Fpme. 2207   **Thermodynamics and Automotive Engines (2+1)**

Marks: 50
Time: 2 hours

1   Fill in the blanks.   (10x1=10)

1   If each molecule is described in a system, then it is _____ approach.

2   A system whose chemical composition and physical properties are the same in all parts of the system is _____

3   Specific volume is an _____

4   If the atmospheric pressure is 760 mm of Hg and gauge pressure is 2 bar, then, the Absolute pressure will be _____ bar.

5   Heat is a _____ function.

State True or False

6   A process which permits transfer of mass across the boundary of the system is known as Flow process.

7   The absolute pressure of a given mass of a perfect gas varies inversely as its volume, when the temperature remains constant. This is Charles's Law.

8   If the value of specific heat at constant pressure 'Cp' = 1.0325 and R = 297 J/kgK, The value of Adiabatic index Y is 0.7355 kJ/kgK.

9   First law of thermodynamics deals with conservation of momentum.

10 The change in internal energy during Isothermal process will be equal to the work done.

II   Write short notes/answers etc on ANY FIVE   (5x2=10)

1   Kelvin-Planck's and Clausius statement of second law of thermodynamics

2   Represent general law of expansion or compression of gas in a PV diagram and what happens when the value of 'n' varies from 0 to ∞

3   'Entropy' of a gas

4   An inventor claims to have developed an efficient heat engine which would have a heat source at 1000°C and reject heat to a sink at 50°C and gives an efficiency of 90%. Justify whether his claim is possible

5   Fuel injectors.

6   Function of a governor.

7   SAE scales and API scales

III   Answer any FIVE of the following.   (5x4=20)

1   A certain gas occupies a space of 0.3 m^3 at a pressure of 2 bar and a temperature of 77°C. It is heated at a constant volume, until the pressure is 7 bar. Determine: 1.temperature at the end of the process; 2. mass of the gas; 3.change in internal energy; and 4.change in enthalpy during the process. Assume Cp=1.005 kJ/kg K; C_v =0.712 kJ/kg K

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2   Derive an expression for ideal efficiency of a diesel cycle, using ideal air as the working fluid.

3   Properties of fuel used in IC engines.

4   What is meant by heat balance? What are the factors to be considered?

5   Different types of lubricating systems.

6   Electrical system of an IC engine.

7   Knocking and the methods to prevent it.

IV   Answer any ONE of the following   (1x10=10)

1   Application of valve timing diagram. With neat sketch, explain about the valve timing diagrams of petrol and diesel engines.

2   Engine cooling systems.

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