Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER–II EXAMINATION – SUMMER 2015

Subject Code: 2722112 **Date: 01/06/2015**

Subject Name: Exergy Analysis Of Thermal System

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.**

Q.1	**(a)**	State and explain the Gouy - stodola theorem.	**07**
	(b)	Explain exergy balance for non flow & steady flow process.	**07**
Q.2	**(a)**	Explain the decrease of exergy principle & exergy destruction.	**07**
	(b)	Explain exergy analysis of mixing & separation process of fluids.	**07**
		OR	
	(b)	Explain the fundamental of exergy-economics system.	**07**
Q.3	**(a)**	What is the reversible cycle that represents the simple steam power plant?	**07**
	(b)	Express the overall efficiency of steam plant as the product of boiler, Turbine, generator & cycle efficiency.	**07**
		OR	
Q.3	**(a)**	How does braytone cycle compare with rankine cycle?	**07**
	(b)	How can heat pump be used for (a) Space heating (b) year ï round Air-conditioning?	**07**
Q.4	**(a)**	In a gas turbine plant, working on the brayton cycle with a regenerator of 75% effectiveness, the air at the inlet to the compressor is at 0.1MPa, 30$^{\circ c}$,the pressure ratio in 6 ,and the maximam cycle temperature is 900 $^{\circ c}$ if the turbine & compressor have each an efficiency of 80% find the Percentage increase in cycle efficiency due to regeneration.	**07**
	(b)	How is heat transfer through a finite temperature difference equivalent to the destruction of its availability.	**07**
		OR	
Q.4	**(a)**	Water at 140 kpa & 10 $^{\circ c}$ enters a mixing chamber at a rate of 136 kg/ min, Where it is mixed steadily with steam entering at 140 kpa & 115 $^{\circ c}$ .the mixture leaves the chamber at 140 kpa and 55 $^{\circ c}$ & heat is being lost to the surrounding air at T_o= 22 $^{\circ c}$ at a rate of 190 kj/ min Neglecting the changes in kinetic & potential energies , determine the reversible work & exergy destroyed for this process.	**07**
	(b)	Explain exergy economics analysis of gas turbine power plant.	**07**
Q.5	**(a)**	What is the effect of regeneration on brayton cycle efficiency? Define effective of a regenerator.	**07**
	(b)	Derive the expression of optimum pressure ratio for maximam net work outpat in an ideal brayton cycle. What is the corresponding cycle efficiency?	**07**
		OR	
Q.5	**(a)**	Explain the advantage & disadvantages of gas turbine plant for a utility system.	**07**
	(b)	What the effect is of reheat on (a) the specific output (b) the cycle efficiency (c) steam rate and (d) heat rate, of a steam power plant?	**07**

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