Code No: **R32035** **R10** **Set No. 1**

III B.Tech II Semester Supplementary Examinations, Dec - 2015

DESIGN OF MACHINE MEMBERS-II

(Mechanical Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
(Data books may be allowed)

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1 a) Explain the various factors that influence the life of a roller bearing.

b) A full journal bearing has the following specifications:
Journal Diameter:46 mm; Bearing length: 66 mm; speed : 2800 rpm
Radial clearance to radius ratio: 0.0015; Radial load: 820 N.
Viscosity of the lubricant at the operating temperature: 8.4 cP
Considering the bearing as a lightly loaded bearing,
Determine (i) the friction torque (ii) Coefficient of friction under given operating conditions and (iii) power loss in the bearing.

2 a) Explain the design for a centre crank shaft when the crank is at an angle of maximum twisting moment.

b) What is the function of a connecting rod of an internal combustion engine?

3 Design a cast iron piston for a single acting internal combustion engine having 200 mm as the cylinder bore. The maximum explosion pressure is 4 MPa. Draw a neat dimensional sketch of the piston to bring out the details.

4 List the assumptions made in the Winkler – Bach theory of curved beams. Derive the expression for the circumferential stress using this theory.
What are the practical applications of this theory?

5 a) Discuss the wire designation and construction.

b) Determine the percentage increase in horse power capacity made possible in changing from a flat belt drive to a V-belt drive. The diameter of the flat belt pulley is same as the pitch diameter of grooved pulley. Speed of rotation is also same. The coefficient of friction for flat belt as well as V-belts is 0.3. Groove angle is 60^0. Belts are of the same material and same cross sectional area. In each case the angle of wrap is 150^0.

6 Design a pair of spur gears with stub teeth to transmit 55 kW from a 175 mm pinion running at 2500 rpm to a gear running at 1250 rpm. Both the gears are made of steel having BHN 260. Approximate the pitch by means of Lewis equation and then adjust the dimensions to keep within the limits set by the dynamic load and wear equation.

7 a) Show that the efficiency of self locking screws is less than 50 percent.

b) In a hand vice, the screw has double start square threads of 24 mm outside diameter. If the lever is 200 mm long and the maximum force that can be applied at the end of lever is 250 N, find the force with which the job is held in the jaws of the vice. Assume a coefficient of friction of 0.12.

8 For operating the exhaust valve of a petrol engine, the maximum load required on the valve is 5000 N. The rocker arm oscillates around a pin whose centre line is 250 mm away from the valve axis. The two arms of the rocker are equal and make an included angle of 160°. Design the rocker arm with the fulcrum if the tensile stress is 70 MPa and the bearing pressure is 7 N/mm^2. Assume the cross-section of the rocker arm as rectangular.

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