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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, November/December - 2018

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) Explain the coal handling circuit of the steam power plant with a line diagram. [2]
- b) What constituents help for the formation of corrosion in the pipes? Explain. [3]
- c) Explain the closed cycle gas turbine used in the power plants. [2]
- d) Differentiate between thermo ionic and thermo electric power generation. [3]
- e) Explain the function and limitations of solar collectors. [2]
- f) What are the wind energy capacities available in India? Explain. [3]
- g) What are different fertile materials used for nuclear power generation? [2]
- h) How to avoid radiation hazards from the nuclear power plants? Explain. [3]
- i) Explain the terms maximum load, average load and connected load. [2]
- j) What are the pollution standards to be maintained in India? Explain. [3]

PART-B

(50 Marks)

- 2.a) Why the draught is required in the steam power plants? Explain the different methods to achieve the required draught.
- b) Explain the principle of operation of electro static precipitator (ESP) along with the suitable diagram. [5+5]

OR

- 3.a) What is the mechanism adopted for the rejection of heat from the condenser of a steam power plant? Explain their importance.
- b) How to classify the coals in India based on their ash content? Explain the proximate and ultimate analysis of coal. [5+5]

- 4.a) How to achieve the turbocharging of internal combustion engines? Explain them.
- b) Explain the principle of operation of combined cycle power generation system and compare it with the stand alone power generation units. [5+5]

OR

- 5.a) How to make use of solar energy for the generation of power? Discuss the merits and demerits.
- b) What are different auxillary components required for the gas turbine power plants? Explain them with suitable applications. [5+5]

- 6.a) What are typical ponds and storage units suitable for installation of hydro electric power plants? Explain them.
- b) What is the importance of spill ways in hydro electric power projects? Explain their practical applications. [5+5]

OR

- 7.a) What are the major sources for the tidal energy for power generation? Explain different sources available in India and the corresponding capacities of power generation.
- b) Draw the typical layout of hydro electric power generation plant along with the auxiliary components and explain. [5+5]
- 8.a) Describe the principle of operation of sodium Graphite reactor used for the nuclear power generation and explain the corresponding chemical reactions.
- b) What are different methods to dispose the radioactive waste to avoid environmental pollution? Explain. [5+5]

OR

- 9.a) What are different types of moderators used in the nuclear power plants? Explain the significance of moderators in the plants.
- b) What do you understand by the gas cooled nuclear reactor and discuss the principle along with a neat sketch. [5+5]

- 10.a) How to distribute the power for different locations and explain the general requirements.
- b) Determine the annual cost of a feed water softener from the following data: Cost = Rs 80,000/-, Salvage value = 5%, Life = 10 years; Annual repair and maintenance cost = Rs 2500/-, Annual cost of chemicals = Rs 5000/-, Labour cost = Rs 300/- per day for two members; Interest on sinking fund = 5%. [5+5]

OR

- 11.a) What is the impact on the environment and human health for the effluents released from the thermal power plants? Explain how to control them.
- b) The yearly duration curve of a certain plant can be considered as a straight line from 20 MW to 3 MW. To meet this load, three turbine generator units, two rated at 10 MW each and one at 5 MW are installed. Determine i) Installed capacity ii) Plant factor iii) Maximum demand iv) Load factor and v) Utilisation factor. [5+5]

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