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

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2132502 **Date: 05/06/2017**

Subject Name: Engineering Thermodynamics & Heat transfer

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.**

			MARKS
Q.1		**Define following terms:**	**14**
	1	Macroscopic Approach	
	2	Homogeneous System	
	3	Entropy	
	4	Enthalpy	
	5	Energy	
	6	Exergy	
	7	Composite System	
	8	Conduction	
	9	Convection	
	10	Radiation	
	11	Pure Substance	
	12	Reversibility	
	13	Clausius Inequality	
	14	Emissivity	
Q.2	**(a)**	The e.m.f. in a thermocouple with the test junction at t℃ on gas thermometer scale and reference junction at ice point is given by $\mathcal{E} = 0.20\,t - 5\times10^{-4}\,t^2$ mV The millivoltmeter is calibrated at ice and steam points. What will this thermometer read in a place where the gas thermometer reads 50℃?	**03**
	(b)	Explain Zeroth Law of Thermodyanmics with any one application.	**04**
	(c)	Write a short note on Carnot Cycle (Reversible Cycle).	**07**
		OR	
	(c)	Define Irreversibility. What are the causes of Irreversibility?	**07**
Q.3	**(a)**	A cyclic heat engine operates between a source temperature of 800℃ and a sink temperature of 30℃. What is the least rate of heat rejection per kW net output of the engine?	**03**
	(b)	Explain the concept of p-v diagram for a pure substance with neat sketch.	**04**
	(c)	Derive general steady flow energy equation.	**07**
		OR	
Q.3	**(a)**	Define PMM1 and PMM2.	**03**
	(b)	Explain the concept of Mollier diagram for a pure substance with neat sketch.	**04**
	(c)	Explain the concept of Energy & Exergy with suitable example.	**07**
Q.4	**(a)**	What is the mechanism of Heat Transfer?	**03**
	(b)	Define the function of Heat Exchanger. Classify Heat Exchangers.	**04**
	(c)	Explain & classify types of Convection.	**07**
		OR	

Q.4	**(a)**	Define Internal Flow, Laminar Flow and Turbulant Flow.	**03**
	(b)	The inner surface of a plane brick wall is at 60°C and the outer surface is at 35°C. Calculate the rate of heat transfer per m² of surface area of the wall, which is 220 mm thick. The thermal conductivity of the brick is 0.51 W/m°C.	**04**
	(c)	How heat is conducted in Hollow and Composite cylinders? Explain with neat sketch.	**07**
Q.5	**(a)**	Compare First Law and Second Law of Thermodynamics.	**03**
	(b)	Explain & draw the pool boiling curve.	**04**
	(c)	Derive the equation for logarithmic mean temperature difference (LMTD) for counter flow heat exchanger.	**07**

OR

Q.5	**(a)**	Explain emissivity and absorptivity of a surface.	**03**
	(b)	Differentiate between Black Body and Gray Body.	**04**
	(c)	Define the term Radiation. Explain following laws of Radiation: 1.) Stefan Boltzman Law 2.) Kirchoff's Law	**07**

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