NEW SCHEME

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# First Semester B.E Degree Examination, February/March 2005
## Common to all branches
# Elements of Mechanical Engineering

Time: 3 hrs.]                                                              [Max.Marks : 100

**Note:** *1. Answer any FIVE full Questions.*
*2. Draw sketches using pencil only.*
*3. Use of steam table is permitted.*

1. (a) i) Classify different sources of energy with suitable examples.   **(5 Marks)**

    ii)  Briefly explain the utilisation of solar energy.   **(5 Marks)**

   (b) Define the terms

    i)   dryness fraction of steam

    ii)  specific enthalpy

    iii) degree of super heat

    iv)  specific volume   **(4 Marks)**

   (c) Find the internal energy of 2.5 kg of steam at 20 bar when

    i)   it is wet, its dryness fraction being 0.9

    ii)  it is superheated, its temperature being $350^0$C (take the specific heat of steam as $2.3 kJ/kg - ^0 k$).   **(6 Marks)**

2. (a) With the help of temperature - enthalpy diagram explain the formation of steam at constant pressure.   **(5 Marks)**

   (b) Describe with a neat sketch the working of a Babcock - Wicox boiler. Show the direction of flow of flue gas.   **(10 Marks)**

   (c) List the boiler mountings and accessories and also mention their uses.   **(5 Marks)**

3. (a) State the differences between an impulse turbine and a reaction turbine.   **(4 Marks)**

   (b) WIth a neat sketch explain the construction and working of a closed cycle gas turbine.   **(8 Marks)**

   (c) Sketch and explain the working of a Kaplan turbine.   **(8 Marks)**

4. (a) How are IC engines classified ?   **(4 Marks)**

   (b) Explain with sketches the working of 2 - stroke diesel engine.   **(6 Marks)**

   (c) A 4 - cylinder two stroke petrol engine develops 30 kW at 2500 rpm. The mean effective pressure on each piston is 8 bar and mechanical efficiency is 80%. Calculate the diameter and stroke of each cylinder, stroke to bore ratio 1.5. Also calculate the fuel consumption if brake thermal efficiency is 28%. The calorific value of the fuel is 43900 kJ/kg.   **(10 Marks)**

**5.** (a) What are the desirable properties of a good refrigerant? **(4 Marks)**

(b) Explain with a neat sketch the working of vapour absorption refrigeration system. **(8 Marks)**

(c) Draw a neat sketch of engine lathe and label the parts. **(8 Marks)**

**6.** (a) With a neat sketch explain the construction and working of a radial drilling machine. **(8 Marks)**

(b) Explain the following with sketches.

  i) upmilling

  ii) down milling

  iii) face milling **(6 Marks)**

(c) Enumerate the applications and advantages of centreless grinding. **(6 Marks)**

**7.** (a) Distinguish between soldering, brazing and welding. **(6 Marks)**

(b) Sketch and explain the Oxy-Acetylene welding. **(6 Marks)**

(c) i) What are the basic requirements of a good lubricant? **(4 Marks)**

  ii) Describe with sketch working of bushed bearing. **(4 Marks)**

**8.** (a) Derive an expression for ratio of belt tensions in flat open belt drive. **(6 Marks)**

(b) Two parallel shafts 6m apart are provided with 300 mm and 400 mm diameter pulleys and are connected by a cross belt. The direction of rotation of the follower pulley is to be reversed by changing over to an open belt drive. How much length of the belt should be changed ? **(6 Marks)**

(c) i) Differentiate between simple gear train and compound gear train. **(4 Marks)**

  ii) Explain the closed loop control system with the functional block diagram. **(4 Marks)**

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