B.Tech III Semester Regular/Supplementary Examinations, February 2021

THERMODYNAMICS
(MECHANICAL ENGINEERING)

Date:17.02.2021   Duration: 3 hours

Maximum Marks: 70

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks   (10x2M=20 Marks)

1   Define thermodynamic equilibrium.
2   State first law of Thermodynamics.
3   What is PMM-2.
4   Define third law of thermodynamics.
5   What is the use of mollier diagram?
6   Explain free expansion process.
7   Define mass fraction and mole fraction.
8   What is Vanderwaals equation of state?
9   Define air standard efficiency.
10 Sketch Diesel cycle on P-V and T-S graph.

Part-B

(10MX 5=50Marks)

Answer All the following questions.

11   A.Differentiate microscopic and macroscopic approach of thermodynamics. [5M]
     B. What is quassi static process.[5M]

OR

12   A. Explain the construction and working of a constant volume gas thermometer.[5M]
     B. Define zeroth law of thermodynamics. What are its applications? [5M]

                                                                        [5M]
13   A. Derive steady flow energy equation.   [5M]
     B. What are the limitations of first law of thermodynamics.

OR

14   A. Show the equivalence of Clausius and Kelvin planck statements of second law of
     thermodynamics. [5M]
     B. Define availability and irreversibility. [5M]

15   A. Define (i) Triple point (ii) Critical point   [5M]
     B. Sketch and explain P-V-T diagram.[5M]

OR

16   A. Calculate the dryness fraction of steam which has 1.5kg of water in suspension with 50kg of steam.[5M]

B. What is Clapeyron equation.[5M]

17   A. What is compressibility chart. [5M]

B.A sample of fuel has the following percentage composition:Carbon=86 percent; Hydrogen=8 percent; Sulphur=3 percent; Oxygen=2 percent; Ash=1 percent. for an air fuel ratio of 12:1, calculate:

(i) Mixture strength as percentage rich or weak.

(ii) Volumetric analysis of the dry products of combustion. [5M]

OR

18   A. Explain the process of phase change ice to liquid state. [5M]

B. Explain Dalton's law of partial pressure.[5M]

19   A. Compare Otto cycle and Diesel cycle. [5M]

B. Explain the processes in Atkinson cycle and sketch P-V graph.   [5M]

OR

20   A. The efficiency of an Otto cycle is 60% and $\gamma=1.4$. What is compression ratio?[5M]

B. Explain the processes in otto cycle. [5M]