

8E8073

8E8073

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 optional 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)