Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III(NEW) EXAMINATION – WINTER 2022

Subject Code:3130109 Date:24-02-2023

Subject Name:Thermodynamics for Aeronautical Engineering

Time:02:30 PM TO 05:00 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)**	List the components of Brayton cycle and state their purpose.	**03**
	(b)	Explain Carnot cycle with P-V and T-s diagram.	**04**
	(c)	Explain airport terminal layout.	**07**
Q.2	**(a)**	Define the terms thermodynamics, microscopic and macroscopic point of view.	**03**
	(b)	Derive an expression of efficiency of an Otto cycle.	**04**
	(c)	Draw and explain P-V and T-s diagram of a diesel cycle.	**07**
		OR	
	(c)	Compare the efficiency of Otto cycle and Diesel cycle for same compression ratio and same heat addition.	**07**
Q.3	**(a)**	Define: system, surrounding, boundary and universe.	**03**
	(b)	State first law of thermodynamics. Also define internal energy of the system and show that internal energy is a property of the system.	**04**
	(c)	Discuss perpetual motion machines of first kind and second kind.	**07**
		OR	
Q.3	**(a)**	Write the limitations of first law of thermodynamics.	**03**
	(b)	Explain flow processes and non flow processes.	**04**
	(c)	Explain the steady flow energy equation for nozzle and boiler.	**07**
Q.4	**(a)**	State and explain the second law of thermodynamics.	**03**
	(b)	Carnot cycle is not practical. Justify.	**04**
	(c)	State and prove the Clausious theorem.	**07**
		OR	
Q.4	**(a)**	Derive the relation, Cp-Cv = R.	**03**
	(b)	Derive the first and second T-dS equations.	**04**
	(c)	Derive Maxwell's equation.	**07**
Q.5	**(a)**	Define coefficient of volume expansion and isothermal compressibility.	**03**
	(b)	Draw and explain Brayton cycle in brief.	**04**
	(c)	Draw and explain Brayton cycle with reheating and derive the expression of cycle efficiency for the same.	**07**
		OR	
Q.5	**(a)**	Enlist the components of jet engine and write their functions.	**03**
	(b)	Draw h-s diagram of diffuser and derive its efficiency equation.	**04**
	(c)	What is the importance of Intercooling? Draw Brayton cycle with intercooling and explain it in detail.	**07**

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