

Name of the Program: (Example: B. Sc./BBA/MA/B.Tech.)	B.Tech.	Semester:	IV
Paper Title :	Kinematics of Machines	Paper Code:	EME42116
Maximum Marks :	40	Time duration:	3 hours
Total No of questions:	08	Total No. of Pages:	02
Answer all the Groups			

Group A

(Answer all the questions)

$5 \times 1 = 5$

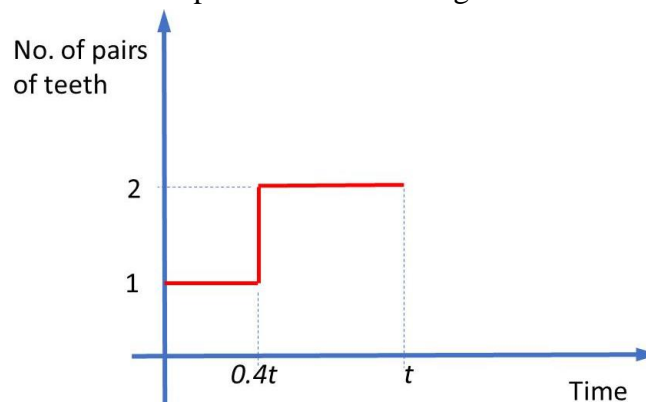
1. a) A belt travelling at a very high velocity has a safe tension of 10kN, and transmits maximum power. The limiting value of the centrifugal tension in the belt is _____.
- b) In spur gears, the circle on which the involute is generated is called the _____.
- c) In flat belt drive, if the slip between the driver and the belt is 1%, that between belt and follower is 3% and driver and follower pulley diameters are equal, then the velocity ratio of the drive will be _____.
- d) Power transmitted increases continuously as the velocity of the belt increases. (True/False)
- e) A gear set with 20° pressure angle has maximum paths of approach and recess as 20 mm and 30 mm, respectively. The centre distance for the gear set is _____ mm.

Group B

*(Answer any **three** questions)*

$3 \times 5 = 15$

2. Find out the Contact Ratio for two spur gears in mesh if the number of pairs of teeth in contact varies with time as shown below for one complete rotation of the gears.



3. A flat belt weighing 1.0 kg/m run has an area of cross-section of 700 mm^2 . The angle of lap is 160° on the smaller pulley, $\mu = 0.12$. The maximum safe stress in the belt is 10 N/mm^2 . What is the power that can be transmitted by the belt at a speed of 10 m/s.

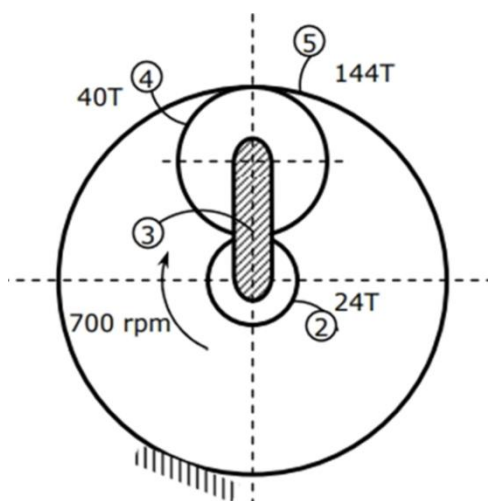
4. A pair of spur gears with 14 and 21 teeth is of involute profile, module 6 mm, and pressure angle 20° . Find the maximum addendum on the pinion and the gear to avoid interference. If the pinion runs at 300 rpm, find the maximum velocity of sliding of teeth at the initial and final contacts.
5. An open belt drive connects two pulleys 120 cm and 50 cm diameters, on parallel shafts 4 m apart. The maximum tension in the belt is 1855.3 N. The coefficient of friction is 0.3. The driver pulley of diameter 120 cm runs at 200 r.p.m. Calculate the power transmitted by the drive.

Group C

(Answer any *two* questions)

$2 \times 10 = 20$

6. As shown below, gears 2, 4 and 5 have 24, 40 and 144 teeth respectively. Gear 5 is fixed. Gear 2 is rotating clockwise at 700 rpm. What will be the rpm of the arm 3 and gear 4?



7. A belt of density 1 g/cm^3 has a maximum permissible stress of 250 N/cm^2 . Determine the maximum power that can be transmitted by a belt of $20 \text{ cm} \times 1.2 \text{ cm}$ if the ratio of the tight side to slack side tension is 2.
8. For the reduction drive obtained with the reverted gear train, the numbers of teeth on the driving gears are equal to each other, and, the numbers of teeth on the driven gears are also equal to each other. Find the speed of the countershaft.

