USN 18ME15

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

Time: 3 hrs. Max. Marks: **100**

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.*
*2. Use of Thermodynamic data hand book is permitted.*

### Module-1

1 a. Explain briefly the principle of conversion of solar energy directly into electrical energy in a solar cell. (10 Marks)
b. Write a note on wind energy and its conversion. (10 Marks)

**OR**

2 a. Explain I - law of thermodynamics. List the similarities and dissimilarities between work and heat. (10 Marks)
b. Define the following term in relation to steam:
(i) Dryness fraction
(ii) Latent heat
(iii) Degree of super heat
(iv) Saturation temperature (10 Marks)

### Module-2

3 a. Differentiate between water tube boiler and fire tube boiler. (04 Marks)
b. List the boiler mountings and accessories and also mention their uses. (06 Marks)
c. With neat sketch explain the working of Babcock and Wilcox boiler. (10 Marks)

**OR**

4 a. With a neat sketch explain the working of Pelton Wheel. (10 Marks)
b. With a neat sketch explain the working of a Reciprocating pump, state the advantages and uses. (10 Marks)

### Module-3

5 a. Differentiate between Two-stroke and Four stroke engine. (04 Marks)
b. Explain with neat sketch construction and working of 4-stroke diesel engine with the help of theoretical P-V diagram. (10 Marks)
c. A four stroke single cylinder Diesel engine piston diameter 250 mm and stroke 400 min. The mean effective pressure is 4-bar and speed is 500 rpm. Diameter of the brake drum is 1000mm. The effective brake load is 400 N. Find IP BP and FP. (06 Marks)

**OR**

6 a. What are the properties of good refrigerant? (04 Marks)
b. Explain with neat sketch working principle of vapour compression refrigeration. (10 Marks)
c. Explain the following
(i) Refrigeration effect
(ii) Ton of refrigeration
(iii) COP. (06 Marks)

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## Module-4

7 a. Write a note on application of ferrous and non-ferrous alloys. **(06 Marks)**

b. Define composite material. State the advantages and applications of composite material. **(05 Marks)**

c. Differentiate between Soldering, Brazing and Welding. **(09 Marks)**

**OR**

8 a. Differentiate between Open and Crossed belt drive. **(06 Marks)**

b. Enumerate the advantages and disadvantages of gear drive over belt drive. **(06 Marks)**

c. Derive an equation for length of belt in open belt drive. **(08 Marks)**

## Module-5

9 a. Explain the following operation on lathe with suitable sketches:
(i) Turning (ii) Knurling (iii) Facing (iv) Thread cutting (10 Marks)

b. Explain the following operation on milling machine with suitable sketches:
(i) Form milling (ii) Angular milling (iii) Gang milling **(10 Marks'**

**OR**

10 a. Differentiate between open loop and closed loop systems. **(06 Marks)**

b. Define robot. Write down industrial applications of robot. **(04 Marks)**

c. Explain the components of CNC with a block diagram. (10 **Marks)**