GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEM- I / II Winter Examination-Dec.-2011

Subject code: 110006   **Date: 30/12/2011**
Subject Name: Elements of Mechanical Engineering
Time: 10.30 am -1.00 pm   **Total marks: 70**
Instructions:
1. **Attempt any five questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Use of Steam Tables and Mollier's Chart is permissible**

Q-1 (a) What is flow and non-flow process?   3
   (b) Define :   (i) Sensible heat   (ii) Enthalpy of evaporation   4
                  (iii) Heat of superheat   (iv) Dryness Faction.
   (c) Calculate the enthalpy per kg of steam at 10 bar pressure and a temperature of 300 ºC.   7
      Find also the change in enthalpy if this steam is expanded to 1.4 bar and dryness fraction
      of 0.8. Take specific heat of superheat steam equal to 2.29 kj/kgK.

Q-2 (a) What is adiabatic process? Prove with usual notations the law of governing adiabatic   7
      process process as PV^γ = Constant.
   (b) 0.67 kg of gas at 14 bar and 290 ºC is expanded to four times the original volum according   7
      to the law $PV^{1.3}$ = Constant.
              Caluculate : (1) The original and final volume of the gas.
                           (2) The final temperature of the gas .
                           (3) The final pressure of the gas. Take R = 287 J/kgK.

Q-3 (a) Differentiate between petrol engine and diesel engine.   3
   (b) Derive equeation for air standard efficiency of otto cycle.   4
   (c) In an ideal constant volume cycle the pressure and temperature at the beginning of the
      comperession are 97 kPa and 50 ºC respectively. The volume ratio is 5. The heat supplied   7
      during the cycle is 930 kj/kg of working fluid.
           Calculate : (1) The maximum temperature attained in the cycle.
                       (2) The thermal efficiency of the cycle.
                       (3) Work done during the cycle/kg of working fluide.

Q-4 (a) State the function of the following :   3
       (1) Pressure gauge
       (2) Fusible plug
       (3) superheater
   (b) With neat sketch describe the working of two stroke cycle petrol engine.   4
   (c) With neat sketch describe the construction and working of Cochran boiler.   7

Q-5 (a) Give classification of governor. Explain working of any one with neat sketch.   3
   (b) Classify the centrifugal pump and explain with neat sketch the vertex type centrifugal   4
      Pump.
   (c) Classify the air compressor . Differentiate between reciprocating compressor and   7
      rotary compressor.

Q-6 (a) What is refrigerant? State the most widely used refrigerant.   3
   (b) With neat sketch explain vapour compression refrigeration cycle.   4
   (c) Explain with neat sketch split air conditioner. State its advantages.   7

Q-7 (a) What is zeroth law of thermodynamics.   3
   (b) With simple sketch explain working of disc clutch.   4
   (c) Write short note on: Type of belt drive.   7

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