



## P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

**First Semester, B.E. Semester End Examination; Dec - 2016/Jan - 2017**

### Elements of Mechanical Engineering

(Common to all Branches)

Time: 3 hrs

Max. Marks: 100

*Note: Answer FIVE full questions, selecting ONE full question from each unit.*

#### UNIT - I

- 1 a. Explain the following terms :
- |                      |                        |   |
|----------------------|------------------------|---|
| i) Internal Energy   | ii) Dryness fraction   | 8 |
| iii) Specific Volume | iv) Enthalpy of steam. |   |
- b. Sketch and explain the working of a closed cycle gas turbine. 8
- c. Mention any four applications of boilers. 4
- 2 a. Sketch and explain pressure temperature diagram for steam formation. 8
- b. Differentiate between Impulse and Reaction turbines. 8
- c. Write a short note on latent heat of evaporation. 4

#### UNIT - II

- 3 a. With neat sketches, explain the working of two-stroke petrol engine. 10
- b. 4-stroke diesel engine has a piston dia 250 mm and stroke 400 mm. The mean effective pressure is 4 bar and speed is 500 rpm. The diameter of the brake drum is 1000 mm and the effective brake load is 400 N. Find; 10
- |                    |                 |                        |
|--------------------|-----------------|------------------------|
| i) Indicated power | ii) Brake power | iii) Frictional power. |
|--------------------|-----------------|------------------------|
- 4 a. Differentiate between two-stroke and four-stroke engine. 8
- b. A 4-cylinder two stroke cycle petrol engine produces 30 kW at 2500 rpm. The mean effective pressure on each piston is 8 bar and mechanical efficiency is 80%. Calculate the diameter and stroke of each cylinder of stroke to bore ratio 1.5 also calculate the fuel consumption of the engine, if brake thermal efficiency is 28%. The calorific value of the fuel is 43900 kJ/kg. 12

#### UNIT - III

- 5 a. Sketch and explain working of centrifugal pump and mention its applications. 10
- b. With neat sketch, explain working principle of vapour compression refrigeration system. 10
- 6 a. What are the advantages, disadvantages and applications of centrifugal pump? 10
- b. With neat sketch, explain working principle of room air conditioner system. 10

#### UNIT - IV

- 7 a. Sketch and explain radial drilling machine. 10
- b. Differentiate between up milling and down milling process. 6
- c. How to specify a lathe? 4

- 8 a. Sketch and explain working principle of centerless grinding machine. 8
- b. Explain with relevant sketches :
- i) Counter Sinking                      ii) Counter boring                      12
- iii) Tapping                              iv) Reaming.

**UNIT - V**

- 9 a. The velocity ratio of a gear drive is 2. The driving wheel has 16 teeth and turns at 120 rpm. Find the rpm and the number of teeth on the driven wheel. 6
- b. With neat sketch, explain working principle of electric arc welding process. 10
- c. Differentiate between Soldering and Brazing. 4
- 10 a. Mention any six application of soldering process. 6
- b. Define slip and creep with respect to belt drive. 6
- c. Explain with sketches types of gas flames. 8

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