First/Second Semester B.E. Degree Examination, Dec.2016/Jan.2017
Elements of Mechanical Engineering

Time: 3 hrs.

Max. Marks:100

Note: *Answer FIVE full questions, selecting*
ONE full question from each module.

Module – 1

1 a. Briefly explain petroleum based liquid fuels and gaseous fuels. (04 Marks)
   b. With the help of suitable sketch explain the working of typical wind mill. (06 Marks)
   c. Explain the working to Babcock and Wilcox boiler with neat diagram. (10 Marks)

2 a. Define solar constant. With neat sketch, explain the working of flat plate collector. (06 Marks)
   b. Compare bio fuels with petroleum fuels in terms of Calorific value and emission. (06 Marks)
   c. With respect to steam, define the following terms and mention the units :
      i)   Enthalpy of wet steam
      ii) Degree of superheat
      iii) Internal energy and
      iv) Specific volume. (08 Marks)

Module – 2

3 a. Briefly explain Delaval steam turbine with the help of pressure and velocity diagrams. (06 Marks)
   b. Differentiate between open cycle and closed cycle gas turbines. (06 Marks)
   c. With the help of line diagram explain the working of 4-stroke petrol engine. (08 Marks)

4 a. Differentiate between impulse turbine and Reaction turbine. (06 Marks)
   b. With suitable sketch explain the working of Pelton wheel impulse turbine. (06 Marks)
   c. Following observations are taken during a trial on 4-stroke petrol engine :
      * Cylinder diameter = 25cm   * Stroke length = 40cm
      * Crack shaft speed = 250rpm   * Brake load = 70kg
      * Brake drum dia = 2m   * MEP = 6 bar
      * Diesel oil consumption = 0.1 m^3/min   * Calorific value = 43900kJ/kg
      * Specific gravity of diesel = 0.78
      Find :
      i)   Brake power
      ii) Indicated power
      iii) Mechanical efficiency
      iv) Frictional power
      v)   Brake Thermal efficiency
      vi) Indicated Thermal efficiency. (08 Marks)

Module – 3

5 a. With suitable sketches, differentiate between the following machining operations :
      i)   Drilling and Tapping
      ii) Counter boring and counter sinking. (08 Marks)
   b. What is Robot? Mention its applications in industries. (06 Marks)
   c. With the help of block diagram, explain the basic elements of CNC system. (06 Marks)

6 a. With suitable sketches explain the following machining operations:
    i) Taper turning by swiveling compound rest method
    ii) Slot milling. (08 Marks)
  b. Briefly explain the following configuration of Robot :
    i) Cartesian Co-ordinate configuration
    ii) Cylindrical Co-ordinate configuration (06 Marks)
  c. With the help of block diagram, explain the basic elements of NC system. (06 Marks)

Module – 4

7 a. Explain the following non-ferrous metals in terms of properties and uses :
    i) Copper
    ii) Aluminium. (08 Marks)
  b. Explain briefly how composite materials are classified. (06 Marks)
  c. With suitable sketch explain the principle and operation of arc welding process. (06 Marks)

8 a. Bring out the broad classification of Ferrous metals and discuss in brief. (08 Marks)
  b. What are the advantages and disadvantages of composite materials over other materials? (06 Marks)
  c. Briefly discuss the three types of flames used in gas welding. (06 Marks)

Module – 5

9 a. Define the following terms :
    i) Refrigeration effect
    ii) Ton of Refrigeration
    iii) Co-efficient of Performance (COP) (06 Marks)
  b. With suitable sketch explain the working of vapour compression refrigeration system. (08 Marks)
  c. List the various applications of Air conditioner. (06 Marks)

10 a. What are the desirable properties of refrigerant? Explain in brief. (06 Marks)
  b. With suitable sketch, explain the working of vapour absorption refrigeration system. (08 Marks)
  c. Explain the working of Room Air conditioner with suitable sketch. (06 Marks)

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