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MES14

First Semester B.E. Degree Examination, June/July 08
Elements of Mechanical Engineering

Time: 3 hrs. Max. Marks:100

Note : ***1. Answer any FIVE full questions.***
2. Use of steam tables is permitted.

1 a. Explain the factors, which favor the use of non-conventional energy. **(05 Marks)**
b. Briefly explain the method of harnessing solar energy **(05 Marks)**
c. Determine the quality of steam/Degree of superheat for the following states of steam.
i) Steam is at 5 bar having a specific volume of $0.32 m^3/kg$.
ii) Steam is at 8 bar pressure and 200^0C temperature
iii) Steam is at 10 bar pressure and having enthalpy of 2595 kJ/kg
iv) Steam is at 10bar pressure and having enthalpy of 2929 kJ/kg **(10 Marks)**

2 a. Write the advantages of water tube boiler over fire tube boiler. **(05 Marks)**
b. Explain the working principle of Lancashire boiler with a neat sketch. **(10 Marks)**
c. Define and give examples for i) Boiler mountings ii) Boiler accessories. **(05 Marks)**

3 a. Write the comparison between impulse and reaction steam turbines. **(06 Marks)**
b. Explain open and closed cycle gas turbine plant. **(06 Marks)**
c. Explain principle of operation of Francis turbine with a neat sketch. **(08 Marks)**

4 a. Explain different parts of I.C. engines. **(04 Marks)**
b. Explain the principle of working of four-stroke diesel engine with the help of P V diagram. **(08 Marks)**
c. A four-stroke single cylinder petrol engine has a bore of 150 mm and a stroke of 250 mm. At 500 rpm and full load, the net load on the friction brake is 435N and the torque arm is 0.45 m. The indicator diagram gives a net area of 580 mm^2 and a length of 70 mm with a spring rating of 0.815 bar/mm. Determine indicated power, brake power and mechanical efficiency. **(08 Marks)**

5 a. Explain the vapour compression refrigeration system with a neat sketch. **(10 Marks)**
b. Name the major parts of a lathe and state their functions. **(05 Marks)**
c. Explain the principle of facing operation on a lathe with a neat sketch. **(05 Marks)**

6 a. Draw a neat sketch of the radial drilling machine and explain its construction and working. **(08 Marks)**
b. With the help of a neat sketch explain the construction and working of a horizontal milling machine. **(07 Marks)**
c. What are abrasive materials? Name the various abrasive materials and bonding materials used in grinding wheels. **(05 Marks)**

7 a. Explain electric are welding with a neat sketch. **(08 Marks)**
b. Name and explain briefly any six important properties of a good lubricant. **(06 Marks)**
c. Explain with a sketch a bushed solid journal bearing. **(06 Marks)**

8 a. The tension on tight side of a belt is 3000 N and the angle of lap is 160^0. If the co-efficient of friction 0.25, find the tension on the slack side of the belt. **(05 Marks)**
b. A toothed gear has 72 teeth and circular pitch of 26 mm. Find the following **(06 Marks)**
i) Pitch diameter
ii) Diametral pitch
iii) Module of the gear
c. Explain closed loop control system with simple block diagram. **(09 Marks)**

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