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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) Friction power
- iv) Mechanical efficiency
- v) Brake thermal efficiency
- vi) Indicated thermal efficiency.

(08 Marks)

Module-3

- 5 a. Explain with neat sketches the following operations carried out on a drilling machine:
- Boring
 - Counter boring
 - Counter sinking. (08 Marks)
- b. Explain the following operations carried out on a Lathe machine, with neat sketches :
- Thread cutting
 - Taper turning
 - 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 :
- Aluminium
 - 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 :
- Soldering and Brazing
 - 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 :
- Ton of refrigeration
 - Coefficient of performance. (04 Marks)
