

   OR

   During a 10 hour run from one station to another, a railway engine develops an average power of 1200kW. If the engine is driven by an atomic power plant of 20% efficiency, how much U^{235} would be consumed on the run? Each U^{235} atom on fission release 180MeV of energy. 8

4. a) Write short notes on MHD. Converter. 6

   b) What is an HTGR? Why is called Magnox? Explain its main features. 8

   OR

   A nuclear reactor consumes 10kg of U^{235} per day. Calculate its power output if the average energy released per U^{235} fission is 200MeV. 8

5. a) Discuss the differences between Kaplan, Francis and pelton turbines and state the types of power plants they are suitable for. 6

   b) Why is governing of hydraulic turbines necessary? Explain the governing mechanism of a Kaplan turbines. 8

OR

A hydroelectric power plant produces 20MW under a head of 15m if the overall efficiency of the plant is 72% determine: 8

i) Type of turbine

ii) Synchronous speed of the generator

6. a) With the help of diagram explain the functions of the following parts of a hydro-electric power station: 6

   i) Spillway

   ii) Forebay

   iii) Penstock

   b) Explain how the operations of hydro-electric and thermal power plants in a power system can be combined economically. 8

OR

Derive an expression for the specific speed of a hydraulic turbine and calculate it for a turbine operating under a head of 24m and running at 400 rpm. The rate of discharge is $9m^3$/sec. and turbine efficiency is 90%. 8

7. a) Discuss the economic loading of combined steam and hydro-plants. 6

   b) Enumerate various types of tariff and explain any two of them. 8

OR

The annual peak load on a 30MW power station is 25MW. The power station supplies load having maximum demand of 10MW, 8.5MW, 5MW and 4.5MW. The annual load factor is 0.45 Find: 8

i) Avg. load

ii) Energy supplied per hour

iii) Diversity factor

iv) Demand factor

8. Write short notes on any two of the following: 14

   a) Hybrid energy systems

   b) Fissionable and fertile materials

   c) Plant design and its layout

   d) Power station economics

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