UNIT – I

2. Discuss the method of finding calorific values of solid and liquid fuel. 15

3. The following is the ultimate analysis of a sample of petrol by weight. Carbon = 85%, Hydrogen ⇒ 15%. Calculate the ratio of air to petrol consumption by weight if volumetric analysis of dry exhaust is $CO_2 \Rightarrow 11.5\%, CO \Rightarrow 1.2\%, O_2 \Rightarrow 0.9\%$ and $N_2 \Rightarrow 86\%$.

   Also find percentage of excess air. 15

UNIT – II

4. How Rankine cycle is differ from cannot cycle ? Explain the effect of reheat and intercooling on rankine cycle using suitable diagrams. 15

5. Explain Air-standard dual cycle with suitable diagram. Derive the equation for air standard efficiency, work output and mean effective pressure. 15

UNIT – III

6. Define Psychometry. Derive the relation between various types of psychometric term. 15

7. (a) Define Mach number. Explain the various types of stagnation properties during compressible flow. 10

   (b) Derive formulae to find out nozzle and diffuser efficiency. 5

UNIT – IV

8. Define steam turbine. Discuss the various method for velocity and pressure compounding of steam turbine using neat sketch/diagrams. 15

9. A trial on a two stage single acting reciprocating air compressor gave the following data : 15

   Free air delivered ⇒ $6m^3$/minute

   Atmospheric Pressure and temperature - 1 bar and 27°C.

   Delivery Pressure ⇒ 40 bar

   Speed ⇒ 400 rpm

   Intermediate pressure ⇒ 6 bar

   Temperature at inlet to second stage ⇒ 27°C

   Law of compression ⇒ $PV^{1.3}$ ⇒ constant

   Mechanical efficiency ⇒ 80%

   Stroke of L. P. ⇒ diameter of L. P ⇒ stroke of H. P.

   Calculate : (i) Cylinder-diameters

   (ii) Power required, neglect clearance

Roll No. .....

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B. Tech. 4th Semester (ME) Examination – May, 2023

APPLIED THERMODYNAMICS

Paper : PCC-ME-202-G

Time : Three hours] *[Maximum Marks : 75*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt ***five*** questions in all, selecting ***one*** question from each Unit. Question No. **1** is ***compulsory***. All questions carry equal marks.

1. Explain the following : $2.5 \times 6 = 15$

(a) Adiabatic flame temperature

(b) Eco-friendly Refrigerants

(c) VCRS with diagram

(d) Condition of choked flow

(e) Degree of Reaction

(f) Subsonic and Supersonic flow