Total No. of Printed Pages:3

SUBJECT CODE NO:- H-104
FACULTY OF SCIENCE AND TECHNOLOGY
T.E. (MECH/PROD)
Design of Machine Elements - II
(OLD)

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B i) Attempt any three questions from each section.
ii) Assume suitable data if required.
iii) Use of non-programmable calculator & design data book is allowed.

Section A

Q.1 A pair of spur gears with 20° full depth involute teeth consists of a 20 teeth pinion meshing with all teeth gear. The module is 3mm while the face width is 40mm. The material for pinion as well as for gear is steel with an ultimate tensile strength of 600 N/mm^2. The gears are heat treated to surface hardness of 400 BHN. The pinion rotates at 1450 rpm and the service & center for application is 1.75. Assume that velocity factor for dynamic load and factor of safety is 1.5. Determine the rated power that gears can transmit. 14

Q.2 As pair of helical gears used to transmit 7.5 KW at 1440 rpm of pinion has 20° involute stub teeth. Helix angle is 30° Gear ratio 4:1. Centre distance is 200mm. Material for both pinion & gear is steel having safe static stress 100 mpa & hardness of 200 BHN Design the gear. Check the design for dynamic & wear strength considerations. Given that 13

$$y' = 0.175 - \left(\frac{0.841}{T_f}\right) \&$$

$$KV = \frac{5.6}{5.6 + \sqrt{V}}$$

C dynamic load constant = 119 x 10^3 N/m
Use minimum number of teeth

Q.3 Find the power transmitted by a pair of 20° bevel gear with t_p=40 & t_g=60 teeth gears are made of steel and are hardened to 35° BHN module is 6.5mm, width of face is 60mm but the thickness of the blanks is 35mm. Pinion rotates at 600 rpm. The shaft angle α is 90° safe. Static stress for gears = 105 MPa. Assume KV= $\frac{6}{6+v}$; 13
(for dynamic load calculation = 250 KN/m

Q.4 A dry single plate clutch is to transmit 25 HP at 100 r.p.m. The number of springs to be used is 4 and ratio of mean radius of friction faces & radial width of friction faces is 1.5. Calculate 13
(a) Mean radius
(b) Radial width of friction faces
(c) Dimensions of Springs. Assume mean coil diameter 6 times diameter of wire.

Q.5 Write short note on (Any three) 13

(a) Centrifugal clutch
(b) Formative no of teeth on Bevel gear
(c) Merits and demerits of worm and worm wheel.
(d) Causes of gear failure.

Section - B

Q.6 (a) Explain the newton law of viscosity. 04

(b) A 75mm long full Journal bearing of diameter 75mm. Supports a load of 12 KN on a Journal turning at 1800 r.p.m. Assuming at D/cd ratio of 1000 and z as 0.01 kg/m^3 S at the operating temperature determine coefficient of friction using 10

(i) Mckee's equation
(ii) Raimondi & Boy d's curves

Q.7 (a) Derive the miner's equation 05

(b) A deep groove ball bearing has a dynamic capacity of 20200 N and is to operate on following Work cycle of different radial loads 08

5800 N	at 200 rpm	for 25% of time
8900 N	at 500 rpm	for 20% of time
3500 N	at 400 rpm	for remaining time

Assume that the loads are steady and that the inner race rotates find the average life of bearing in hours.

Q.8 (a) Explain slip & creep of belts. 04

(b) A flat leather belt is used to transmit 10 KW Power from a pulley rotating at 720 r.p.m. to another pulley at 240 r.p.m. The centre distance between the pulley is twice the diameter of larger pulley. The belt should operate at a constant speed of 20m/sec approximately. The stress in the belt should not exceed 2.5 N/mm^2. The density of leather belt is 0.98 gm/cc & coefficient of friction between belt & pulley is 0.35 Belt thickness is 5mm Calculate 09

(a) Diameter of pulley
(b) Length and width of belt
(c) Belt tensions

Q.9 Figure 01 shows a long shoe brake. Find the power absorbed and the force P, if the maximum pressure intensity is 0.8 mpa. Assume μ= 0.25. The width of the shoe is 50mm derive the expression 13

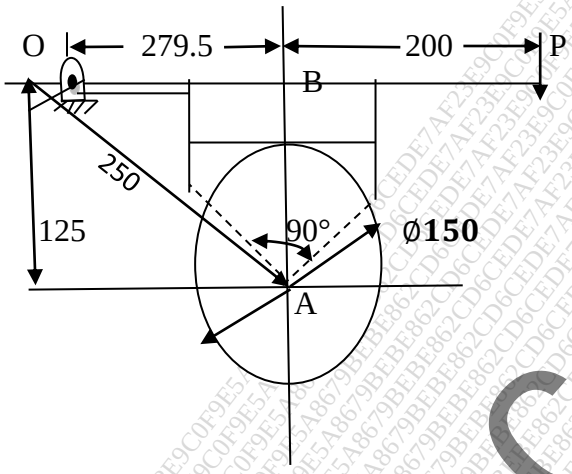

figure 01

Q10 Write Short note on (Any three) 13

(a) Stribecks's equation
(b) Reynold's equation
(c) Compare V-belt, flat belt & chain drive
(d) Petroeff equation.