**BBDNITM**

**MECHANICAL DEPARTMENT**

**SESSION (2018-19)**

**Subject- IC Engine and Compressors [RME-051]**

**Assignment no. 2**

**Theory**

**1**. Enlist the assumptions which are made for fuel-air cycle analysis.

**2**. Explain the phenomenon of dissociation. Also explain its effect on maximum temperature and power.

**3**. Explain following:

a. Burning time loss factor

b. Heat loss factor

c. Pumping and friction loss factor

**Numerical**

**4**. What will be the effect of percentage change in the efficiency of Otto cycle having a compression ratio of 8, if the specific heat at constant volume increases by 1.1 percent?

**5.** Calculate the percentage change in efficiency of air standard Otto cycle having a compression ratio of 7, if the specific heat at constant volume increases by 2 %.

**6.** The following particulars relate to a Diesel cycle: Compression ratio = 18, cut-off = 5% of stroke, mean specific heat Cv for cycle = 0.71 kJ/kg K, characteristic gas constant = 0.285 kJ/kg K. If the mean specific heat for the air standard cycle increases by 2% determine the percentage change in the air standard efficiency.

**7.** What will be the effect on the efficiency of a diesel cycle having a compression ratio of 20 and a cut-off takes place at 8% of the swept volume, if the Cv increases by 1%. Take Cv = 0.717 kJ/kg K and R = 0.287 kJ/kg K.

**8.** A petrol engine using a compression ratio 7 and air-fuel ratio of 15:1 has the pressure and temperature at the end of suction stroke as 1 bar and 57°C respectively. The fuel used has a calorific value of 44000 kJ/kg. Compression follows the law pv1.33⋅ = constant and specific heat at constant volume is given by the relation,  where ‘T’ is in Kelvin. Determine the maximum pressure and temperature in the cylinder and compare this value with that of constant specific heat, Cv = 0.718 kJ/kg K.

**9.** A Diesel engine uses a compression ratio of 16 and at the end of compression the temperature of the air is 1100 K. Now the air is supplied at constant pressure by burning fuel of calorific value of 44200 kJ/kg K and the fuel-air ratio is 0.04:1. Specific heat at constant volume T is given as: where ‘T’ is in Kelvin. Determine the maximum temperature in the cylinder and compare this value with that of constant specific heat, Cv = 0.72 kJ/kg K.

**10.** In an oil engine, working on dual combustion cycle the temperature and pressure et the beginning of compression are 87°C and 1 bar. The compression ratio is 14:1. The heat supplied per kg of air is 1700 kJ, half of which is supplied at constant volume and half at constant pressure. Take Cv = 0.718 + 2.1 X 10-4 T, where T is in Kelvin. Calculate (i) The maximum pressure in the cycle (ii) The percentage of stroke at which cut-off occurs.