



K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

InSem Examination-I Winter2024	
Exam Seat No.:	
Academic Year:2024-2025	Semester: III
Class: SY	Program: B.Tech
Branch Code: MEC	Pattern:2023
Name of Course: Engineering Thermodynamics	Course Code:2305202
Max. Marks:30	Duration:1.15 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 01 page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.

Marks CO

Question No. 1

- 1 a) Draw a block diagram for refrigeration system showing its four components. Show the heat/work flows for each component. Apply steady flow energy equation to compressor and throttling device explaining the assumptions made. (7) 01

Question No. 2

- 2 a) Draw the block diagram of heat engine and write expression for efficiency as well as maximum efficiency. Estimate the maximum efficiency, maximum work transfer and minimum heat rejected from an engine working between 1000 K and 300 K. Assume 500 kJ of heat is supplied to the engine. (8) 01

OR

- 2 b) Write general steady flow energy equation and explain its terms. Apply this equation to an evaporator and get a reduced expression in terms of enthalpy. Calculate the Rate of Heat absorbed by Evaporator. Assume the refrigerant flow rate is 0.1 kg/s. Let the enthalpy at the inlet is 100 kJ and the exit enthalpy is 150 kJ. (8) 01

Question No. 3

- 3 a) Explain the concept of dead state, available energy and unavailable energy. Apply this concept to a heat transferred Q from a source at a temperature T Kelvin. Represent this available energy on temperature entropy diagram. (7) 2

Question No. 4

- 4 a) What is entropy? What do you understand by exergy? Suppose 50 kg of hot copper block at 100 degree Celsius is dropped in river which is at 30 degree Celsius. What will happen to the entropy of copper block and river? What will happen to the entropy of universe during this process? Calculate the entropy change of copper block. Assume specific heat of copper as 0.38 kJ/kg K. (8) 2

OR

- 4 b) What happens to available energy when heat is transferred through finite temperature difference? Derive an expression for decrease in available energy when heat is transferred through finite temperature difference. (8) 2

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