

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV(New) • EXAMINATION – WINTER 2016****Subject Code:2143406****Date:18/11/2016****Subject Name:Thermo Dynamics and Thermal Eng.****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.

MARKS

Q.1	Short Questions	14
	1 What is a thermodynamics system?	
	2 Define an isolated system.	
	3 What is zeroth law of Thermodynamics?	
	4 Define: Ideal gas.	
	5 What is a displacement work?	
	6 What is an indicator diagram?	
	7 Define: Path functions.	
	8 Define: Lost work.	
	9 What do you understand by 'High grade energy'?	
	10 Explain the term 'Low grade energy'?	
	11 Define the term 'Dead state'.	
	12 Define the term 'Refrigeration'.	
	13 Explain the term 'Dew point temperature'.	
	14 What do you understand by saturated air?	
Q.2	(a) Explain the mechanical, chemical and thermal equilibrium.	03
	(b) Give the differential form of SFEE.	04
	(c) What is quality of steam? What are the different methods of measurement of quality?	07
	OR	
	(c) A cooling tower nozzle disperses water into a stream of droplets. If the average diameter of the droplets is 60 microns, estimate the work required for atomizing 1 kg of water isothermally at the ambient condition. Give surface tension of water in contact with air = 0.07 N/m, density of water = 1000 kg/m ³ , water is assumed to enter the nozzle through a pipe of 15 mm diameter.	07
Q.3	(a) What are the intensive and extensive properties?	03
	(b) List out the causes of entropy increase.	04
	(c) What do you understand by entropy transfer? Why is entropy transfer associated with heat transfer and not with work transfer?	07
	OR	
Q.3	(a) Distinguish between the terms 'Change of state', 'Path' and 'Process'.	03
	(b) Show that the enthalpy of fluid before throttling is equal to that after throttling.	04
	(c) A fluid at 200 kPa and 300 C has a volume of 0.8 m ³ . In a frictionless process at constant volume the pressure changes to 100 kPa. Find the final temperature and heat transferred if fluid is air.	07

Q.4	(a)	Explain in detail: COP of refrigerant.	03
	(b)	State and prove the clausius theorem.	04
	(c)	Explain the working of single stage reciprocating air compressor with a neat sketch.	07
OR			
Q.4	(a)	Evaluate the ammonia as a refrigerant.	03
	(b)	Explain the various properties of steam.	04
	(c)	Explain about vapour compression refrigeration system with suitable sketches.	07
Q.5	(a)	How does brayton cycle compare with rankine cycle?	03
	(b)	Explain the PVT behavior of pure substance with the help of appropriate diagram.	04
	(c)	Compare the efficiency of Otto, diesel and dual cycle for same compression ratio and heat rejection with help of p-v and T-S diagram.	07
OR			
Q.5	(a)	Describe the principle of psychometric in detail.	03
	(b)	Derive the equation for conduction of heat through a plane wall.	04
	(c)	Derive the equation for conduction of heat through a radial wall.	07
