

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-IV(NEW) – EXAMINATION – SUMMER 2019
Subject Code:2140106
Date:17/05/2019
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	(a) Define availability, unavailability and irreversibility.	03
	(b) With an example explain an open system and closed system.	04
	(c) List the Engineering Application of SFEE and explain any two.	07
Q.2	(a) Discuss limitations of a Carnot cycle.	03
	(b) Draw and explain Rankine cycle.	04
	(c) With usual notations prove that $\Phi \delta Q/T \leq 0$.	07
	OR	
	(c) Derive the expression for efficiency and mean effective pressure for diesel cycle.	07
Q.3	(a) Draw P-V and T-S diagram of Brayton cycle.	03
	(b) Explain the available energy referred to finite heat source.	04
	(c) List the thermodynamic processes involved in ideal Otto cycle. Derive the expression of efficiency of Otto cycle.	07
	OR	
Q.3	(a) State the principle of increase of entropy. List the four application of entropy principle.	03
	(b) Write a note on PMM1.	04
	(c) State and explain Dalton's law of partial pressure and Avogadro's law.	07
Q.4	(a) Justify that energy is property of the system.	03
	(b) What are the causes of irreversibility?	04
	(c) State Kelvin-Planck Statement of Second Law of thermodynamics and show that violation of Kelvin-Planck statement leading to violation of Clausius statement.	07
	OR	
Q.4	(a) List applications of various components of a Rankine cycle.	03
	(b) Prove that, $C_p - C_v = T\beta^2 v / k_T$	04
	(c) Dry and saturated steam at pressure of 10.5 bar is supplied to a turbine and expanded isentropically to a pressure 0.075 bar. Calculate Thermal efficiency of Rankine cycle.	07
Q.5	(a) Explain in brief the characteristics of entropy.	03
	(b) Explain the effect of superheating of steam on the performance of Rankine cycle.	04
	(c) Why Carnot cycle is a hypothetical cycle? Enlist the assumptions considered for Carnot cycle and prove the expression of efficiency of a cycle following Carnot cycle. What are the relative modifications done in Ranking cycle?	07
	OR	
Q.5	(a) Define cut off ratio, mean effective pressure and steam rate.	03
	(b) Prove that all reversible engines working between the two constant temperatures Reservoirs have the same efficiency.	04
	(c) Define property. What is meant by intensive and extensive property? State the differences between Microscopic approach and macroscopic approach.	07
