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Printed Pages: 02 **Sub Code: NME801 / EME801**

Paper Id: 140264 **Roll No.**

B TECH
(SEM-VIII) THEORY EXAMINATION 2018-19
POWER PLANT ENGINEERING

Time: 3 Hours ***Total Marks: 100***

Note: 1. Attempt all Sections.
2. If require any missing data; then choose suitably.
3. Use of Steam Tables and Mollier chart is permitted.

SECTION A

1. Attempt *all* questions in brief. **2 x10 = 20**

a. What are the selection criteria of power plant unit?
b. What do you understand by moderation?
c. Differentiate between boiler accessories and boiler mountings.
d. What are methods of ash handling?
e. Explain exhaust system in diesel power plant in brief.
f. Write down the perfect conditions for intercooling in brayton cycle.
g. Explain wind energy.
h. What are advantages of nuclear power plant?
i. Enlist various control room in a power plant.
j. Define air cooling system.

SECTION B

2. Attempt any *three* of the following: **10 x 3 = 30**

a. Define the working principle of Geo thermal power plant? Explain it with help suitable diagram.

b. Explain the working of air standard diesel cycle with the P-V diagram and T-S diagram. Also derive its efficiency and work ratio.

c. Write the short note on following
i. Generator and transformer cooling ii. Pollution due to power generation

d. Steam is supplied to a turbine at 30 bar and 350°C. The turbine exhaust pressure is 0.08 bar. The main condensate is heated regeneratively in two stages by steam bled from the turbine at 5 bar and 1.0 bar respectively. Calculate masses of steam bled off at each pressure per kg of steam entering the turbine and the theoretical thermal efficiency of the cycle.

e. Discuss in details the significance of reheating, inter-cooling and regeneration on the performance of gas turbine by making suitable layout and T-s diagram.

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SECTION C

3. Attempt any one part of the following: 10 x 1 = 10

(a) How the cost of power generation can be controlled? What are the elements which contribute to the cost of the electricity?

(b) Discuss the load estimation and load curve for power plant calculation in detail.

4. Attempt any one part of the following: 10 x 1 = 10

(a) Explain the working of fire tube and water tube boilers, in reference with Lancashire and 'Babcock and Wilcox boiler' with neat sketches.

(b) A power generating plant uses steam as a working fluid and operates on Rankine cycle between a source temperature of 311.1^0C (boiler pressure 100 bar) and a sink temperature of 32.9^0 (condenser pressure 0.05 bar). Determine the cycle efficiency and work ratio if all the processes are reversible. Also determine the rate of steam generation if the power output of the plant is 1 MW. (b) How the cycle efficiency and work ratio would be affected if isentropic efficiency of turbine is 0.8 and the saturated liquid coming out of the condenser is compressed to the boiler pressure with an isentropic efficiency of 0.9.

5. Attempt any one part of the following: 10 x 1 = 10

(a) A gas turbine plants consists of two stage compressor with perfect intercooler and a single stage turbine. If the plants work between the temperatures limits 300 K and 1000 K and 1 bar and 16 bar. Find the net power of the plant per kg of air. Take specific heat at constant pressure 1 KJ/kgK.
Explain the working principle of a power transformer with the help of neat sketch.

(b) Why is supercharging necessary in diesel power plant? What methods are used for supercharging the diesel engine?

6. Attempt any one part of the following: 10 x 1 = 10

(a) Discuss the various factors while selecting a site for a hydro-electric plant. In what way a fore bay differs from a surge tank.

(b) Draw a neat diagram of nuclear reactor and show different components. Discuss the function of moderator. Why lighter materials are used as moderator

7. Attempt any one part of the following: 10 x 1 = 10

(a) Explain the working of wind power plant with neat sketch along with its limitation.

(b) Discuss purpose and classification of instrumentation. Also discuss different type of recorder and their use.

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