Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–I&II EXAMINATION – SUMMER 2025

Subject Code:3110006 Date:05-07-2025

Subject Name:Basic Mechanical 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.**
5. **Usage of steam table is permitted.**

			Marks
Q.1	**(a)**	Write a short note on "Global Warming and solar energy"	**03**
	(b)	Write the mathematical form of the First Law and explain each term.	**04**
	(c)	Derive the characteristics gas equation for a perfect gas with usual notations.	**07**
Q.2	**(a)**	Differentiate between heat and work in the context of the First Law.	**03**
	(b)	Name the types of prime movers based on the source of energy.	**04**
	(c)	Explain vapour compression refrigeration cycle used in domestic refrigerator.	**07**
		OR	
	(c)	How much heat to be added to convert 4kg water at 20 °C into steam at 8 bar and 200 °C. take Cp of superheated steam as 2.1 KJ/kg and specific heat of water of water as 4.187 KJ/kgK.	**07**
Q.3	**(a)**	With usual notations prove that Cp – Cv= R.	**03**
	(b)	The engine working on ideal Otto cycle. The temperature at the beginning and at the end of compression is 50 °C and 400 °C. Calculate the air standard efficiency and compression ratio.	**04**
	(c)	Explain with neat sketch throttling calorimeter. Also state its advantages and disadvantages.	**07**
		OR	
Q.3	**(a)**	Explain open system, closed system and isolated system.	**03**
	(b)	Write a difference between SI engine and CI engine	**04**
	(c)	Derive an expression of air standard efficiency of Diesel cycle. Draw its P-V and T-S diagram.	**07**
Q.4	**(a)**	Classify internal combustion Engine.	**03**
	(b)	List out application of compressed air.	**04**
	(c)	Explain with neat sketch Cochran boiler.	**07**
		OR	
Q.4	**(a)**	How do you classify steam boilers?	**03**
	(b)	Draw labeled diagram of Babcock and Wilcox boiler.	**04**
	(c)	What is priming? Explain with neat sketch centrifugal pump.	**07**
Q.5	**(a)**	Explain single acting reciprocating pump.	**03**
	(b)	Write a short on a single plate (disc) friction clutch	**04**
	(c)	Define following mechanical properties: (1) Elasticity (2) Malleability (3) Ductility (4) Stiffness (5) Hardness (6) Toughness (7) Resilience.	**07**

OR

Q.5	**(a)**	Write function of clutch, Break and Coupling.	**03**
	(b)	What is refrigerant? Describe the properties of good refrigerant.	**04**
	(c)	Compare belt drive, chain drive and gear drive.	**07**

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