

R18

Code No: 158DA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech IV Year II Semester Examinations, June - 2024

BASICS OF POWER PLANT ENGINEERING

(Common to CE, ME, ECE, MIE)

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) Draw the layout of Rankine Cycle and represent various energy interactions. [2]
- b) Write few characteristics of super critical boilers. [3]
- c) What are the major fields of application of gas turbine? [2]
- d) List out the advantages of 'combined cycle power generation'. [3]
- e) What is calandria? [2]
- f) What is the function of a pressurizer in a PWR? [3]
- g) What do you mean by solar thermal energy? [2]
- h) What are the applications of biogas? [3]
- i) What are various types of pollution from nuclear power plants? [2]
- j) What are various load distribution parameters? [3]

PART – B**(50 Marks)**

- 2.a) Draw the layout of modern coal power plant and indicate various components.
 - b) What are the requirements of good coal handling plant? [5+5]
- OR**
- 3.a) Name various draught systems. Describe the operation of a balanced draught system.
 - b) What are the properties required for an ideal binary fluid used in high temperature limit? [5+5]

- 4.a) Explain with a neat sketch the layout of a gas turbine power plant.
- b) A gas turbine unit has a pressure ratio of 6 : 1 and maximum cycle temperature of 610°C. The isentropic efficiencies of the compressor and turbine are 0.80 and 0.82 respectively. Calculate the power output in kilowatts of an electric generator geared to the turbine when the air enters the compressor at 15°C at the rate of 16 kg/s. Take $c_p = 1.005$ kJ/kg K and $\gamma = 1.4$ for the compression process, and take $c_p = 1.11$ kJ/kg K and $\gamma = 1.333$ for the expansion process. [4+6]

OR

5. What are the components required for integrated gasifier based combined cycle power generation system? Explain the function each of them. [10]

- 6.a) With the neat sketch, explain the boiling water reactor power plant.
b) Differentiate between nuclear fission and nuclear fusion and which process is more efficient? [5+5]

OR

- 7.a) Draw the simple diagram for fast breeder reactor used in nuclear thermal power plant and explain its constructional and operational features.
b) Explain the advantages and limitations of gas cooled and liquid cooled reactors used in Nuclear power plants. [5+5]
8. What are the various factors to be considered in selecting the site for a hydroelectric power plant and discuss about primary and secondary investigation. [10]

OR

- 9.a) How to make use of the tides for power generation based on their capacities? Explain the principle of operation.
b) Explain how solar energy is harnessed with the help of p-v cells. [5+5]
10. Explain briefly the following tariff:
a) Straight meter rate
b) Block meter rate
c) Doherty rate (three-part tariff). [3+3+4]

OR

11. Explain in detail about the following:
a) Capital or fixed cost
b) Operational cost. [5+5]

---ooOoo---