

Semester: 3rd

Branch: Mech,Prod,GE, CAD/CAM, CNC, Metallurgy, Print Making Tech., Mech (Ad. Manu. Tech.), Mech Engg(Fabrication Tech)

Subject Name: Thermodynamics - I /Thermodynamics/ Pr. Of Therm. Engg.

Time Allowed : 3 Hrs.

MM:100

Section –A

Note: Multiple Choice questions. All questions are compulsory.

$$10 \times 1 = 10$$

- Q.1. Zeroth's law of thermodynamics forms the basis of measurement of
a) Pressure b) Temperature c) Energy d) Work

Q.2. The volume of 1 kg-mol of any gas at N.T.P. is
a) 22 m^3 b) 22.1 m^3 c) 22.2 m^3 d) 22.4 m^3

Q.3. Area under temperature-entropy diagram gives
a) Work b) Power c) Heat d) None of these

Q.4. Work done during constant volume process is
a) Maximum b) Zero c) Positive d) Negative

Q.5. Which of the following parameter remains constant during superheating of steam
a) Volume b) Pressure c) Internal energy d) Enthalpy

Q.6. The thermodynamic cycle in which heat is supplied partly under constant pressure and partly under constant volume is known as:-
a) Dual Cycle b) Carnot Cycle c) Rankine Cycle d) Diesel Cycle

Q.7. The efficiency of perpetual motion machine of second kind is
a) 0% b) 50% c) 75% d) 100%

Q.8. Which of the following is correct?
a) $dS = T\delta Q$ b) $\delta Q = \frac{T}{ds}$ c) $\delta Q = TdS$ d) $T = \frac{\delta Q}{ds}$

Q.9. The device which supply feed water to the boiler is called
a) Economizer b) Water level indicator
c) Feed pump d) Safety valve

Q.10. The volumetric efficiency of a compressor
a) Decreases with decrease in compression ratio
b) Increases with decrease in compression ratio
c) Decreases with increase in compression ratio
d) Increases with increase in compression ratio

Section-B

Note: Objective type questions. All questions are compulsory.

$$10 \times 1 = 10$$

- Q.11. The property of a system whose value does not depend upon mass is called _____.

Q.12. The polytrophic index is unity for _____ process.

Q.13. In an adiabatic process, transfer of heat energy takes place. (True/False)

Q.14. The units of specific volume are _____.

Q.15. The high pressure boilers are _____ tube boilers.

Q.16. _____ water is used for boiler.

Q.17. Efficiency of Carnot cycle increase with _____ of sink temperature.

Q.18. At critical pressure latent heat becomes _____.

Q.19. Otto cycle is also known as _____.

Q.20. Pressure gauges record the absolute pressure of the steam. (True/False)

Section -C

Note: Short answer type Questions. Attempt any twelve questions out of fifteen questions. **12x5=60**

- Q.21. What do you mean by property of a system? Differentiate between extensive and intensive properties of a system giving two examples each.
- Q.22. Define Boyle's & Charle's law. Hence deduce gas equation from these laws.
- Q.23. What are the limitations of first law of thermodynamics?
- Q.24. Find out the expression to calculate the work done in case of isothermal process.
- Q.25. Derive the steady flow energy equation and write the assumptions made in deriving this particular Equation.
- Q.26. Draw and briefly make understood the phase equilibrium diagram on P-T coordinates.
- Q.27. Explain the terms wet steam, dry and saturated steam and superheated steam.
- Q.28. Briefly explain the process of measuring the quality of steam using throttling calorimeter.
- Q.29. Steam at a pressure of 10 bar and 0.95 dry expands isentropically to a pressure of 4 bar. Determine the final fraction of steam by 1. Using steam tables and 2. Using Mollier Chart.
- Q.30. Compare water tube and fire tube boilers.
- Q.31. Enlist the assumptions made in air standard cycle.
- Q.32. In an ideal engine working on Carnot cycle 1/5th of the heat input is converted into work. The efficiency gets doubled if the temperature of sink is reduced by 60°C . Find the temperature of source and sink.
- Q.33. Differentiate between Reciprocating and Rotary Compressors.
- Q.34. Enlist the advantages of Multistage Compressors over Single Stage Compressors.
- Q.35. Explain triple point with P-T diagram.

Section-D

Note: Long answer questions. Attempt any two questions out of three questions.

2x10=20

- Q.36. Explain with the help of neat sketch the working of Babcock and Wilcox boiler.
- Q.37. Density of a H_2 gas is 0.09kg/m^3 at N.T.P. and the value of γ is 1.4. Find the characteristics gas constant for H_2 gas and it's both specific heats.
- Q.38. Explain the construction and working of axial flow compressor with the help of neat sketch.