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TME - 801

(Following Paper ID and Roll No. to be filled in your Answer Book)
PAPER ID: 0480
Roll No.

B. Tech.

(SEM. VIII) EXAMINATION, 2007-08

POWER PLANT ENGINEERING

Time: 3 Hours]

[Total Marks : 100

10×2

- **Note:** (1) Attempt **all** questions.
 - (2) All questions carry equal marks.
 - (3) Use of steam table is allowed.
 - (4) Be precise in your answer.
- Attempt any two parts of the following:
 - (a) The percentage composition of a sample coal is C=90; H₂=3.5; O₂=3.0, N₂=1.0 and S=0.5; the remainder being ash. Estimate the minimum weight of air required for the combustion of 1 kg of this fuel, if 50% excess air is supplied. Also find the composition of the dry products of combustion.
 - (b) Define following terms:
 - (i) Demand Factor
 - (ii) Load Factor
 - (iii) Diversity Factor
 - (iv) Plant Capacity Factor

What is the significance of load curves? What is a load duration curve?

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A power station has the installed capacity of (c) 180 MW. Calculate the cost of generation from the data given below:

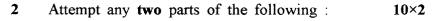
Capital cost = Rs.300 \times 10⁶

Rate of interest and depreciation = 18% Annual cost of fuel, salaries and taxation

 $= Rs.36 \times 10^{6}$

Load Factor = 0.4

If the annual load factor is raised to 0.5, calculate the saving in cost per kwh.



- (a) What do you mean by 'supercritical boilers' and 'supercharged boilers'? Explain with neat sketch the construction and working of Benson boiler.
- Explain with the help of a neat diagram the (b) arrangement of the Fluidised Bed Combustion System.
- (c) A prime mover uses 15000 kg. of steam per hour and develops 2450 kW. The steam is supplied at 30 bar and 350°C. The exhaust steam is condensed at 725 mm of Hg when atmospheric pressure is 755 mm Hg. The condensate temperature from the condenser is 31°C and the rise of temperature of circulating

Determine:

- (i) The quality of steam entering the condenser.
- The quantity of circulating cooling water and the ratio of cooling.



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water is from 8°C to 18°C.

- 3 Attempt any two parts of the following:
 - owing: 10×2
 - (a) Explain the following lubrication system in a diesel engine:(i) Wet pump lubrication system
 - ii) Dry pump lubrication system
 - (b) Explain working of a combined cycle power plant. Enlist the advantages of 'combined cycle'.
 - (c) Describe with a neat sketch a closed cycle gas turbine. State advantages and disadvantages of gas turbine plants over thermal power plants.
 - 4 Attempt any two parts of the following: 10×2
 - (a) Describe with the help of a neat sketch the construction and working of a pressurised water reactor (PWR). Compare a PWR with BWR (Boiling Water Reactor).
 - (b) Explain the factors which should be considered while selecting a site for hydro-electric plant.

 Enumerate essential elements of a hydro-electric power plant.
 - (c) Write short notes on:
 - (i) Geothermal plant
 - (ii) MHD generator.
 - 5 Attempt any two parts of the following:
 - (a) Explain how the following is carried out;
 - (i) Transformer protection;
 - (ii) Bus protection
 - (iii) Protection of transmission lines.

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10×2

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(ii) Electromagnetic transducers.

(c) What is particulate emission? How is it controlled?

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