

IV B. Tech I Semester Regular Examinations, November – 2022**POWER PLANT ENGINEERING****(Mechanical Engineering)****Time: 3 hours****Max. Marks: 75**

*Answer any FIVE Questions
ONE Question from Each unit
All Questions Carry Equal Marks*

UNIT-I

- 1 Explain about ash handling system and different types of ash handling equipment's with suitable sketches. [15]

(OR)

- 2 a) Explain about cooling ponds, natural draught cooling and mechanical Draught cooling towers. [8]
b) Write down the applications of cooling towers. [7]

UNIT-II

- 3 a) Name the major components of a gas turbine plant. Draw a simple line diagram for a simple open cycle gas turbine plant. [8]
b) Mention the advantages and disadvantages of a constant pressure gas turbine. [7]

(OR)

- 4 a) What are the most commonly used starting systems used in diesel power plants? Explain them briefly. [7]
b) Mention the advantages and disadvantages of diesel power plant over a gas turbine power plant? [8]

UNIT-III

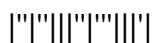
- 5 a) How the Graphite can be used in the nuclear power plant reactors? Explain the special requirement of Graphite in the reactions. [7]
b) List out the advantages and disadvantages of nuclear plants over conventional thermal plants. [8]

(OR)

- 6 State the functions of a dam. How are dams classified? Briefly describe a few important types of dams. How would you select the site and the type of the dam? [15]

UNIT-IV

- 7 a) What are the major sources of air pollution? Explain. [9]
b) Discuss briefly about the measurement of smoke and dust [6]



(OR)

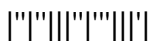
- 8 a) Draw the electric line diagram to measure CO₂ in the flue gases and explain the working. [7]
b) Enumerate the two ways of control of atmospheres pollution. Which is more common? [8]

UNIT-V

- 9 a) Give a brief note on: i) Connected load ii) Maximum demand iii) Demand factor [7]
b) Write the harmful effects of carbon monoxide. [8]

(OR)

- 10 The peak load on a power plant is 60 MW. The loads having maximum demands of 30 MW, 20 MW, 10 MW and 14 MW are connected to the power plant. The capacity of the power plant is 80 MW and the annual load factor is 0.50. Estimate (a) the average load on the power plant, (b) the energy supplied per year, (c) the demand factor, (d) the diversity factor. [15]



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UNIT-I

1 What is cooling tower? Explain about cooling ponds, natural draught [15]
cooling and mechanical draught cooling towers.

(OR)

2 a) Make neat sketch and explain the working of a) chain grate stoker [7]
(b) spreader stoker (c) multi retort stoker.

b) What are renewable and non - renewable energy sources? Discuss with [8]
reference to Indian scenario.

UNIT-II

3 a) Discuss the wet sump lubrication system pertaining to a diesel engine. [7]
b) Differentiate among open, closed and semi closed gas turbine power [8]
plants with their applications.

(OR)

4 a) Derive an expression for the thermal efficiency. Write about air-rate and [8]
work-ratio.

b) Why the starting of diesel plant is more difficult? [7]

UNIT-III

5 a) What is Hydrological cycle? Explain its significance in locating the site [7]
and design of hydro electric power plants

b) What are the various factors to be considered in selecting the site for a [8]
hydro electric power plant and discuss briefly about primary and
secondary investigations.

(OR)

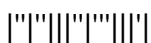
6 a) What factors are considered in selecting on economical site for nuclear [7]
power plant?

b) How to make use of the gas for the cooling of a chemical reactor in the [8]
nuclear thermal power plants? Explain with a suitable diagram

UNIT-IV

7 a) Compare the principle of operation of combined cycle power plant with [7]
the cogeneration unit along with their limitations.

b) What is the importance of measurements and instrumentation in power [8]
plant?



(OR)

- 8 Explain in-detail the pump storage plant in combination with steam or nuclear power plant. List out its limitations. [15]

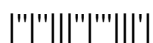
UNIT-V

- 9 a) What do you understand by load factor and capacity factor? When are they numerically equal? [7]
b) What are the various costs involved in power plant? Discuss briefly. [8]

(OR)

- 10 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 450.00 per tonne. Calculate (a) the annual revenue earned if energy is sold at Rs 1 per kWh and (b) the capacity factor of the plant. [15]

JNTU FAST UPDATES



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UNIT-I

- 1 a) Explain about different components of pulverized fuel burning system. [7]
b) Differentiate between wet type and dry type dust collectors. [8]

(OR)

- 2 a) Enumerate the difference between over feed and under feed fuel supply. [7]
b) Write briefly about pneumatic ash handling system. [8]

UNIT-II

- 3 a) Discuss with a simple sketch, thermostat cooling system in Diesel [7]
power plant.
b) Discuss briefly the effects of supercharging on performance of Diesel [8]
power plant with relevant sketches.

(OR)

- 4 A regenerative gas turbine power plant consists of two stage [15]
compressor with perfect cooling and single turbine. All the components
of the plants are mounted on a single shaft. The overall pressure ratio is
8. The max. temperature of the cycle is limited to 590 deg centigrade.
The regenerator receives 60% of the available energy from the exhaust
gases. The compressor and turbine isentropic efficiencies are 83% and
86% respectively. Find the efficiency and ratio of useful work to the
turbine work.

UNIT-III

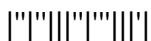
- 5 a) What are the different moderators used in a nuclear power plant. What [7]
properties make them suitable as moderators
b) Explain with a simple sketch, the working of gas cooled reactor with [8]
relative advantages.

(OR)

- 6 a) Explain the factors affecting the run-off in hydrological cycle [7]
b) Explain the working of pump storage with neat sketch [8]

UNIT-IV

- 7 Explain briefly how run off river plant be coupled with thermal power [15]
plant? List out its advantages and disadvantages.



(OR)

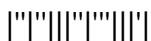
- 8 a) Discuss briefly methods available to control pollution from power plants. [7]
b) What are the drawbacks of wet methods of purifying flue gases from Sulphur oxides? [8]

UNIT-V

- 9 a) Explain (i) Plant capacity factor (ii) Plant use factor (iii) Load factor [7]
b) Draw the load curve for the power requirement in India and discuss the methods to fulfill the part load conditions. [8]

(OR)

- 10 Calculate the cost of generation per kWh for a power station having the following data: [15]
Installed capacity of the plant = 200MW
Capital cost = Rs. 400 Crores
Rate of interest and depreciation = 12%
Annual cost of fuel, salaries and taxation = Rs 5 crores
Load factor = 50%
Also estimate the saving in cost per kWh if the annual load factor is raised to 60%.



Code No: R194103H

R19

Set No. 4

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UNIT-I

- 1 a) Write briefly about cyclone furnace, design and construction. [7]
b) Explain about pulse - jet dust collector. [8]
(OR)
- 2 a) Describe various types of burners used to burn pulverized coal. [7]
b) Describe the various types of grates used with hand fired furnace. [8]

UNIT-II

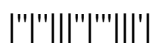
- 3 a) What are the various factors to be considered while selecting the site for diesel engine power plant? [7]
b) Give the layout of gas turbine power plant. [8]
(OR)
- 4 a) Draw and explain the layout of modern diesel power plant showing the following systems. [8]
(i) Fuel supply system
(ii) Lubrication system
b) Discuss with relevant sketch working of regenerative gas turbine cycle. [7]

UNIT-III

- 5 a) Enumerate and explain the essential components of a nuclear reactor [7]
b) What factors to be considered while selecting materials for the various reactor components [8]
(OR)
- 6 a) Discuss hydrograph and flow duration curve and their use for hydro plants. [7]
b) Discuss briefly on different types of draft tubes used in hydro-electric plant [8]

UNIT-IV

- 7 Draw the schematic diagram of magneto hydrodynamic direct energy conversion power generation unit along with their auxiliary components and discuss the principle. [15]



(OR)

- 8 a) Discuss the various methods of purifying flue gases from Sulphur oxides. [7]
b) How water is purified? List out some methods to purify water. [8]

UNIT-V

- 9 a) Explain the significance of: (i). Load factor (ii). Diversity factor (iii). Plant capacity factor (iv). Plant use factor [8]
b) Explain how the NO_x emissions can be reduced in the flue gases [7]

(OR)

- 10 A consumer has following connected load: 10 lamps of 60 W each 2 heaters of 1000 W each, Max. demand = 1500 W. On the average he uses 8 lamps, for 5 hrs a day and each heater for 3 hrs a day. Find his average demand, load factor and monthly energy consumption. [15]

