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

(An Autonomous Institution affiliated to VTU, Belgaum)

First Semester, B.E. - Make-up Examination; Jan / Feb - 2017

Elements of Mechanical Engineering

(Common to all Branches)

Time: 3 hrs

Max. Marks: 100

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

ii) Missing data may suitably assume.

UNIT - I

- 1 a. Define the following :
- | | | | |
|---------------------|---------------------|-----------------------|----|
| i) Enthalpy | ii) Wet steam | iii) Dryness fraction | 10 |
| iv) Internal energy | v) Specific volume. | | |
- b. Explain the steam formation mechanism at constant pressure with Temperature-Enthalpy diagram. 10
- 2 a. With a neat sketch, explain the working of a closed-cycle gas turbine. 10
- b. Explain the working principle of reaction steam turbine with neat sketch. 10

UNIT - II

- 3 a. Explain the working principle of 4-stroke petrol engine with theoretical PV diagram. 10
- b. A 4-stroke diesel engine has a piston diameter 300 mm and stroke 500 mm, the mean effective pressure is 6 bar and speed is 600 rpm. The diameter of the brake drum is 1000 mm and the effective brake load is 500 N. Find I.P, B.P, and F.P. 10
- 4 a. Differentiate between 2-stroke and 4-stroke engines. 8
- b. A single cylinder 4-stroke I.C. engine has a swept volume of 6 liters and runs at a rated speed of 300 rpm. At full load, the torque developed was measured with a belt dynamometer whose pulley diameter is 1 m. The tension in the tight side and slack side of the belt is 700 N and 300 N respectively. 4 kg of fuel was consumed in one hour. The indicated mean effective pressure is 6 bar and the C.V of the fuel is 42000 kJ/kg. Calculate the B.P, I.P, mechanical efficiency, indicated thermal efficiency, brake thermal efficiency, and brake specific fuel consumption. 12

UNIT - III

- 5 a. What are the functions of pump? Describe with a neat sketch, working of centrifugal pump. 10
- b. Explain with neat sketch, vapour compression refrigerating system. 10
- 6 a. Define pump. Explain with a sketch, the construction and working of single acting reciprocating pump. 10
- b. What is refrigeration? Explain in brief properties of good refrigerants. 10

UNIT - IV

- 7 a. Draw a neat sketch of center lathe and label the parts. 10
- b. With neat sketch, explain the construction and working of a radial drilling machine. 10
- 8 a. List the various operations performed on milling machine and explain any two operation with neat sketches. 10
- b. Define grinding. With the help of neat sketch, explain the working of cylindrical grinding machine. 10

UNIT - V

- 9 a. Distinguish between soldering, brazing and welding. 10
- b. With a neat sketch, explain the working of oxy-acetylene gas welding process. 10
- 10 a. Derive an expression for the length of the open belt drive. 10
- b. A prime mover running at 240 rpm drives a DC generator, by a belt drive. The diameter of the pulley on the output shaft of the prime mover is 160 cm and that of the generator shaft is 60 cm. Determine the speed of the generator shaft in the following cases :
- i) Neglecting thickness of belt 10
- ii) Considering belt thickness. The thickness of the belt is 6 mm
- iii) Considering the thickness of belt and slip of 3%
- iv) Velocity of belt considering belt thickness.

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