

Total No. of Questions :6]

SEAT No. :

**P5662**

[Total No. of Pages :3

**TE/INSEM./OCT.-108**

**T.E. (Mechanical)**

**THEORY OF MACHINES - II**

**(2015 Course) (Semester - I) (302043)**

*Time : 1 Hour]*

*[Max. Marks :30*

*Instructions to the candidates:*

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume Suitable data if necessary.

**Q1) a) State and derive law of gearing? [4]**

- b) Two mating gear wheels have 20 and 40 involute teeth of 10 mm module and 20° pressure angle. The Addenda on each wheel is to be made of such a length that the path of contact on each side of the pitch point has  $\frac{1}{2}$  the maximum possible length. Determine the addendum height for each gear wheel and path of contact. If smaller wheel rotates at 250 rpm find the velocity of point of contact along the surface of each tooth at the instant when the tip of a tooth of a smaller wheel is in contact. [6]

OR

**Q2) a) Compare Cycloidal and Involute Gear tooth profile. [4]**

- b) Two 20° involute spur gears have a module of 10 mm. The addenda is one module. The larger gear has 50 teeth and the pinion has 13 teeth. Does interference occur? If it occur, to what value should the pressure angle be changed to eliminate interference? [6]

**P.T.O.**

- Q3) a)** Explain force analysis of helical gears with neat sketch. [4]
- b)** In a spiral gear drive connecting two shafts, the wheels are of equal diameter and the approximate centre distance is 134 mm, the speed ratio = 1.25. The angle between the two shafts is  $80^\circ$  and the normal pitch is 12.5 mm. The spiral angle for the driving and driven wheels are same hand. [6]

Find:

- The spiral angle of each wheel,
- Number of teeth on each wheel,
- Efficiency of the drive, and
- The maximum efficiency if friction angle =  $6^\circ$ .

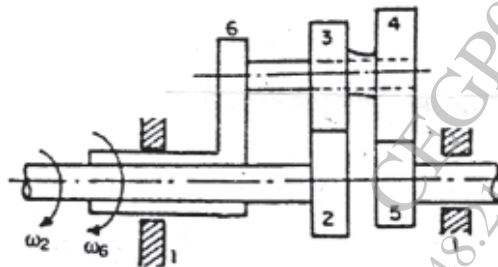
OR

- Q4) a)** Derive an expression for geometrical relationship for bevel gears. [4]
- b)** A two start worm rotating at 800 rpm drives a 26 teeth worm gear. The worm has pitch diameter of 54 mm and a pitch of 18 mm. If the coefficient of friction is 0.06, find [6]

- The helix angle of the worm.
- The centre distance.
- The lead angle of maximum efficiency.
- The Maximum efficiency.

- Q5) a)** Explain with neat sketch. [4]
- Simple gear train.
  - Reverted gear train.

- b)** Fig. shows a gear train that has two inputs, sun gear 2 rotates at 500 rpm and arm 6 rotates at 750 rpm both clockwise, as viewed from left. No of teeth on gear 2, 3, 4 and 5 are 18, 22, 25 and 15 respectively. Determine the speed and direction of rotation of gear 5. [6]



OR

- Q6)** Fig. shows an epicyclic gear train. Pinion A has 15 teeth and is rigidly fixed to the motor shaft. The wheel B has 20 teeth and gears with A and also with the annular fixed wheel E. Pinion C has 15 teeth and is integral with B (B, C being a compound gear wheel). Gear C meshes with annular wheel D, which is keyed to the machine shaft. The arm rotates about the same shaft on which A is fixed and carries the compound wheel B, C. If the motor runs at 1000 r.p.m., find the speed of the machine shaft. Find the torque exerted on the machine shaft, if the motor develops a torque of 100 N-m. **[10]**

