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15NT553

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Fundamental of Thermodynamics

Time: 3 hrs.

Max. Marks: 80

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

Module-1

1 a. Explain macroscopic and microscopic approaches in study of thermodynamics. Give the practical applications of thermodynamics. **(08 Marks)**
   b. Distinguish between work and heat. **(08 Marks)**

OR

2 a. Derive expressions for displacement work for different thermodynamic processes. **(10 Marks)**
   b. Explain about mechanical definition of work and thermodynamic definitions of work. **(06 Marks)**

Module-2

3 a. Write a brief note on energy. Prove that energy is a property of a system. **(08 Marks)**
   b. Explain Joules experiment and derive an expression between heat and work. What is mechanical equivalent of heat? **(08 Marks)**

OR

4 a. Brief about different modes of energy. **(08 Marks)**
   b. Derive an expression for the first law of thermodynamics to control volume. **(08 Marks)**

Module-3

5 a. Discuss about direct heat engines and heat pump. Explain about working of a refrigerator and its COP. **(08 Marks)**
   b. Describe about Clausius theorem and Clausius inequality. **(08 Marks)**

OR

6 a. State and explain Clausiu's second law of thermodynamics. Add a note on equivalence of Kelvin-Plank's and Clausius's statements. **(10 Marks)**
   b. Explain about available and un-available energy. **(06 Marks)**

Module-4

7 a. Explain about pure substances, ideal gases and real gases. Give comparison between the ideal gas law and real gas law. **(08 Marks)**
   b. Write a brief note on compressibility factor and compressibility chart of real gas. **(08 Marks)**

OR

8 a. Discuss about gravimetric and molar analysis of ideal gas mixtures. **(10 Marks)**
   b. Derive an expression for Dalton's law of additive pressure and Amagat's law of additive volume. **(06 Marks)**

Module-5

9 a. Explain the working principle, process and thermal efficiency of a spart ignition otto cycle with the help of a P-V and T-S diagrams. **(08 Marks)**
   b. Write a detailed note on binary vapour cycle. **(08 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. **(08 Marks)**
    b. Discuss about the processes in a simple Rankine cycle. Add a note on the analysis and performance of Rankine cycle. **(08 Marks)**

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