Code No: 117GP **R13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, March - 2017

POWER PLANT ENGINEERING

(Mechanical Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

Part- A (25 Marks)

1.a) What are different components of pulverized fuel burning system? [2]
b) Differentiate between underfeed and overfeed fuel bed systems. [3]
c) Explain the starting equipment used for the internal combustion engine power plant. [2]
d) Explain the principle of operation of fuel cell used for power generation. [3]
e) Explain different non conventional sources for power generation. [2]
f) Differentiate between dams and spillways used in hydro electric power plants. [3]
g) What are the major sources for the radiation hazards in nuclear power plants? [2]
h) Explain the breeding materials used for the chemical reaction in the nuclear power plants. [3]
i) Define the terms demand factor, diversity factor and load factor. [2]
j) Explain the effects of effluents on the environment and human health. [3]

Part-B (50 Marks)

2.a) What are different methods used for collection of the dust before sending the flue gas through chimney? Explain them with suitable diagrams.
b) Explain ash handling cycle layout for the thermal power plant and discuss the salient features. [5+5]

OR

3.a) Discuss the constructional and operational features of retort stokers used in thermal power plants.
b) What are different types of hoppers used for coal in steam power plants? Explain them. [5+5]

4.a) Draw the schematic diagram of magneto hydrodynamic direct energy conversion power generation unit along with their auxiliary components and discuss the principle.
b) What type of fuel injection system is used in internal combustion engine power plants? Explain the merits and demerits. [5+5]

OR

5.a) Compare the principle of operation of combined cycle power plant with the cogeneration unit along with their limitations.
b) Differentiate between closed cycle and open cycle power plants along with their advantages. [5+5]

6.a) What is Hydrological cycle? Explain its significance in locating the site and design of hydro electric power plants.

b) How to make use of the tides for power generation based on their capacities? Explain the principle of operation. [5+5]

OR

7.a) Explain the characteristics of hydrographs with respect to the power generation along with the suitable curves.

b) Differentiate between the constructional and working of horizontal axis wind turbine and vertical axis wind turbines. [5+5]

8.a) What are the byproducts formed during nuclear fission and fusion reactions in the nuclear power plants? Explain their applicability.

b) Explain the principle of operation of boiling water reactor used for power generation along with a neat sketch. [5+5]

OR

9.a) How the Graphite can be used in the nuclear power plant reactors? Explain the special requirement of Graphite in the reactions.

b) How to make use of the gas for the cooling of a chemical reactor in the nuclear thermal power plants? Explain with a suitable diagram. [5+5]

10.a) Draw the load curve for the power requirement in India and discuss the methods to fulfill the part load conditions.

b) A power station has the installed capacity of 150 MW. Calculate the cost of generation. Capital cost = Rs.140×10^6. Rate of interest and depreciation = 20 %; Annual cost of fuel oil, salaries and taxation = Rs.30×10^6; Load factor = 42 %. [5+5]

OR

11.a) What are different pollutants evolved from the thermal and nuclear power plants? Explain the methods to control them.

b) The following data is given for a steam power plant: Maximum Demand 25,000 kW; Load factor 40%; Coal consumption 0.86 kg/kWh; Boiler efficiency 85%; Turbine efficiency 90%; Price of coal Rs. 55 per Ton; Determine: i) Thermal efficiency of the station ii) Coal bill of the station for one year. [5+5]

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