

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-IV(New) • EXAMINATION – WINTER 2016

Subject Code:2140106

Date:22/11/2016

Subject Name:Basic Engineering Thermodynamics

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 Define Homogeneous and Heterogeneous systems.	
	2 Density is an extensive property. True or False?	
	3 State Zeroth law of thermodynamics.	
	4 Define PMM1 and PMM2.	
	5 Heat and Work both are form of energies. True or False?	
	6 According to 1 st law of thermodynamics Heat can flow from hot end to cold end and cold end to hot end. True or False?	
	7 Define COP?	
	8 Why Work is a high grade energy and heat is a low grade energy?	
	9 Define Entropy.	
	10 An Otto cycle is also known as _____.	
	11 Brayton is also known as _____.	
	12 For the same compression ratio, the efficiency of Diesel cycle is Less than Otto cycle. True or False?	
	13 State Boyle's law.	
	14 Define Enthalpy.	
Q.2	(a) What do you mean by extensive and intensive properties?	03
	(b) Differentiate Macroscopic and Microscopic approach.	04
	(c) Can you define a term "System"? Classify it.	07
	OR	
	(c) Fluid enters a nozzle with a velocity of 60 m/s and initial enthalpy is 2900 kJ/kg. The enthalpy of fluid at the exit of nozzle is 2600 kJ/kg. Assume that no heat interaction between nozzle and surroundings takes place. Calculate	07
	i. Velocity of fluid at the exit of nozzle	
	ii. The mass flow rate when inlet area is 0.15m ² and specific volume at inlet is 0.25 m ³ /kg.	
	iii. The exit area of nozzle when the specific volume at the nozzle exit is 0.6 m ³ /kg.	
Q.3	(a) How system boundary differs from Control surface?	03
	(b) What do you mean by Critical Point? Discuss.	04
	(c) Prove equivalence between Kelvin-Plank and Clausius statements of 1 st law of thermodynamics.	07
	OR	
Q.3	(a) Explain Steady flow process and Unsteady flow process	03
	(b) Explain Kelvin-Plank statement of second law of thermodynamics in detail.	04

- (c) Derive Steady Flow Energy Equation. **07**
- Q.4** (a) What is the physical significance of Equation of State? **03**
- (b) Explain Avogadro's law. **04**
- (c) Derive ideal gas equation. **07**
- OR**
- Q.4** (a) Define High grade and Low grade energy. **03**
- (b) How would you explain Available Energy and Unavailable Energy? **04**
- (c) What are the necessary conditions for a process to be Reversible? Define Irreversibility. **07**
- Q.5** (a) Draw p-v and T-s diagram for modified Rankine cycle. **03**
- (b) Compare Carnot and Rankine cycles. **04**
- (c) With neat sketch explain Carnot vapor cycle. **07**
- OR**
- Q.5** (a) What do you mean by Gas Power cycles? **03**
- (b) The engine working on ideal Otto cycle. The temperature at the beginning and at the end of compression is 60°C and 450°C. Determine the air standard efficiency and compression ratio. **04**
- (c) With neat sketch explain Otto cycle. **07**
