Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– IV(NEW) EXAMINATION – SUMMER 2015

Subject Code: 2142004 **Date:03/06/2015**

Subject Name: Engineering Thermodynamics

Time: 10:30am-1.00pm **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: path, process, isolated system, intensive property, quasi-static process, perfect gas.	**07**
	(b)	Write steady flow energy equation in case of diffuser, boiler, turbine, nozzle, pump, heat exchanger and condenser.	**07**
Q.2	**(a)**	In a carnot cycle, heat is supplied at 625 K and is rejected at 300 K.The working fluid is water which while receiving heat evaporates from liquid at 625 K to steam at 625 K. The entropy change for this process is 1.4374KJ/kg K. If the cycle operates with 1 kg mass of water, find the heat supplied, work done and heat rejected.	**07**
	(b)	Draw line diagram of Brayton cycle represent on p-v diagram and derive expression for efficiency of Brayton cycle.	**07**
		OR	
	(b)	Derive expression for air standard efficiency of diesel cycle.	**07**
Q.3	**(a)**	An Otto cycle takes in air at 1 bar and 15°C. The compression ratio is 8 to 1 and 2000 kJ/kg of energy is released to air in each cycle. To what value must the compression ratio be raised to increase the net work per cycle by 20 percent ?	**07**
	(b)	State the Carnot theorem and explain PMM-II(Perpetual Motion Machine of second kind).	**07**
		OR	
Q.3	**(a)**	Explain briefly Otto cycle with help of p-v and T-s diagram and derive an expression for ideal efficiency of Otto cycle.	**07**
	(b)	Prove that violation of Kelvin-Plank statement leads to violation of Clausius statement.	**07**
Q.4	**(a)**	State and prove clausious theorem.	**07**
	(b)	What do you mean by the term entropy? What are the characteristics of entropy? How the principle of entropy is used to determine whether the process path is reversible, irreversible or impossible.	**07**
		OR	
Q.4	**(a)**	What do you understand by Joule-Thomson coefficient? Explain.	**07**
	(b)	Define available energy, unavailable energy, dead state, reversibility, irreversibility and effectiveness.	**07**
Q.5	**(a)**	State and explain i) Equation of State ii) Avogadro's law	**07**

	(b)	Explain briefly Dalton's law and Gibbs-Dalton law applied to mixture of Perfect gases.	**07**

OR

Q.5	**(a)**	State and explain i) Law of corresponding state ii) Compressibility chart	**07**
	(b)	Derive Vander wall's equation.	**07**

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