## **GUJARAT TECHNOLOGICAL UNIVERSITY**

	BE ·	SEMESTER-IV(New) • EXAMINATION – WINTE	CR 2016
Subject (	Code:	2143406	Date:18/11/2016
Subject N	lame	Thermo Dynamics and Thermal Eng.	
Time:02:	30 PN	A to 05:00 PM	Total Marks: 70
Instruction	5:		
1.	Attem	ot all questions.	
2.	Make s	suitable assumptions wherever necessary.	
3.	Figure	s to the right indicate full marks.	
			MARKS
01		Short Questions	14
Q.1	1	What is a thermodynamics system?	14
	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?	1
Q.2	(a)	Explain the mechanical, chemical and therm	nal <b>03</b>
		equilibrium.	0.4
	(D)	Give the differential form of SFEE.	04 .da 07
	(C)	of measurement of quality?	ous 07
	(c)	A cooling tower nozzle disperses water into a stream	of <b>07</b>
	(0)	droplets. If the average diameter of the droplets is	60
		microns, estimate the wok required for atomizing 1 kg	of
		water isothermally at the ambient condition. Give surfa	nce
		tension of water in contact with air = $0.07$ N/m, dens	ity
		of water = $1000 \text{ kg/m}^3$ , water is assumed to enter	the
		nozzle through a pipe of 15 mm diameter.	
Q.3	<b>(a)</b>	What are the intensive and extensive properties?	03
	<b>(b)</b>	List out the causes of entropy increase.	. 04
	( <b>c</b> )	What do you understand by entropy transfer? Why	1S <b>0</b> 7
		entropy transfer associated with heat transfer and not w	ith
		work transfer?	
03	(n)	<b>UK</b> Distinguish between the terms 'Change of state' 'Pa	th' <b>03</b>
Q.3	( <b>a</b> )	and 'Process'	ui 05
	( <b>b</b> )	Show that the enthalpy of fluid before throttling is equi	ual <b>04</b>
		to that after throttling.	VT
	(c)	A fluid at 200 kPa and 300 C has a volume of 0.8 m3.	In <b>07</b>
	(-)	a frictionless process at constant volume the press	ure
		changes to 100 kPA. Find the final temperature and h	eat
		transferred if fluid is air.	

<b>(a)</b>	Explain in detail: COP of refrigerant.		
<b>(b)</b>	State and prove the clausius theorem.	04	
(c)	Explain the working of single stage reciprocating air	07	
	compressor with a neat sketch.		
	OR		
<b>(a)</b>	Evaluate the ammonia as a refrigerant.	03	
<b>(b</b> )	Explain the various properties of steam.	04	
( <b>c</b> )	Explain about vapour compression refrigeration system with suitable sketches.	07	
(a)	How does brayton cycle compare with rankine cycle?	03	
(b)	Explain the PVT behavior of pure substance with the help	04	
	of appropriate diagram.		
(c)	Compare the efficiency of Otto, diesel and dual cycle for same compression ratio and heat rejection with help of p- y and T-S diagram	07	
<b>(</b> 2)	Describe the principle of psychometric in detail	03	
$(\mathbf{u})$	Derive the equation for conduction of heat through a	04	
(0)	plane wall	04	
(c)	Derive the equation for conduction of heat through a radial wall.	07	
	<ul> <li>(a)</li> <li>(b)</li> <li>(c)</li> <li>(a)</li> <li>(b)</li> <li>(c)</li> <li>(a)</li> <li>(b)</li> <li>(c)</li> <li>(a)</li> <li>(b)</li> <li>(c)</li> </ul>	<ul> <li>(a) Explain in detail: COP of refrigerant.</li> <li>(b) State and prove the clausius theorem.</li> <li>(c) Explain the working of single stage reciprocating air compressor with a neat sketch.</li> <li>OR</li> <li>(a) Evaluate the ammonia as a refrigerant.</li> <li>(b) Explain the various properties of steam.</li> <li>(c) Explain about vapour compression refrigeration system with suitable sketches.</li> <li>(a) How does brayton cycle compare with rankine cycle?</li> <li>(b) Explain the PVT behavior of pure substance with the help of appropriate diagram.</li> <li>(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.</li> <li>(a) Describe the principle of psychometric in detail.</li> <li>(b) Derive the equation for conduction of heat through a plane wall.</li> <li>(c) Derive the equation for conduction of heat through a radial wall.</li> </ul>	

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