Total No. of Printed Pages:3

SUBJECT CODE NO:- P-264
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E. (MECH/PROD) Examination MAY/JUNE-2016
Design of Machine Elements - II
(Revised)

[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 necessary.
iii) Use of non-programmable calculator and design data book is allowed.

Section A

Q.1 A pair of spur gears with 20^0 full depth involutes teeth is used to transmit 20KW at 700rpm of pinion with velocity ratio 4. Pinion is made of cast steel ($\sigma = 120mpa$) and gear C.I. 50mpa. Design the gear specify all design parameters. Check the design for wear strength and dynamic load. 14
Given, $K_v = \frac{3}{3+V}$, $Y = 0.154 - \frac{0.912}{no.of\ teeth}$ wear load factor K=1.3N/mm^2. No of teeth for pinion 18, Dynamic load constant c=206 KN/m.

Q.2 A pair of helical steel gears on parallel shafts with a Centre distance of 380mm is mean to transmit power with a velocity ratio 4. Pinion rotates at 8000 rpm teeth are stub with 45^0 helix angle, face width is 22mm and module is 1mm. State whether this pair can transmit any power satisfactory. Assume value of c in dynamic load is 120KN/m. 13

Q.3 a) Explain compound and reverted gear train. 03
b) An epicycle gear consists of three gears A, B and C as shown in fig. The gear 'A' has 72 internal teeth and gear 'C' has 32 external teeth. The gear B meshes with both 'A' and 'C' and is carried on an arm EF which rotates about the Centre of 'A' at 20rpm. If the gear 'A' is freed, determine the speed of gear B and C. 10

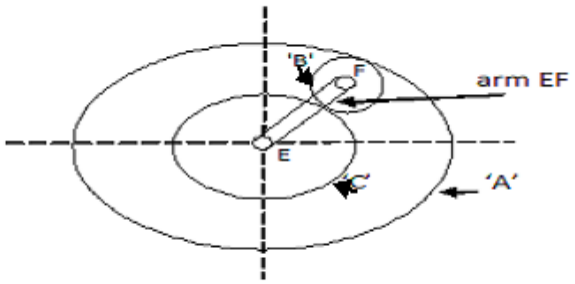


Fig. 1

Q.4 A single dry plate clutch is to be designed to transmit 7.5KW at 900rpm. Find 13
i. Diameter of shaft.
ii. Mean radius and face width of the friction liners assuming the ratio of the means radious to the face width as 4.
iii. Outer and inner radius of the clutch plate.

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

i. Merits and demerits of worm and worm wheel speed reducer.
ii. Lewis equation for Bevel gear.
iii. Gear material for worm and worm wheel speed reducer.
iv. Causes of gear failure.

Section B

Q.6 a) In a journal bearing of 100mm diameter with a bearing clearance of 0.2mm; it is found suitable to use lubricating oil with viscosity 60 cp (centi poise). The shaft runs at 400rpm and develops a bearing pressure of 1.5N/mm^2. Determine 10
a) Bearing pressure when the shaft speed is increased to 500rpm, other parameter remaining same.
b) Viscosity at 0.15mm bearing clearance, 450rpm of shaft and 2.0N/mm^2 bearing pressure.

b) State the desirable properties of good lubricating oil. 04

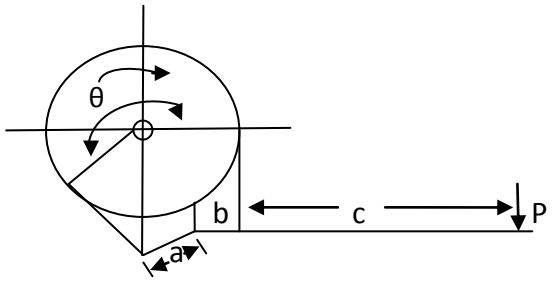
Q.7 Select a single row deep groove ball bearing for a radial load of 4000N and on aerial load of 5000N operating at a speed of 1400rpm for an average life 6 years at 10 hours/day. Assume uniform and steady load. Assume no. of working days, 300 days/year. 13

Q.8 A V-belt drive is to be used with 1.2m Centre distance. The driving pulley is of 250mm diameter and is to be supplied with 20KW at 950rpm. The driven pulley is to run at 425rpm. The area of cross section of each belt=148mm^2. Mass density of belt material = 980Kg/m^3. The permissible tensile stress = 2MPa. Coefficient of friction = 0.3 and groove angle is 38^0. Find the number of belts required and lengths of belt. 13

Q.9 A differential band brake is as shown in fig. the width and thickness of band is 75mm and 3mm respectively. The permissible tensile stress in the band is limited to 75MPa. 13
The coefficient of friction is= 0.3. Calculate

i. Tensions in the band
ii. The actuating force
iii. The torque capacity

Check whether the brake is self-locking?



a=50mm
b=100mm
c=600mm
θ= 230^0

Q.10 Write short notes. (Any three) 13

i. Compare between rigid drives and belt drives
ii. Heat dissipation in brake
iii. Properties of sliding contact bearing
iv. Hertz contact stresses
v. Striback equation for static load in rolling contact bearing.