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8E8073

Roll No. _____

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B.Tech. VIII Semester (Main/Back) Examination, May 2016

Mechanical Engg.

8ME3 A Power Generation

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates:

Attempt any **five** questions, selecting one question from **each unit**. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.)

Units of quantities used/calculated must be stated clearly.

Unit - I

1. a) Define the following terms :

- i) Load factor
- ii) Plant factor
- iii) Demand factor
- iv) Diversity factor
- v) Reserve factor

(2×5=10)

- b) What is present worth concept? How it is estimated

(2+4=6)

OR

1. a) A thermal power plant of 210 MW capacity has the maximum load of 160 MW. Its annual load factor is 0.6. The coal consumption is 1 kg per kWh of energy generated and the cost of coal is Rs. 450 per tonne. Calculate

i) The annual revenue earned if energy is sold at Re 1 per kWh

ii) The capacity factor of the plant

(5+3=8)

- b) What are the considerations to be made while selecting the location for a thermal power plant

(8)

Unit - II

2. a) Discuss various efficiencies for studying the performance of a steam turbine plant (8)
- b) Explain the effect of variation of steam condition on thermal efficiency of steam power plant (8)

OR

2. Sketch the layout of a steam of steam power plant and explain the following
- i) coal & ash circuit
 - ii) air & gas circuit
 - iii) feed water & steam flow circuit
 - iv) cooling water circuit
- (8+2+2+2+2=16)

Unit - III

3. a) What are the advantages and disadvantages of gas turbine power plant over diesel power plant (6)
- b) Discuss the performance characteristics of a gas turbine power plant (10)

OR

3. a) Enumerate and explain briefly the essential elements of hydroelectric power plant (10)
- b) A turbine is to operate under a head of 24m at 200 rpm. The discharge is 8.5 m³/s. If the overall efficiency is 88% , determine
- i) power generated
 - ii) specific speed of the turbine
 - iii) type of turbine
- (2+2+2=6)

Unit - IV

4. a) What do you understand by teetering of rotor? In what cases it is required? (4+2=6)
- b) Explain the following terms:
- i) drag force
 - ii) lift force
 - iii) pitch angle
 - iv) chord
 - v) angle of attack
- (2x5=10)

OR

4. a) Define the term "solidity". Explain the major applications of wind power (2+8=10)
- b) A horizontal axis wind turbine(HAWT) is installed at a location having free wind velocity of 15m/s. The 80m diameter rotor has three blades attached to the hub. Find the rotational speed of the turbine for optimal extraction(6)

Unit - V

5. a) Describe the principle of solar photo-voltaic energy conversion (6)
- b) Classify different types of solar thermal collectors and explain the working of liquid flat plate collector with necessary sketch (10)

OR

5. Write short notes on any **four**

- a) pyranometer
- b) pyreheliometer
- c) solar time
- d) compound parabolic concentrator
- e) solar PV applications
- f) solar cookers

(4×4=16)