

Code No: 117GP

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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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