VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY (VSSUT), ODISHA

Odd Mid Semester Examination for Academic Session 2025-26

COURSE NAME: B.Tech SEMESTER: 3RD

BRANCH NAME: PRODUCTION ENGINEERING

SUBJECT NAME: THERMAL & FLUID ENGINEERING

FULL MARKS: **30** TIME: **90 Minutes**

Answer **All** Questions.

The figures in the right hand margin indicate Marks. *Symbols carry usual meaning.*

Q1. Answer all Questions. [2 × 3]

a) What are the different types of Thermal Equilibriums? Briefly explain. - CO1

b) What do you mean by free expansion? What are the conditions when an ideal gas undergoes free expansion? - CO2

c) Define exergy. Mention different types of exergy. - CO3

Q2. [8]

What are Heat and Work? How is work said to be positive or negative in Thermodynamics? What are various processes of Work transfer? - CO1

OR

What is steady flow? Derive the steady state energy equation of 1st law of thermodynamics of an open system? - CO1

Q3. [8]

A fluid system contained in a piston cylinder machine passes through a complete cycle of four processes. The summation of heat transfer is -350 KJ/cycle. The system completes 250 cycle per minute. Complete the following table and find the network transfer in K watt. - CO2

Process	Q(KJ/min)	W(KJ/min)	dU(KJ/min)
1-2	0	4340	?
2-3	42000	0	?
3-4	-4200	?	-73200
4-1	?	?	?

OR

a) A non-flow reversible (quasi-static process) can be written down by an equation $p = (v^2 + 8/v)$ bar. Determine the work done if volume changes from 1 to $3m^3$. [4]+[4] - CO2

b) Work done by substance in a reversible non-flow manner is in accordance with $v = (15/p)\ m^3$, where p is in bar. Evaluate the work done on or by the system as pressure increases from 10 to 100 bar. Indicate whether it is a compression process or expansion process.

Q4. [8] - CO3

Differentiate between i) specific heat and latent heat.

ii) Enthalpy and Entropy

OR

Define 2nd law of thermodynamics. What are the two statements given by 2nd law of thermodynamics. Discuss both the statements briefly. - CO3