PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech., Summer 2017 - 18 Examination

Semester: 3   Date: 11/06/2018
Subject Code: 03101202   Time: 2:00 pm to 4:30 pm
Subject Name: Basic Engineering Thermodynamics   Total Marks: 60

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1	**Objective Type Questions** (All are compulsory) (Each of one mark)	**(15)**

    1. Define zeroth law of thermodynamics.
    2. Define a control volume.
    3. Define the Thermodynamics.
    4. Define intensive property
    5. What are the causes of irreversibility?
    6. All reversible engines operating between two fixed temperatures have _____efficiency. (same/More/less)
    7. Second law of thermodynamic defines _____ (Internal Energy/Entropy)
    8. Refrigerator and Heat pump works on _____ law of thermodynamics. (Zero/First/Second)
    9. Value of cut-off ratio is always _____than 1. ($>$/ $<$/$=$)
    10. By reheating final dryness fraction of steam is _____. (increases/decreases)
    11. Heat and Work are
       a). Intensive Property   b). Extensive Property   c). Point function   d). Path function
    12. Thermal power plants works on
       a). Carnot cycle   b). Joule cycle   c). Brayton cycle   d). Rankine cycle
    13. For same compression ratio and for same heat added
       a). Otto cycle is more efficient than diesel cycle
       b). Diesel cycle is more efficient than Otto cycle
       c). Efficiency depends on other factors
       d). None of the above
    14. Which of the following is the unit of entropy?
       a). J/kg K   b). J/K   c). Nm/kg sec   d). J/kg
    15. The equation $(p + a/v^2)(v - b) = R$ is known as
       a). Maxwell's equation   b). Van der Wall's equation
       c) Avogadro's equation   d). Real gas equation

Q.2	**Answer the following questions. (Attempt any three)**	**(15)**

    A) Explain briefly Dalton's law and Gibb's-Dalton law
    B) Derive an expression for the efficiency of Otto cycle

    C) Sketch the Ideal Rankine cycle on p-V, T-s, and h-s diagram
    D) Define a thermodynamic system. Differentiate between open system, closed system and an isolated system

Q.3	A) State the first law of thermodynamics, its applications and limitations.	**(07)**
	B) With usual notations prove that $\oint (\delta Q/T) \leq 0$.	**(08)**

<div align="center">OR</div>

	B) Explain the method of determination of calorific value of a given fuel by Bomb calorimeter with neat sketch.	**(08)**
Q.4	A) Explain Clausius theorem.	**(07)**

<div align="center">OR</div>

	A) 2 kg of an ideal gas is compressed adiabatically from pressure 100 kPa and temperature 220 K to a final pressure of 400 kPa. Make calculations for 1. Initial volume 2. Final volume and temperature 3. Work performed 4. Heat added to a subtracted from a system and 5. Change in internal energy. It may be presumed that for the given ideal gas Cp=1 kJ/kg K & Cv=0.707 kJ/kg K	**(07)**
	B) Derive Vander waal's equation	**(08)**