USN | 1 | A | Y | 1 | 2 | M | E | 0 | 1 | 3 | | 10ME833

Eighth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Power Plant Engineering

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer FIVE full questions, selecting at least TWO questions from each part.***
2. ***Use of thermodynamic data hand book is permitted.***

PART – A

1 a. List the different types of coals used for steam generation. With a neat sketch, explain the working of spreader stoker. **(10 Marks)**

b. What are the advantages of using pulversied coal for combustion? Explain with a neat sketch the operation of a cyclone furnace. **(10 Marks)**

2 a. With sketch, discuss the following equipments:
i) Screw conveyor ii) Pneumatic ash handling **(10 Marks)**

b. What are the advantages of high pressure boiler? With a neat sketch explain the working of Benson boiler. **(10 Marks)**

3 a. What are the various types of draughts used in usual practice? Explain forced draught system. **(06 Marks)**

b. A chimney of height 32 m is used for producing a draught of 16 mm of water. The temperatures of ambient air and flue gases are 27°C and 300°C respectively. The coal burned in the combustion chamber contains 81% carbon, 5% moisture and remaining ash. Neglecting losses and assuming the value of burnt products equivalent to the volume of air supplied and complete combustion of fuel find the percentage of excess air supplied. **(08 Marks)**

c. What is the function of a cooling tower in a steam power plant? Explain the working of a hyperbolic cooling tower. **(06 Marks)**

4 a. Why the starting of diesel plants is more difficult? Explain the different methods used for starting diesel engine plant. **(08 Marks)**

b. Explain thermo-syphon cooling. **(04 Marks)**

c. Give the specific advantages and limitations of gas turbine plants and name the different methods used to improve the output and performance of gas turbine plant. **(08 Marks)**

PART – B

5 a. Explain briefly the essential features of a pumped storage plant. **(08 Marks)**

b. Explain the following:
i) Penstock ii) Surge tank iii) Gates and valves **(08 Marks)**

c. Enumerate the advantages of hydroelectric power plant over a thermal power plant. **(04 Marks)**

6 a. Explain how energy is released by,
i) Nuclear fission and
ii) Nuclear fusion phenomena. **(10 Marks)**

b. Describe with a neat sketch a pressurized water reactor (PWR). Mention its advantages. **(10 Marks)**

7 a. Define the following:
i) Load factor ii) Demand factor iii) Use factor. **(06 Marks)**

b. The peak load on a 50 MW power station is 39 MW. It supplies power through four transformers whose connected loads are 17, 12, 9 and 10 MW. The maximum demands on these transformers are 15, 10, 8 and 9 MW respectively. If the annual load factor is 50% and the plant is operating for 65% of the period in a year find out: (i) Average load (ii) Energy supplied per year (iii) Demand factor (iv) Diversity factor (v) Use factor. **(08 Marks)**

c. The yearly duration curves of a certain plant can be considered as a straight line from 300 MW to 80 MW. Power is supplied with the generating unit of 200 MW capacity and two units of 100 MW capacity each. Determine
i) Installed capacity ii) Load factor iii) Plant factor iv) Utilization factor **(06 Marks)**

8 a. Enumerate the various factors to be considered while selecting a site for hydroelectric and nuclear power plant. **(06 Marks)**

b. Mention various types of tariff and explain any two of them. **(08 Marks)**

c. The output of a generating station is 500×10^6 kWh per year and average load factor is 0.7. If the annual fixed charges are ₹ 50 per kW of installed plant and annual running charges are 5 per kWh, what is the cost per kWh of energy at the bus bar? **(06 Marks)**

* * * * *