Code No: R05320305 $\boxed{\textbf{R05}}$ $\boxed{\textbf{Set No. 2}}$

III B.Tech II Semester Examinations,December 2010
DESIGN OF MACHINE MEMBERS-II
Common to Mechanical Engineering, Production Engineering
Time: 3 hours Max Marks: 80
Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Write a short note on hydrostatic squeeze film lubrication?

    (b) A journal bearing 0.075m long on a 0.0025m shaft supports a load of 2700N. The bearing has clearance of 0.05mm and the viscosity of the oil used is 0.027kg/ms at the operating temperature. If the bearing capable of dissipating 150W/m^2/^{0}C, determine the maximum speed of rotation. [4+12]

2. A CI flat pulley transmits 20kW at a sped of 560 rpm. The pulley overhangs the nearest bearing by 200mm. assuming the ratio of the belt tension as 2: determine

    (a) Shaft diameter

    (b) Pulley diameter and Cross section of eight arms. [16]

3. A lathe has two flat, CI slide ways of equal width and height half the width. While turning a 100 mm diameter work piece, the tangential, radial and axial components of the cutting force were found to be P$_x$=1200N, P$_y$=1300N and P$_z$=3000N respectively. Calculate the lathe slide ways width assuming suitable values. Cast iron slide ways can with stand a maximum pressure of 2500 kN/m^2. [16]

4. (a) Why dynamic load is induced in the gear teeth? Explain the procedure of designing the dynamic load using Buckingham equation.

    (b) Design a pair of spur pinion and gear made of cast steel and CI respectively. The diameter of pinion is 140mm and it transmits 30kW at 1250rpm. The gear ratio 3:1 and teeth are 20^0 full depth involute. [8+8]

5. (a) Enumerate the various piston troubles.

    (b) Why a piston clearance is necessary? What is its value?

    (c) Find the thickness of the head of a heavy duty oil engine trunk piston 0.3m diameter, the maximum pressure is 8.55 M pa and if made of

        i. Cast Iron (allowable stress 37.5kN/m^2)
        ii. Cast Aluminium alloy (allowable stress 60kN/m^2)
        iii. an Aluminium forging((allowable stress 90kN/m^2). [6+4+6]

6. A curved bar of rectangular section, initially unstressed, is subjected to bending moment of 1400 N-m which tends to straighten the bar. The section is 4 cm wide by 5 cm deep in the plane of bending, and the mean radius of curvature is 10 cm. Find the position of the neutral axis and magnitudes of the greatest bending stress and draw a diagram to show approximately how the stress varies across the section. [16]

1

7. Design the connecting rod of a petrol engine from the following data.

Piston diameter	=120mm.
Stroke	=140 mm
Weight of reciprocating parts	= 2kg
Length of the connecting rod	=300mm
Speed (maximum)	=2000 r.p.m.
Maximum explosion pressure	=2.25N/mm^2.	[16]

8. (a) How does the helix angle influence on the efficiency of square threaded screw?

   (b) A load of 12kN is raised by a screw, with single start square threads of 50mm mean diameter and 12mm pitch. The screw is operated by a hand wheel, the boss of which is threaded to act as a nut. The load is resisted by a thrust collar, which supports wheel boss, and has a mean radius of 30mm. The coefficient of friction is 0.15 for the screw, and 0.18 for the collar. If the tangential force applied by each hand on the wheel is 120N; determine the diameter of hand wheel required.   [4+12]

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Code No: R05320305 | R05 | Set No. 4

III B.Tech II Semester Examinations,December 2010
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   Weight of reciprocating parts   = 2kg
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3

7. A curved bar of rectangular section, initially unstressed, is subjected to bending moment of 1400 N-m which tends to straighten the bar. The section is 4 cm wide by 5 cm deep in the plane of bending, and the mean radius of curvature is 10 cm. Find the position of the neutral axis and magnitudes of the greatest bending stress and draw a diagram to show approximately how the stress varies across the section. [16]

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Code No: R05320305 **R05** **Set No. 1**

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5

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Code No: R05320305 | **R05** | **Set No. 3**

III B.Tech II Semester Examinations,December 2010
DESIGN OF MACHINE MEMBERS-II
Common to Mechanical Engineering, Production Engineering

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