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10ME833

Eighth Semester B.E. Degree Examination, Jan./Feb.2021
Power Plant Engineering

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. What are the advantages of stoker firing over pulverized system of firing? With a neat sketch, explain the working of a single retort stoker. (10 Marks)
- b. Sketch and explain the working of a direct and a central system of feeding pulverized fuel to the furnace. Mention at least two advantages and disadvantages each. (10 Marks)
- 2 a. Draw a general layout of an ash and dust handling system used in modern power plants. With a schematic sketch, explain the working of a pneumatic ash handling system. (10 Marks)
- b. Draw a neat sketch of a Benson Boiler showing clearly different heat transfer sections and explain its working. List out any five advantages offered by this boiler. (10 Marks)
- 3 a. Starting from fundamentals, derive an expression to determine chimney draught in terms of water column in mm of water. (09 Marks)
- b. A chimney is 28 m high and the temperature of gases inside the chimney is 320°C. The temperature of outside air is 23°C. The furnace is supplied with 15 kg of air/kg of coal burnt. Calculate the draught in mm of water and in m of hot gases. (06 Marks)
- c. Sketch and explain the working of a hyperbolic natural draft cooling tower. Mention any two advantages. (05 Marks)
- 4 a. With relevant sketch, explain the following engine starting methods used for a diesel engine,
 - (i) Compressed air system.
 - (ii) Electric starting. (10 Marks)
- b. Explain the working of a Diesel engine exhaust system. (05 Marks)
- c. With the help of a block diagram, explain the working of an indirect closed cycle gas turbine plant. (05 Marks)

PART – B

- 5 a. What do you understand by 'Hydrograph'? Draw a typical hydrograph and mention any five useful information available from hydrograph. (05 Marks)
- b. The run-off data of a river at a particular site are tabulated below. The discharge given is in millions of cubic meter and each month is assumed on an average has 30 days.
 - (i) Draw a hydrograph and flow duration curve.
 - (ii) Determine the power in MW if the head available is 100 m, with an overall generation efficiency of 90%. Assume mean flow of water. (10 Marks)

Month	Discharge	Month	Discharge
January	45	July	75
February	30	August	120
March	20	September	115
April	15	October	80
May	0	November	70
June	60	December	50

- c. Sketch and explain the working of a pumped storage plant. (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

- 6 a. With a schematic diagram, explain the working of a pressurized water reactor and mention any two advantages and disadvantages of it. (10 Marks)
- b. Define the following :
(i) Multiplication factor
(ii) Thermal utilization factor. (04 Marks)
- c. Explain briefly wastes associated with nuclear power plants. (06 Marks)
- 7 a. Define the following terms:
(i) Demand factor
(ii) Load factor
(iii) Diversity factor
(iv) Utilization factor.
(v) Capacity of factor
(vi) Use factor. (12 Marks)
- b. The peak load on a power station is 35 MW. The loads having maximum demands of 15, 10, 5 and 7 MW are connected to the power station. The capacity of the power station is 40 MW and annual load factor is 50 percent. Find (i) The average load on the power station
(ii) Energy Supplied / year (iii) Demand factor (iv) Diversity factor. (08 Marks)
- 8 a. What do you understand by Tariff? List out various types of Tariff and explain step meter and block meter rate with graphical representation. (12 Marks)
- b. The load demand for an industrial consumer is, 300 kW for 1 hr/day, 250 kW for 7 hr/day and 75 kW for 8 hr/day. Assuming a six day week, estimate the yearly energy cost if two part tariff is Rs.100/kW + 10 paise per kWh. (08 Marks)
