

ME452 Thermal Engineering

277

REG. NO

OCTOBER 2021

Time: Three hours

Maximum Marks: 75

- Note:
1. Answer ALL the questions in PART-A (1 mark each)
 2. Answer any ONE question from each unit in PART-B (3 marks each)
 3. Answer any ONE question from each unit in PART-C (10 marks each)
 4. The question paper contains TWO Pages

PART-A (1x10=10)

1. What is phase diagram?
2. Define : Entropy of steam.
3. What are various heat losses in boiler?
4. Write any two safety precautions in boiler operation.
5. Name the Pollutants of thermal power plant.
6. Define condenser efficiency.
7. Define actual COP.
8. Define relative humidity.
9. List the important conventional energy sources.
10. What is radio activity?

PART-B (3x5=15)

UNIT-I

11. State the advantages of super heated steam.
12. Write short notes on Mollier diagram.

UNIT-II

13. List the advantages of high pressure boiler.
14. Why the boiler feed water treatment is needed?

UNIT-III

15. Write a short notes on fluidised bed combustion.
16. Compare the jet condenser with surface condenser.

UNIT-IV

17. What are humidification and dehumidification?
18. Mention the applications of AC.

UNIT-V

19. What are the merits and demerits of diesel power plant?
20. What are the effects of nuclear radiation?

PART-C (10x5=50)

UNIT-I

21. In a combined separating and wire drawing calorimeter, the following readings were taken. Total quantity of steam passed through the diaphragm = 24 KG, water drained in the separator = 1.23 KG. steam pressure before wire drawing = 9 bar, steam pressure on leaving = 1.2 bar, Temperature of steam on leaving = 110°C. Find the dryness fraction of steam.
22. One kg of steam at a pressure of 1 bar and 0.85 dry is compressed according to law $P.V.^{1.25}$ constant. The final pressure is 2 bar. Find the final condition of steam and heat which passes through the cylinder walls.

UNIT-II

23. With a line sketch, explain the working of BHEL high pressure boiler.
24. In a boiler trial, the following observations were obtained.

Mass of feed water	-	1520 KG/Hour
Temperature of feed water	-	30°C
Dryness fraction of steam	-	0.95
Pressure of steam	-	8.5 bar
Coal burnt per hour	-	200 Kg
Calorific value of coal	-	27300 KJ/KG & Coal
Ash and unburnt coal collected	-	16 KG/hour
Calorific value of ash and unburnt coal	=	3780 KJ/KG.
Mass of flue gases	-	17.3 KG/KG of coal
Temperature of flue gases	-	330°C.
Boiler room temperature	-	17°C.
Mean specific heat of flue gases	=	1 KJ/KG K

 Estimate the boiler efficiency and draw up a heat balance sheet.

UNIT-III

25. What is the necessary of compounding in a steam turbine, Explain any 2 types of compounding with sketch.
26. A Surface condenser is designed to handle 17500 kg of steam per hour. The steam enters at 0.2 bar and 0.87 dry. It is condensed to water at 60°C. The circulating water enters at 40°C and leaves at 50°C. The condenser is made of 22 mm inside diameter tubes. If the velocity of water in the tubes should not exceed 1.78 m/sec. determine the number of tubes that must be used to build the condenser.

UNIT-IV

27. Explain with line diagram, the working of vapour absorption refrigeration system.
28. Describe the working of window type Air conditioning system with a neat sketch.

UNIT-V

29. Draw the layout of nuclear power plant and explain.
30. Explain in detail any two methods of uranium enrichment with sketches.
