B.E DEGREE EXAMINATIONS: NOV/DEC 2024

(Regulation 2018)

Sixth Semester

MECHANICAL ENGINEERING

U18MET6004: Design of Transmission Systems

COURSE OUTCOMES

CO1: Choose suitable flexible drive for specific application

CO2: Design spur and helical gear by considering strength and life.

CO3: Estimate the dimensions of bevel and worm gears

CO4: Construct the gear box for suitable application.

CO5: Design braking system for various applications.

CO6: Apply the concepts of pressure and wear theories to design clutches.

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

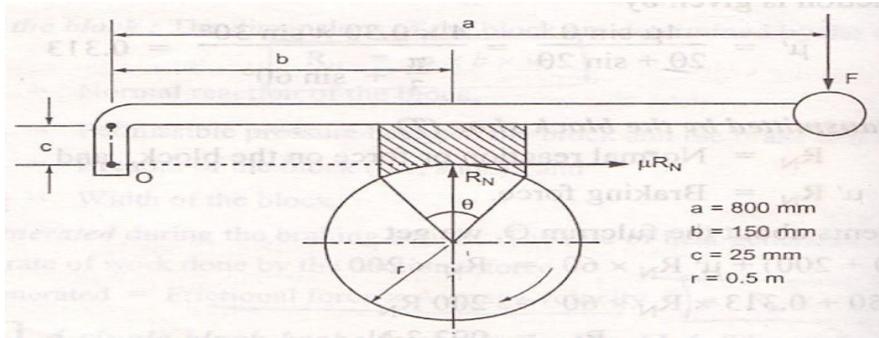|			
1.	What are the factors upon which the coefficient of friction between the belt and pulley depends?	CO1	[K_1]
2.	Brief the term "crowning of pulley"	CO1	[K_1]
3.	What is pressure angle? What is the effect of increase in pressure angle?	CO2	[K_1]
4.	What are the main types of gear tooth failure?	CO2	[K_1]
5.	How are Bevel gears manufactured?	CO3	[K_1]
6.	List out the main types of failure in worm gears	CO3	[K_1]
7.	What are preferred numbers?	CO4	[K_1]
8.	What is meant by self-energizing brake?	CO5	[K_1]
9.	In cone clutches, semi cone angle should be greater than 12 degree, why?	CO6	[K_2]
10.	List the characteristics of material used for brake lining?	CO5	[K_1]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	A belt drive is required to transmit 12 KW from a motor running at 720 r.p.m the belt is 12 mm thick and has a mass density of 0.001 gm/mm^3. Permissible stress	(16)	CO1	[K_2]

in the belt not to exceed 2.5 N/mm^2. Diameter of driving pulley is 250 mm whereas the speed of the drive pulley is 240 r.p.m. the two shafts are 1.25 m apart. Coefficient of friction is 0.25 determine the width of the belt.

12.	Design a spur gear drive required to transmit 45 KW at a pinion speed of 800 r.p.m. the velocity ratio is 3.5:1. The teeth are 20 full depth involute with 18 teeth on the pinion. Both the pinion and gear are made of steel with a maximum safe static stress of 180 N/mm^2. Assume light shock conditions.	(16)	CO2	[K$_2$]
13.	A pair of bevel gears is to be used to transmit 10 KW from a pinion rotating at 420 r.p.m. to a gear mounted on a shaft which intersects the pinion shaft at an angle 700. Assuming that the pinion is to have an outside pitch diameter of 180 mm, a pressure angle of 200, a face width of 45 mm, and the gear shaft is to rotate at 140 r.p.m., determine (i) the pitch angle for the gears (ii) the forces on the pinion and gear and (iii) the toque produced about the shaft axis	(16)	CO3	[K$_2$]
14.	A nine-speed gear box, used as a head stock gear box of a turret lathe is to provide a speed range of 180 rpm 1800 rpm. using standard step ratio, draw the speed diagram, and the kinematic layout. Also find and fix the number of teeth on all gears	(16)	CO4	[K$_2$]
15.	A automotive single plate clutch consists of two pair of contacting surfaces. The inner and outer radii of friction plate are 120 and 250 mm respectively. The coefficient of friction is 0.25 and the total axial force is 15 KN. Calculate the power transmitting capacity of the clutch plate at 500 r.p.m. using (i) uniform wear theory and (ii) uniform pressure theory.	(16)	CO5	[K$_2$]
16.	The diameter of the brake drum of a single block shown fig is 1 m .it sustains 240 N-m of torque at 400 r.p.m. the coefficient of friction is 0.32. determine the required force to be applied when the rotation of the drum is (a) clock wise, (b) counter clock wise, and angle of contact (i) 35° (ii) 100° .give that a=800 mm, b=150 mm and c = 25 mm. also find the new value of c for self-locking of the	(16)	CO6	[K$_2$]

brake.

$a = 800$ mm
$b = 150$ mm
$c = 25$ mm
$r = 0.5$ m

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