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15EME14/24

First/Second Semester B.E. Degree Examination, Dec.2018/Jan.2019
Elements of Mechanical Engineering

Time: 3 hrs.   Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Compare Renewable and Non-renewable energy resources. **(05 Marks)**
   b. Define "Calorific value" of fuel. Explain "Higher calorific value" and "Lower Calorific value". **(06 Marks)**
   c. Explain the principle of operation of "Solar Pond" with a neat sketch. **(05 Marks)**

OR

2 a. Draw the temperature enthalpy diagram for a constant pressure heating process to represent the following on it?
      i)   Sensible heat
      ii) Latent heat of evaporation
      iii) Amount of superheat
      iv) Saturation temperature
      v)   Super – heated temperature
      vi) Degree of superheat. **(03 Marks)**
   b. Name essential boiler mountings and state their respective functions. **(07 Marks)**
   c. Sketch and label all the parts of a "Babcock and Wilcox" boiler. Indicate the path of flue gases and water circulation in diagram. **(06 Marks)**

Module-2

3 a. Explain with a neat sketch the working principle of a gas turbine working on closed cycle. **(04 Marks)**
   b. Point out the differences between impulse and reaction steam turbines. **(04 Marks)**
   c. With a neat sketch explain the working principle of "Pelton" turbine. **(08 Marks)**

OR

4 a. Compare Two – stroke and Four – Stroke I.C Engines. **(08 Marks)**
   b. The following observations were recorded during a test on a 4-stroke engine :

Bore	= 250mm
Stroke	= 400mm
Crank speed	= 250rpm
Brake load	= 700N
Brake drum diameter	= 2m
Mean effective pressure	= 6 bar
Fuel consumption	= 0.1 litres/min
Specific gravity of fuel	= 0.78
Calorific value of fuel	= 43900 kJ/kg

   Determine :
      i)   Brake power
      ii) Indicated power
      iii) Frication power
      iv) Mechanical efficiency
      v)   Brake thermal efficiency
      vi) Indicated thermal efficiency. **(08 Marks)**

1 of 2

Module-3

5   a.   Explain with neat sketches the following operations carried out on a drilling machine:
      i)   Boring
      ii)   Counter boring
      iii) Counter sinking. **(08 Marks)**

    b.   Explain the following operations carried out on a Lathe machine, with neat sketches :
      i)   Thread cutting
      ii)   Taper turning
      iii) Knurling. **(08 Marks)**

OR

6   a.   Define 'Robotics'. Classify robots based on robot configurations. **(04 Marks)**
    b.   State the advantages and disadvantages of industrial robots. **(04 Marks)**
    c.   Define "automation". Classify automation of production systems and explain in detail. **(08 Marks)**

Module-4

7   a.   State the properties and applications of the following non-ferrous materials :
      i)   Aluminium
      ii)   Copper. **(08 Marks)**
    b.   Define "composite". How are the composite materials classified? State the applications of composite materials in Aircraft and Automobile industry. **(08 Marks)**

OR

8   a.   Bring out the difference between :
      i)   Soldering and Brazing
      ii)   Welding and Brazing. **(08 Marks)**
    b.   Outline the general welding procedure for carrying out electric arc welding. **(04 Marks)**
    c.   Write a short note on "Oxy – acetylene gas welding". **(04 Marks)**

Module-5

9   a.   Name the refrigerants that are commonly used in practice. **(02 Marks)**
    b.   State the properties of a good refrigerant. **(06 Marks)**
    c.   Explain vapour compression refrigeration system with a neat diagram. **(08 Marks)**

OR

10 a.   State the principle and applications of Air conditioners. **(04 Marks)**
    b.   Compare vapour absorption and vapour compression refrigeration systems. **(08 Marks)**
    c.   Define the following :
      i) Ton of refrigeration
      ii) Coefficient of performance. **(04 Marks)**

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