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14EME14/24

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 : (08 Marks)
 - i) Enthalpy of wet steam
 - ii) Degree of superheat
 - iii) Internal energy and
 - iv) Specific volume.

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
* Crank 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 (08 Marks)
 - ii) Counter boring and counter sinking. (06 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)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or signature number of 4780150 will be treated as malpractice.

- 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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