Name: Enrolment No:	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

Online End Semester Examination, December 2020

Programme Name: B. Tech ADE **Semester : V**
Course Name : Theory of M/C **Time : 03 hrs**
Course Code : MECH-2006 **Max. Marks: 100**
Nos. of page(s) :
Instructions:

SECTION A

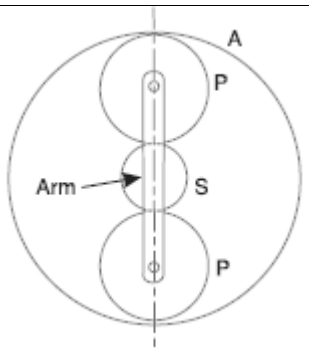
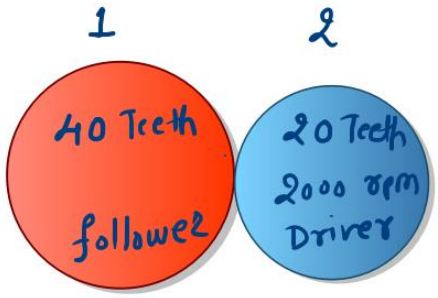
1. **Each Question will carry 5 Marks**

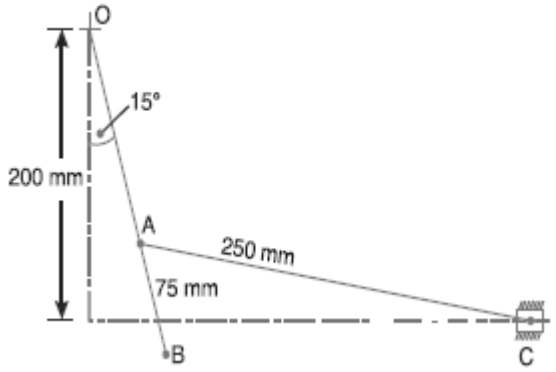
S.N		Marks	CO
1	Define the terms of gears A) Backlash B) Interference	5	CO4
2	Distinguise between higher and lower pair with examples	5	CO2
3	Define mechanical advantage and transmission angle of a mechanism.	5	CO1
4	Explain the phenomena of 'slip' and 'creep' in a belt drive	5	CO5
5	Explain briefly the differences between simple, compound and epicyclic gear trains.	5	CO3
6	Explain how the coriolis component of acceleration arises when a point is rotating about some other fixed point and at the same time its distance from the fixed point varies.	5	CO2

SECTION B

1. **Each question will carry 10 marks**
2. **Instruction: Write short / brief notes/solve the Numerical**

7	An epicyclic gear train, as shown in Figure, has a sun wheel S of 30 teeth and two planet wheels P-P of 50 teeth. The planet wheels mesh with the internal teeth of a fixed annulus A. The driving shaft carrying the sunwheel, transmits 300 r.p.m. The driven shaft is connected to an arm which carries the planet wheels. Determine the speed of the driven shaft.	10	CO4

			
8	Use the data given in the figure and find  The velocity of sliding between the gear teeth faces at the point of engagement, at the pitch point, and at the point of disengagement Assume that the gear teeth are 20° involute form, addendum is 5 mm and the module is 5 mm. (Assume the suitable direction of roation, if needed)	**10**	**CO1**
9	A Load of 5 kN hanging freely from a rope which makes one complete turns around a drum of 150 mm diameter revolving at 20 r.p.m. The other end of the rope is pulled manually. The coefficient of friction is 0.25. Determine 1. The force required manually, 2. The power to raise the Load.	**10**	**CO3**
10	The oscillating link OAB of a mechanism,as shown in Fig, is pivoted at O and is moving at 90 r.p.m. anticlockwise. If OA= 150 mm ; AB = 75 mm, and AC = 250 mm, calculate 1. the velocity of the block C 2. the angular velocity of the link AC	**10**	**CO5**

	 Fig: A		
11	Use the data given in Q 10 and Calculate the rubbing velocities of the pins at O, A and C, assuming that these pins are of equal diameters of 20 mm.	**10**	**CO2**
	SECTION C **1. Each Question carries 20 Marks.** **2. Instruction: Write long answer.**		
12	Draw the profile of the cam when the roller follower moves with Simple Harmonic motion as given below: (a) Outstroke with maximum displacement of 50 mm during 180° of cam rotation it follows (b) Dwell for the next 30° of cam rotation. (c) Return stroke for the next 150° of cam rotation. (d) The minimum radius of the cam is 20 mm and the diameter of the roller is 10 mm. The axis of the roller follower is offset 15 mm from the cam shaft axis. **OR** Draw the profile of the cam when the roller follower moves with Simple Harmonic motion as given below: (a) Outstroke with maximum displacement of 50 mm during 180° of cam rotation it follows (b) Dwell for the next 30° of cam rotation. (c) Return stroke for the next 150° of cam rotation. (d) The minimum radius of the cam is 20 mm and the diameter of the roller is 10 mm. The axis of the roller follower is passing through the cam shaft axis. Find the maximum velocity and acceleration during outstroke and return stroke.	**20**	**CO4**