Code: 9A03605

R09

B.Tech III Year II Semester (R09) Supplementary Examinations December/January 2014/2015

DESIGN OF MACHINE ELEMENTS – II

(Mechanical Engineering)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

Use of design data books is permitted in the examination hall

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1 (a) What are the different types of lubricants used in practice?

(b) Layout the design procedure for Hydrodynamic journal bearing.

2 (a) What are the function of piston rings and piston ribs?

(b) Determine the wall thickness of a wet cast iron cylinder liner with a 5 mm thick dry cast iron inside a 0.22 m bore compression ignition oil engine with the maximum pressure being 5.5 N/mm^2.

3 Design overhung crank shaft for a 0.25 m × 0.4 m horizontal gas engine, explosion pressure 2.38 MPa, weight of flywheel 16 kN, total belt pull 3 kN. When the crank is at 30^0, the torque on the crank shaft is maximum and the gas pressure at this position is 1.015 MPa. Length of the connecting rod is 0.95 m.

4 A curved bar of circular cross -section 100 mm in diameter has a radius of curvature of 25 mm at the inner fibers. The bending moment acting on the bar causes a tensile stress of 20 MN/m^2 in the inner fibers. What will be the stress in the outer fiber?

5 An open belt 100 mm wide connects two pulleys mounted on parallel shafts with their centres 2.4 m apart. The diameter of the larger pulley is 450 mm and that of the smaller pulley 300 mm. The coefficient of friction between the belt and the pulley is 0.3 and the maximum stress in the belt is limited to 14 N/mm width. If the larger pulley rotates at 120 r.p.m, find the maximum power that can be transmitted.

6 (a) How are the gears classified? What are the various terms used in spur gear terminology?

(b) A pair of parallel helical gears consists of a 24 teeth pinion meshing with a 48 teeth gear. The helix angle is 25^0 and the normal pressure angle is 20^0. The normal module is 3 mm. Calculate: (i) transverse module. (ii) the transverse pressure angle. (iii) the axial pitch. (iv) the pitch circle diameters of the pinion and the gear. (v) the center distance and (vi) the addendum and dedendum circle diameters of the pinion.

7 (a) What is the function of a spring?

(b) A helical spring is made from a wire of 6 mm diameter and has outside diameter of 75 mm. If the permissible shear stress is 350 MPa and modulus of rigidity 84 kN/mm^2, find the axial load which the spring can carry and the deflection per active turn.

8 The lead screw of a lathe has Acme threads of 50 mm outside diameter and 8 mm pitch. The screw must exert an axial pressure of 2500 N in order to drive the tool carriage. The thrust is carried on a collar 110 mm outside diameter and 55 mm inside diameter and the lead screw rotates at 30 r.p.m. Determine: (i) the power required to drive the screw; and (ii) the efficiency of the lead screw. Assume a coefficient of friction of 0.15 for the screw and 0.12 for the collar.

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