USN | | | | | | | | | | | **17NT553**

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Fundamentals of Thermodynamics

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Define thermodynamics, thermodynamic process, and thermodynamic laws.   **(10 Marks)**
   b. Discuss about the characteristics of system boundary and control surfaces with examples.
                                                                                       (10 Marks)

OR

2 a. Derive expression for displacement work for different thermodynamic process.   **(10 Marks)**
   b. With a note on thermodynamic properties.   **(10 Marks)**

Module-2

3 a. Derive as expression between heat and work, by explaining Joules experiments.   **(10 Marks)**
   b. What is first law of thermodynamics? Derive a mathematical expression for cyclic and non cyclic process.   **(10 Marks)**

OR

4 a. Write a brief note on energy, prove that energy is a property of a system.   **(10 Marks)**
   b. Brief about different modes of energy.   **(10 Marks)**

Module-3

5 a. Discuss about heat engines and heat pump. Explain about working of a refrigerator and in COP.   **(10 Marks)**
   b. Describe about derive converting heat to work in a thermodynamic cycle with an example.
                                                                                       (10 Marks)

OR

6 a. Discuss about Clausius theorem and Clausius inequality.   **(10 Marks)**
   b. Discuss in detail about Carnots theorem, Carnot cycle and the processs, assumption and importance.   **(10 Marks)**

Module-4

7 a. Explain about pure substance, ideal gases, and real gases. Give comparison between the ideal gas law and real gas law.   **(10 Marks)**
   b. Discuss about gravimetric and molar analysis of ideal gas mixture.   **(10 Marks)**

OR

8 a. Derive as expression for Dalton's law of additive pressure and Amagat's law of additive volume.   **(10 Marks)**
   b. With the help of T-V and P-V diagrams, explain the different phases of water add a note on critical point and triple point.   **(10 Marks)**

Module-5

9 a. Explain the working principle, process and thermal efficiency of a spark – ignition- Otto cycle with the help of P-V and T-S diagrams.   **(10 Marks)**
   b. Explain briefly about Carnot vapour power cycle.   **(10 Marks)**

OR

10 a. Explain the working principle, and process of a diesel engine cycle with the help of P-V and T-S diagrams.   **(10 Marks)**
   b. Write a detailed note on binary vapour cycle.   **(10 Marks)**

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