CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ 15NT553

Fifth Semester B.E. Degree Examination, June/July 2018
Fundamentals of Thermodynamics

Time: 3 hrs.   Max. Marks: 80

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

Module-1

1 a. Define thermodynamics, thermodynamic processes and thermodynamic laws. **(08 Marks)**
   b. Discuss the characteristics of system boundary and control surface with examples. **(08 Marks)**

OR

2 a. Derive expressions for displacement work for different thermodynamic processes. **(10 Marks)**
   b. Write a note on thermodynamic properties. **(06 Marks)**

Module-2

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

OR

4 a. Derive an expression between heat and work. **(06 Marks)**
   b. Write a brief note on energy. Prove that energy is a property of a system. **(05 Marks)**
   c. What are pure substances? State and explain the two property rule for pure substance. **(05 Marks)**

Module-3

5 a. Discuss abut direct heat engines and heat pump. Explain about working of a refrigerator and its COP. **(08 Marks)**
   b. State and explain Kelvin-Plank's second law of thermodynamics and perpetual motion machines. **(08 Marks)**

OR

6 a. State and explain Clausius's second law of thermodynamics. Add a note on equivalence of Kelvin's–Plank's and Clausius's statements. **(10 Marks)**
   b. Explain available and unavailable energy with a diagram. **(06 Marks)**

Module-4

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

OR

8 a. Write a brief note on compressibility factor and compressibility chart of real gas. **(08 Marks)**
   b. Write a short note on latent heat of stream. Explain about steam dryness faction. **(08 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. **(08 Marks)**
   b. Explain briefly about Carnot vapour power cycle **(08 Marks)**

OR

10 a. Discuss about the processes in a simple Rankine cycle. Add a note on the analysis and performance of Rankine cycle. **(08 Marks)**
   b. Write a detailed note on binary vapour cycle. **(08 Marks)**

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