

Code No: **R32035****R10****Set No. 1****III B.Tech II Semester Supplementary Examinations, April -2017****DESIGN OF MACHINE MEMBERS-II****(Mechanical Engineering)****Time: 3 hours****Max. Marks: 75****Answer any FIVE Questions****All Questions carry equal marks**

- 1
 - a) Differentiate between static and dynamic load carrying capacities of rolling contact bearings.
 - b) A 150 mm diameter shaft supporting a load of 10 kN has a speed of 1500 rpm. The shaft runs in a bearing whose length is 1.5 times the shaft diameter. If the diametral clearance of the bearing is 0.15 mm and the absolute viscosity of the oil at the operating temperature is 0.011 kg/m-s, find the power wasted in friction.
- 2
 - a) Explain the various stresses induced in the connecting rod.
 - b) A crank shaft is supported on both ends for the following data:
Stroke of the piston = 400 mm; The connecting rod is 5 cranks long;
Allowable bearing pressure is 3.5 MPa; Permissible stress is 85 MPa;
Maximum force acting on the piston is 40 kN. Find the stresses induced in the crank when it is at dead centre position.
- 3 Design an aluminium alloy piston with a flat head for an IC engine having 100 mm bore. The maximum gas pressure may be taken as 4.5 MPa. Draw a neat dimensional sketch of the piston to bring out the details.
- 4 A curved bar of rectangular cross section of 30 mm width, 40 mm depth and mean radius of 60 mm is initially unstressed. If a bending moment of 400 N-m is applied to the bar which tends to straighten it, determine the stresses at the inner and outer surfaces and sketch a diagram to show the variation of stress across the section. Also find the position of the neutral axis.
- 5
 - a) Present the designation and characteristics of V-belt sections.
 - b) Determine the diameter and length of a cast iron hoist drum for a 25 mm 6X19 hoisting rope. The depth of the mine is 450 m. Adopt a working factor of 5 for the design.
- 6
 - a) List the assumptions made in the Lewis equation for bending of teeth.
 - b) A parallel helical gear 300 mm in diameter has 20^0 involute full depth teeth and helix angle is 30^0 . It transmits a torque of 4500 N-m. Find the tangential, radial and axial loads acting on the teeth. Indicate them graphically.

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- 7 a) Differentiate between differential screw and compound screw.
- b) The lead screw of a lathe has square threads of 24 mm outside diameter and 5 mm pitch. In order to drive the tool carriage, the screw exerts an axial pressure of 2.5 kN. Find the efficiency of the screw and the power required to drive the screw, if it is to rotate at 30 rpm. Neglect bearing friction. Assume coefficient of friction of screw threads as 0.12
- 8 a) A foot lever is 1 m from the centre of shaft. The load applied on the foot plate is 800 N. Find the diameter of the shaft and dimensions of rectangular arm of the foot lever at 60 mm from the centre of shaft assuming width of the arm as 3 times thickness. The allowable tensile stress may be taken as 75 MPa and allowable shear stress as 60 MPa.
- b) Why are bushes of softer material inserted in the eyes of levers?