Allowed tables and Charts(None)

Answer the following Questions: "Assume the missing data "

Question (1) (12 Marks)

(a) Change in enthalpy of a system is the heat supplied at: (comment on your answer)

    (a) constant pressure   (b) constant temperature

    (c) constant volume   (d) constant entropy   (4 Marks)

(b) In a non-flow reversible process for which $P = (3V + 1.5) \times 10^5$ N/m^2, V changes from 1 m^3 to 2 m^3. Determine the work done during this process.   (4 Marks)

(c) During throttling process: (comment on your answer)

    (a) heat exchange does not take place   (b) no work is done by expanding steam

    (c) there is no change of internal energy of steam (d) all of the above   (4 Marks)

Question (2) (16 Marks)

(a) A particular engine has a power output of 2000 Watt and an efficiency of 20%. If the engine rejected 4000 J of heat in each cycle, find:

    (i) The heat absorbed in each cycle.   (ii) The time for each cycle.   (4 Marks)

(b) Air in an ideal Diesel cycle is compressed from 5 Liters to 0.2 Liters, and then it expands during the constant pressure heat addition process to 0.40 Liters. Under cold air standard conditions, what is the thermal efficiency of this cycle? Let $C_p = 1.005$ kJ/kg.$^{\circ}$C and $C_v = 0.718$ kJ/kg.$^{\circ}$C.   (6 Marks)

(c) The tension in a pulley belt is 100 N when stationary. Calculate the tension in each side and the power transmitted when the belt is on the point of slipping on the smaller wheel. The wheel is 240 mm diameter and the coefficient of friction is 0.3. The contact angle is 165°. The wheel speed is 1200 rev/min. if the big pulley is 960 mm find the speed ratio, the speed of the big pulley belt length for open and cross arrangement.   (6 Marks)

Question (3) (12 Marks)

(a) Show a comparison between the Four and Two Stroke Internal Combustion Engines.   (4 Marks)

(b) Show how we can decrease or increase the rate of heat transfer flow.   (4 Marks)

(c) Describe the main methods of lubrication and how it can be tested.   (4 Marks)

Question (4) (10 Marks)

(a) Describe the main types of heavy equipments and show how the hydraulic lift works and discuss its main idea.   (4 Marks)

(b) A hydraulic lift uses 600 liters of water under pressure of 50 bar in lifting a load of 15 tones. How many floors can be estimated if the floor height is 3 m. Take the η_{Lift} efficiency for both the cane and the water pump is 70 %.   (6 Marks)

With my best wishes and successful   *Dr./ Essam M. Wahba*