PARUL   UNIVERSITY
FACULTY   OF   ENGINEERING   & TECHNOLOGY
B.TECH MIDSEM EXAMINATION
7tbSEMESTER
ACY-2022-23 (ODD SEM)

Subject Name (203109401):Machine Design   Branch: Mechanical
Date: *03/0812022*   Time: 10:30 to 12:00 PM   Total Marks: 40

Sr.No.			Marks
Q.I	(A) Attend One line/short Questions.(all compulsory)		OS

I. What are two different modes of gear tooth failures generally considered in design of gears?

2. Write down the formula for Buckinghams's equation for wear strength for helical gear.(use standard notations).

3. Write any two reasons for considering dynamic load in gear design.

4. Write down equation for initial tension for flat belt drive.

5. Write down the equation of belt length for crossed belt drive.

(B) Attend MUltiple Choice Questions. (all compulsory)   OS

I. In Helical Gear ,Axial Thrust increases when Helix angle 'I'   _
   (a) decreases (b) is Constant (c) increases (d) None of above.

2. If the module of spur gear is 6 mm and no of teeth are 32, then pitch circle diameter is   mm.
   (a) 0.005 (b) 192 (c) 5.33 (d) none of above.

3. If the module of spur gear is 5 mm then Diametral pitch (Pd) =   and Circular Pitch (pc) =___   mm considering spur Gear.
   (a) 0.2, *51n* (b) 0.2, 571(c) *5,5n* (d) *0.2,0.2n*

4. In a crossed belt drive the angle of contact on smaller pulley and on larger pulley will be _ _ _
   (a) Same (b) different (c) any angle (d) none of these.

5. In belt drive ,out of below which stresses are existed in belt?
   (a)Shear and bending (b) tension and bending (c) compression and bending (d) shear and compression.

Q.2   Attempt any four.   12

(1) Write down the equation of safety of gear pair against bending and wear. If the effective load is 1500 N, wear strength is 4500 N, bending strength is 3000 N then how much will be factor of safety of a gear pair?

(2) Define the criteria of deciding the weaker structure out of gear and pinion in case of bending failure.

-(3) Explain Spur gear terminology with neat sketch.

(4) Write down any three advantages and limitations of V belt over the flat belt drive.

(5) What is virtual or formative no. of teeth in case of Helical gear. If the actual no. of teeth on gear is 21 , Helix angle is 25° then find out the virtual or formative no. of teeth.

Q.3   Attempt any two.   08

(I) An open type flat belt drive is used to transmit 15kw power from an electric
   .   motor running at a 1440 r.p.m to the compressor running at 480 r.p.m. The
       diameter of the motor pulley is 270 mm.The distance between the two pulley
       shaft is 1620 mm. Ignore the slip and centrifugal tension on the belt.
       (i) diameter of the compressor pulley (ii)Speed Ratio (iii) linear belt speed (iv)
       Length of the belt

(2) A spur pinion rotating in clockwise direction, receives 3 KW, power at 1440 rpm
    and drives the spur gear. The number of teeth on pinion and gear are 35 and 65
    respectively. The tooth system is 20 deg full depth invloute. If the module is 6
    mm. Determine the components of forces acting on gear and pinion.

(3) A Right hand 18 teeth helical pinion at 1440 rpm , transmits 22 kW power to a
    left hand, 40 helical gear mounted on parallel shaft. The normal module is 6 mm
    , and tooth system is 20 deg full depth involute. The helix angle is 23 "The
    pinion is above the gear and rotating in clockwise direction when viewed from the
    right side. Determine the components of force acting on meshing teeth.

Q.4   (A) Following Data refers to a spur gear pair: 05

Parameter	Pinion	Gear
Steel Grade	C50	C35 Mn75
UTS, Mpa	700	600
BHN	240	225
p.c.d,mm	48	144
Number of teeth	24	72
Tooth System	20 o Full Depth Involute	20 o Full Depth Involute
Speed, r.p.m	1440	480

Lewis form Factor, $Y = 1[[0.154 \_ \frac{0.912}{Z}]$

Service Factor k_a= 1.5 .load Concentration factor k_m= 1

Velocity Factor $kv = \frac{3}{3+V}$

Wear Factor K= 0.156[BHN/IOO]2 ,MPa
Factor of Safety= 1.5
Face Width b= 10m, mm
Find Out (i) Beam Strength (ii)Wear Strength

(B) In V - Crossed Belt drive, calculate the angle of contact and approximate centre   05
    distance. Diameter of smaller and larger pulley are 265 mm and 795 mm
    respectively, take centre distance is 1000 mm.

                                            OR

(B) Explain Bevel Gear Terminology with necessary figure.   05

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