Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–III (NEW) EXAMINATION – WINTER 2024

Subject Code: 3130109 Date: 29-11-2024

Subject Name: Thermodynamics for Aeronautical Engineering

Time: 10:30 AM TO 01:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Explain state, property also describe intensive and extensive property.	**07**
	(b)	i) Explain Zeroth Law of thermodynamics in short (ii) Distinguish Macroscopic Vs Microscopic Approach.	**07**
Q.2	**(a)**	Explain the Carnot theorem.	**07**
	(b)	Derive steady flow energy equation for turbine, pump and nozzle with neat sketch.	**07**
		OR	
	(b)	Explain Kelvin-Plank and Clausius statement of second law of thermodynamics.	**07**
Q.3	**(a)**	Justify that the efficiency of diesel cycle is higher than the Otto cycle for the same compression ratio and heat rejection.	**07**
	(b)	Explain Carnot cycle with P-V and T-S diagram.	**07**
		OR	
Q.3	**(a)**	An air standard otto cycle has a compression ratio of 8. At the beginning of the compression the temperature is 300 K and pressure is 1 bar. If the maximum cycle temperature is limited to 1080 K. Determine (i) heat supply per unit mass (ii)Thermal efficiency of the cycle. Also show the cycle on p-v and T-s diagram.	**07**
	(b)	Develop the equation of thermal efficiency for diesel cycle with usual notation.	**07**
Q.4	**(a)**	Draw Schematic diagram, P-V and T-S diagram of Rankine cycle.	**07**
	(b)	Prove that "Entropy is a property of a system".	**07**
		OR	
Q.4	**(a)**	Derive Maxwell relations and various TdS equations.	**07**
	(b)	Write energy relations for various processes occurring in jet engine.	**07**
Q.5	**(a)**	Develop the equation of thermal efficiency for Brayton cycle with usual notation.	**07**
	(b)	Write all the major parts of Jet engine components with their functions.	**07**
		OR	
Q.5	**(a)**	Which cycle is associated with Jet engine? Draw its' P-V & T-S diagram.	**07**
	(b)	Explain heat pump, heat engine and refrigeration. justify that the COP of a heat pump is greater than the COP of Refrigerator by unity.	**07**

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