R09

Code: 9A03605

B.Tech III Year II Semester (R09) Supplementary Examinations May/June 2016
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 different types of bearing?
   (b) Explain Hydrodynamic bearing with neat sketch.

2 (a) What is the purpose of oil scraper rings? Explain in detail.
   (b) What is the material of the piston rings? Explain oil scraper rings.

3 A crank shaft of the center crank type is to be designed for a diesel engine developing 8 kW on break at 1200 rpm .The crank shaft is forged type and has to carry 2 flywheels of 500 N each on either side of the main bearing. The plane of rotation of each wheel is 100 mm from the centerline of adjacent bearing. The maximum load on the connecting rod is 45 kN. The length of the stroke of piston is 160 mm and the length of the connecting rod is 320 mm. The maximum torque is experienced in crankshaft when the crank turns 300 from I.D.C position. The maximum permissible stress in crank pin, web and shaft should not exceed 60 N/sq.mm. The safe limit for the bearing stress, the crank pin and main bearing is 800 N/sq.mm. Design the crank shaft.

4 A ring made of 2.5 cm diameter steel bar carries a pull of 10 kN. Calculate the maximum tensile and compressive stresses in the material of the ring The mean radius of the ring is 15 cm.

5 A flat open belt horizontal drive is to transmit 10 kW at 720 r.p.m. The motor shaft carries the driving pulley of 300 mm diameter while driven pulley is 1000 mm in diameter. Take belt thickness = 9.5 mm, density of belt material = 1000 kg/m^3, maximum permissible stress = 2.5 MPa, Center distance = 3 m and coefficient of friction = 0.3. Find the width of the belt.

6 A pair of helical gears are to transmit 12 kW. The teeth are 20^0 stub in diametral plane and have a helix angle of 45^0. The number of teeth on the pinion is 20 and it runs at 10000 r.p.m, the teeth on the gear is 80. If the gears are made of cast steel, having static strength of 100 MPa. Determine the required face width from the strength point of view.

7 Find the maximum shear stress and deflection induced in a helical spring of the following specifications, if it has to absorb 1000 N-m of energy. Mean diameter of spring = 100 mm; Diameter of steel wire, used for making the spring = 20 mm; Number of coils = 30; Modulus of rigidity of steel = 85 kN/mm^2.

8 (a) List the type of threads used in power screws. Give practical example for each type of threads.
   (b) Explain briefly the advantages and disadvantages of recirculating ball screw over power screws.

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