Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (OLD) - EXAMINATION – SUMMER 2017

Subject Code: 141903 **Date: 01/06/2017**

Subject Name: Engineering Thermodynamics

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.**

Q.1	**(a)**	Define following terms: isolated system, control volume, property.	**07**
	(b)	Carnot cycle is not practical, Justify. State Carnot theorem and perpetual motion machine of second kind.	**07**
Q.2	**(a)**	State the Steady Flow Energy Equation and explain how this equation can be applied for (i) Nozzle, (ii) Boiler, and (iii) Steam Turbine.	**07**
	(b)	A rigid cylinder of volume $0.028m^3$ contains steam at 80 bar and 350^0 C. The cylinder is cooled until the pressure is 50bar. Calculate (i) the state of steam after cooling; (ii) the amount of heat rejected by the steam.	**07**
		OR	
	(b)	Prove that violation of Kelvin-Plank statement leads to violation of Clausius statement.	**07**
Q.3	**(a)**	What is difference between heat and work? Show that heat is a path function and not a property.	**07**
	(b)	A cyclic heat engine operates between a source temperature of 800^0 C and a sink temperature of 30^0 C. Find out the least rate of heat rejection per kw net output of the engine.	**07**
		OR	
Q.3	**(a)**	Define available energy, unavailable energy, dead state, reversibility and irreversibility.	**07**
	(b)	Prove that all reversible engines operating between operating between same temperatures limits have are equally efficient.	**07**
Q.4	**(a)**	Draw and explain the schematic for an ideal Rankine cycle and represent on p-v, T-S, h-s diagram	**07**
	(b)	Show that internal energy and enthalpy of an ideal gas are functions of temperature only.	**07**
		OR	
Q.4	**(a)**	Derive an expression for Otto cycle efficiency with usual notation.	**07**
	(b)	Compare Otto, diesel and dual cycle for (1) For Efficiency and Compression ratio. (2) For Same Compression ratio and same Heat input.	**07**
Q.5	**(a)**	Explain construction and working of Bomb calorimeter with neat sketch.	**07**
	(b)	Derive Maxwell's equations.	**07**
		OR	
Q.5	**(a)**	Explain following term: Gibbs function and Helmholtz function.	**07**
	(b)	State various methods to improve efficiency of Brayton cycle. With suitable diagrams, explain any two of them.	**07**

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