

R18

Code No:158DA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech IV Year II Semester Examinations, July - 2023

BASICS OF POWER PLANT ENGINEERING

(Common to CE, ME, ECE)

Time: 3 Hours

Max. Marks: 75

- Note:** i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

- 1.a) What is the role of condenser in thermal power plants? Explain. [2]
- b) Under what conditions, the supercritical boiler is used? [3]
- c) Draw P-V and T-s diagrams of Brayton cycle and explain salient points. [2]
- d) What are the limitations of gas turbine cycle power plants? [3]
- e) What is the principle of operation of nuclear fusion? Explain. [2]
- f) Explain the reactive material used in nuclear power plants. [3]
- g) How to make use available wind sources for power generation? [2]
- h) What are different types turbines used in hydroelectric power plants? [3]
- i) Explain different load distribution parameters to be considered. [2]
- j) Discuss the costs involved in power generating systems. [3]

PART – B

(50 Marks)

- 2.a) What are the modification suggested in steam power plants to improve the performance? Explain.
- b) Explain the principle of operation of natural draught system used in thermal power plants. [5+5]

OR

- 3.a) Discuss the principle of operation of cogeneration system and explain the suitable conditions for operation.
- b) Describe the constructional and operational features of fluidized bed boilers. [5+5]
- 4.a) Explain different components used for the operation of gas turbine power plants and discuss their limitations.
- b) Describe the principle of operation of Integrated Gasifier based combined cycle power generation system with a suitable diagram. [5+5]

OR

- 5.a) Compare the gas turbine power generation plant with other steam power generation units.
- b) How to combine the steam cycle with gas cycle for the operation of combined cycle? Derive the corresponding efficiency equation. [5+5]

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6.a) Explain the constructional and operational features of CANDU reactor used in nuclear power plants.

b) Describe different methods used to dispose the nuclear waste from the nuclear power plants. [5+5]

OR

7.a) What are the major differences between boiling water reactor and pressurized water reactors of a nuclear power plants? Explain.

b) Explain different safety measures to be taken while commissioning and operation of nuclear power plants. [5+5]

8.a) Describe the principle of operation of Solar PV cell for power generation and discuss its limitations.

b) Draw the layout of hydroelectric power plant and explain the importance of each and every component. [5+5]

OR

9.a) How to make use of biogas for the power generation? Is it economical for operation in the urban areas?

b) Explain the principle of operation of fuel cell based power generation system 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) Explain different types of effluents released from thermal and nuclear power plants and discuss the methods to control them. [5+5]

OR

11.a) What are the ill effects of nuclear and thermal power plants on human beings and environment? Explain.

b) A 200 MW power generating station has an annual peak load of 200 MW and the maximum demands of connected load are 120 MW, 60MW, 90 MW, 60MW and 50MW. The annual load factor of the station is 72%. Calculate (i) the number of units supplied annually and (ii) The diversity factor. [5+5]

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