DRONACHARYA GROUP OF INSTITUTIONS, GREATER NOIDA

Mechanical Engineering Department

Unit IV

Q-1 State and prove the law of gearing and show how the involute teeth profile satisfies the conditions for correct gearing. Derive an expression for the velocity of sliding between a pair of involute teeth.

Q-2 Derive an expression for length of path of contact and number of teeth in contact for involute gears.

Q-3 Derive an expression for minimum number of teeth on a gear wheel.

Q-4 What are the different forms of gear tooth? Discuss the relative advantages of involute and cycloidal gears. Explain the interferences and show how it is prevented.

Q-5 A pinion having 20 teeth of 6 module rotates at 200 rpm, transmitting 2 hp to gear having 50 teeth. The addendum on wheels is 1 module. Find
i) Length of path of approach and recess ii) Contact ratio. iii) Normal reaction between the gear pair assuming only one pair is in contact.
Pressure angle = 20 °

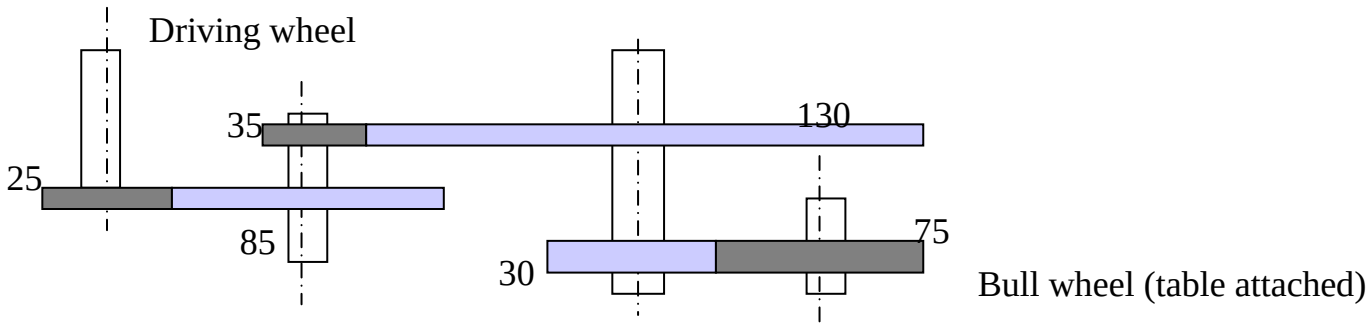
Q-6 A pair of gears has 14 and 16 teeth and the module pitch is 12.5 mm. The addendum is also 12.5 mm. The angle of obliquity is 14.5°.Shows that the gears have interference. Determine the portion by which the addendums of gears must be reduced to avoid interference.

Q-7 Two mating involute gears of 20 ° pressure angle have a gear ratio of 2 and module of 12 mm. The number of teeth on pinion is 20 and speed is 250 rpm. If addendum on each wheel is such that the path of approach and path of recess on each side are half of the maximum possible length each. Find:
(i) The addendum for pinion and gear (ii) The length of arc of contact
(iii) The maximum velocity of sliding during approach and recess.

Q-8 Two spur gear of 24 teeth and 40 teeth of 8 mm module and 20 ° pressure angle of obliquity are in mesh. Addendum of each gear is 9.5 mm. Determine (i) the angle through which pinion turns while any pair of teeth is in contact,
(ii) The velocity of sliding between the teeth when the contact on the pinion tooth is at a radius of 103 mm. Speed of pinion is 300 rpm.

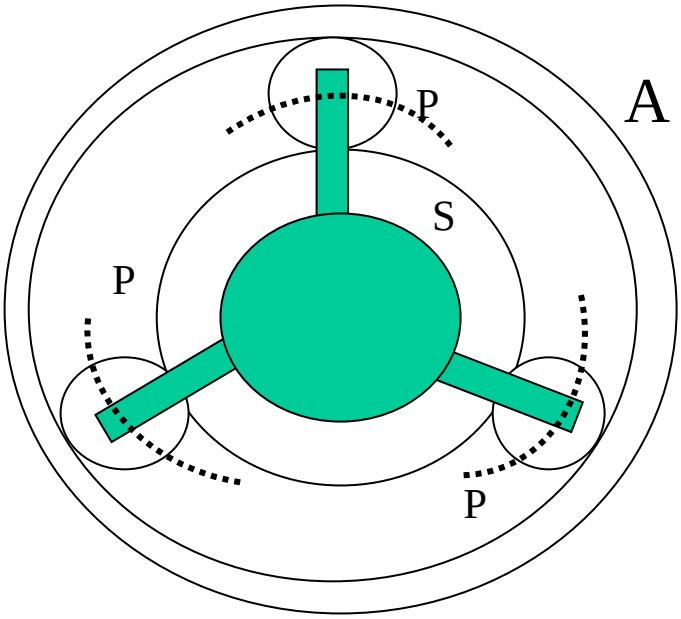
Q-9 Two mating involute gears of 20 ° pressure angle have a gear ratio of 2. The number of teeth on pinion is 20 and speed is 250 rpm. Take a module as 12 mm. If the addendum on each wheel is such that the path of approach and path of recess on each side are half of the maximum possible length each. Find: (i) Addendum for pinion and gear (ii) Length of arc of contact
(iii) Maximum velocity of sliding during approach and recess.

Q-10 Figure shows the gear train arrangement to drive a planning machine. The drive pulley is driven at 360 rpm by an electric motor keyed to the same shaft as this pulley is a 25 teeth pinion driving an 85 teeth gear wheel which is fixed to the same shaft as 35 teeth pinion. This pinion drives a gear wheel that has 130 teeth, fixed to the same shaft as this gear wheel is a 30 teeth pinion which drives a bull wheel. This bull wheel has 75 teeth and meshes with a rack that is bolted to the underside of the table. The pitch of the rack teeth is 25 mm. Calculate the bull wheel speed and the table speed.

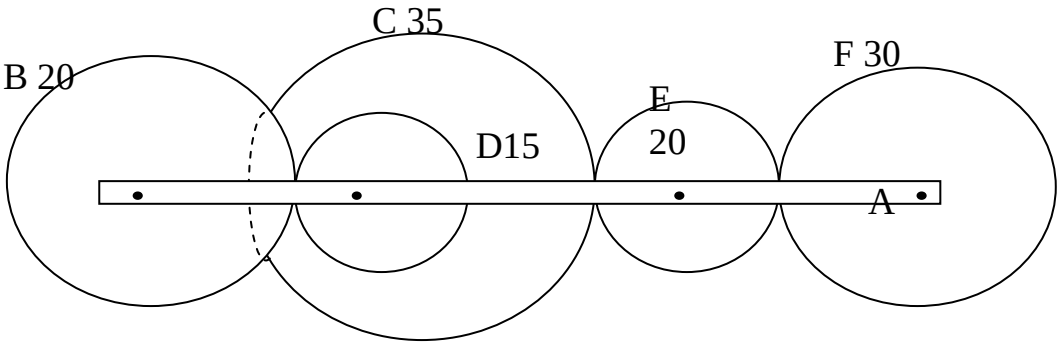


Q-11 Prove that in Sun and planet gear train arrangement , irrespective of whichever wheel is fixed the velocity ratio is always less than or equal to unity

Q-12 The annulus A in the gear train shown in fig rotates at 300 rpm about the axis of the fixed wheel S which has 80m teeth. The three- arm spider is driven at 180 rpm. Determine the number of teeth required on the wheel P.



Q-13 Figure shows an epicyclic gear train arrangement. Wheel E is fixed and gears C and D are integrally cast and mounted on one pin. If the Arm 'A' makes one revolution / sec counted clockwise, determine the speed and the direction of rotation of wheels B and F.



Q-14 In a reverted epicyclic gear train, as shown in figure 4, the arm A carries two gears B and C and compound gear D-E. The gear B meshes with gear E, the gear C meshes with gear D. The number of teeth in gears B, C and D are 75, 30 and 90 respectively. Find the speed and direction of gear C when gear B is fixed and the arm A makes 1000 rpm clockwise.