

Code No: 07A70308

R07**Set No. 2**

IV B.Tech I Semester Examinations, December 2011
POWER PLANT ENGINEERING
Common to Mechanical Engineering, Mechatronics

Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) With a neat diagram explain breeder reactor.
 (b) Compare nuclear power plants with thermal power plants. [8+8]
2. (a) What are the advantages of reheating in a gas turbine power plant?
 (b) How regeneration improves the thermal efficiency of a simple open gas turbine? [6+10]
3. (a) What is fuel cell?
 (b) Explain hydrogen-oxygen cell. [6+10]
4. What do you understand by 'output - handling of coal'? What are the different methods of output coal handling? Discuss their relative merits and demerits. [16]
5. (a) Explain
 - i. Plant use factor
 - ii. Plant capacity factor
 - iii. load factor.
 (b) A central power station has annual factors as follows: Load factor =60%
 Capacity factor= 40%
 Use factor=50%
 Power station has a maximum demand of 15MW. Determine
 - i. Annual energy production
 - ii. Reverse capacity over and above peak load
 - iii. Hours per year not in service. [8+8]
6. Give the lay out of a diesel power plant and explain clearly the principle of working. [16]
7. What are the factors considered in selecting a prime-mover for a hydro electric power plant? [16]
8. (a) Explain the factors which are responsible for efficient design of boiler.
 (b) What are the major advantages of high pressure boilers in modern thermal power plant? [10+6]

Code No: 07A70308

R07**Set No. 4**

**IV B.Tech I Semester Examinations, December 2011
POWER PLANT ENGINEERING**

Common to Mechanical Engineering, Mechatronics

Time: 3 hours

Max Marks: 80

**Answer any FIVE Questions
All Questions carry equal marks**

1. (a) Give the classification of coal and their characteristics.
(b) Explain different stages in coal desulphurization process. [6+10]
2. What are the different types of reactors commonly used in nuclear power stations? Describe the fast breeder reactor with a diagram. [16]
3. (a) What are the important coal properties relevant to the thermal power plant?
(b) What is a coal - oil mixture and how it is prepared? What are the merits of coal oil mixture as a boiler fuel? [6+10]
4. (a) Differentiate flat plate collectors and focusing collectors.
(b) Describe flat plate collector with a diagram. [8+8]
5. (a) What do you mean by depreciation? Enumerate and explain briefly various methods used to calculate the depreciation cost.
(b) What are the effects of SO₂, NO₂ and hydrocarbons on the human and crop lives? [8+8]
6. (a) Describe advantages and disadvantages of hydroelectric power plant.
(b) What is spill way? Explain any two spill ways. [8+8]
7. A gas turbine plant is designed to develop 5 MW power. The inlet pressure and temperature of the air to the compressor are 1 bar and 30°C. The pressure ratio of the cycle is 5. A reheater is used between two turbines at a pressure of 2.24 bar. Calculate the overall efficiency of the cycle and mass flow rate assuming the following data:
Isentropic η of the compressor = 80%
Isentropic η of the turbines = 85%
 $C_{p,a} = 1$ KJ/kg-k, $C_{p,g} = 1.15$ kJ/kg - k, $\gamma = 1.4$ for air $\gamma = 1.33$ for gases. Neglect the mass of the fuel. [16]
8. (a) Explain the important functions of a lubricating system.
(b) Explain the necessity of the cooling system in a diesel engine. What are the methods of cooling the engine? [6+10]

Code No: 07A70308

R07**Set No. 1**

**IV B.Tech I Semester Examinations, December 2011
POWER PLANT ENGINEERING**

Common to Mechanical Engineering, Mechatronics

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) What are different types of fans used for producing draught? What is a balanced draught?
(b) What is a pressurised furnace? What are its characteristic features? [8+8]
2. Discuss the advantages and disadvantages of horizontal and vertical axis wind mills with neat sketches. [16]
3. (a) Write short notes on:
 - i. Inter cooler
 - ii. Heat exchanger
 (b) With the aid of neat sketches briefly describe different arrangements of power plant. [8+8]
4. What are the basic energy resources in India? List out their capacities in different regions. [16]
5. (a) Why supercharging is necessary in diesel plant? What are the methods used for super-charging the diesel engine?
(b) What are the advantages of super charging? [10+6]
6. (a) Explain various safety measures required to be taken for safe operation of a hydraulic power plant.
(b) How are dams classified? [8+8]
7. (a) What do you understand by breeding? What factors control the breeding?
(b) Draw a neat diagram of breeder reactor and list out its advantages and disadvantages. Why only sodium is used as coolant in breeder reactors? [6+10]
8. A power station has the following loads:
 - (a) Residential heating load:
Maximum demand = 1200 KW
Load factor = 0.21
Diversity between consumers = 1.32
 - (b) Commercial load: Maximum demand = 2400KW
Load factor = 0.3
Diversity between consumers = 1.2

Code No: 07A70308

R07

Set No. 1

- (c) Industrial load: Maximum demand = 6000KW
Load factor = 0.82
Diversity between consumers = 1.22
Overall diversity factor may be taken as 1.44

Determine the following:

- (a) maximum demand on system
(b) daily energy consumption(total)
(c) overall load factor
(d) Connected load (total) assuming that demand factor for each load is unity.

[16]

JNTUWORLD

Code No: 07A70308

R07**Set No. 3**

**IV B.Tech I Semester Examinations, December 2011
POWER PLANT ENGINEERING**

Common to Mechanical Engineering, Mechatronics

Time: 3 hours

Max Marks: 80

**Answer any FIVE Questions
All Questions carry equal marks**

1. (a) What are affects of impure water in the boiler?
(b) Explain the water treatment process in power plants. [6+10]
2. (a) What are the different fields where the use of diesel power plant is essential?
(b) How do you classify I.C engines? Describe the working of two storke and four storke engines. [6+10]
3. (a) What are the capital cost and fixed cost to be considered for cost analysis?
(b) A power plant has the installed capacity of 120MW. Calculate the cost of generation, if Capital cost = Rs. 120×10^6 , rate of interest and depreciation =18% Annual cost of fuel oil, salaries and taxation= Rs. 25×10^6 , load factor=40%. [6+10]
4. How are dams classified? What factors are considered in selecting a type of dam? Explain any one of dam with neat sketch. [16]
5. Explain two types of reactors widely used in nuclear power plants with neat diagrams. [16]
6. (a) Classify and explain the working of mechanical dust collectors.
(b) Explain about pulse - jet dust collector. [8+8]
7. (a) What are the advantages and disadvantages of direct energy conversion systems over conversional power generation systems?
(b) How is silicon cells fabricated? [8+8]
8. (a) Discuss the part load behaviour of combined cycle and compare with conventional gas turbine plant of the same capacity.
(b) What are the major advantages of a combined cycle system? [8+8]
