Total No. of Questions : 6] **SEAT No. :**

P3711 **[Total No. of Pages : 3**

Engg. - 8

T. E. (Mechanical / Automobile / Mech. S/W) (Semester-I)

THEORY OF MACHINES - II (In Sem.)

(2012 Pattern)

Time :1 Hour] ***[Max. Marks :30***

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

UNIT - I

Q1) a) Explain the phenomenon of interference in involute gears. **[4]**

b) A pinion of 250 mm pitch circle diameter drives a rack, the addendum height for both is 12.5 mm the profile is involute in form with a pressure angle as 20°. Show that interference does not occur. Find minimum number of teeth on the pinion to ensure continuity of contact. **[6]**

OR

Q2) The pressure angle of two gears in mesh is 20 deg & has a module of 10mm. The no. of teeth on pinion are 24 & on gear 60. The addendum of pinion & gear is same & equal to one module. **[10]**

Determine:

i) No. of pair of teeth in contact

ii) Angle of action of pinion & gear, and

iii) The ratio of sliding to rolling velocity at the beginning of contact, at pitch point and at the end of contact.

P.T.O.

UNIT - II

Q3) a) Derive equation of maximum efficiency for worm and worm gear. **[4]**

b) A pair of single helical gear is required to give a speed reduction of 4:1. The gears are to have a normal module of 3 mm, a pressure angle of 20° and helix angle of 22°. If the shaft centre lines are to be approximately 300 mm apart, determine the number of teeth on each wheel and exact centre distance. **[6]**

OR

Q4) A pair of straight bevel gears has velocity ratio 3 : 1. The pitch circle diameter of pinion is 100 mm at large end of the tooth. An 8.5 kW power is supplied to the pinion which rotates at 1200 rpm. The face width is 30 mm and pressure angle is 20°. Calculate the tangential, radial and axial components of the resultant tooth force acting on pinion. **[10]**

UNIT - III

Q5) An epicyclic gear train as shown in fig. 1, consists of a sun wheel S, a stationary internal gear E and three identical planet wheels P carried on a star - shaped planet carrier C. The size of different toothed wheels are such that the planet carrier C rotates at 1/5th of the speed of the sun - wheel S. The minimum number of teeth on any wheel is 16. The driving torque on the sun wheel is 100 N - m. Determine : **[10]**

i) number of teeth on different wheels of the train, and

ii) torque necessary to keep the internal gear stationary.

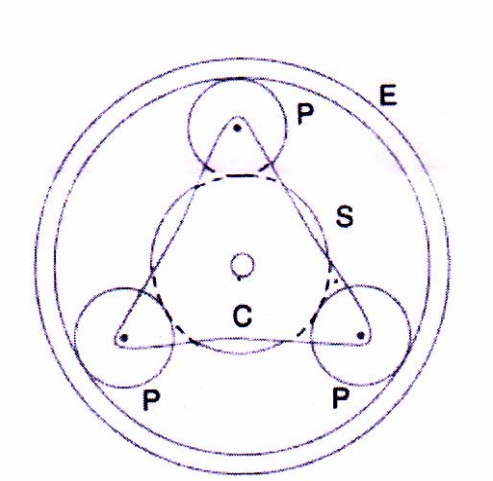

Figure 1

OR

Q6) In the epicyclic gear train as shown in fig. 2, the compound wheels A and B as well as internal wheels C and D rotate independently about the axis O. The wheel E and F rotate on the pins fixed to the arm a. All the wheel are of same module. The number of teeth on the wheels are : TA = 52, TB = 56, TE = TF = 36. Determine the speed of C if

i) The wheel D fixed and arm a rotates at 200 rpm clockwise,

ii) The wheel D rotates at 200 rpm counterclockwise and the arm a rotates at 20 rpm counterclockwise. **[10]**

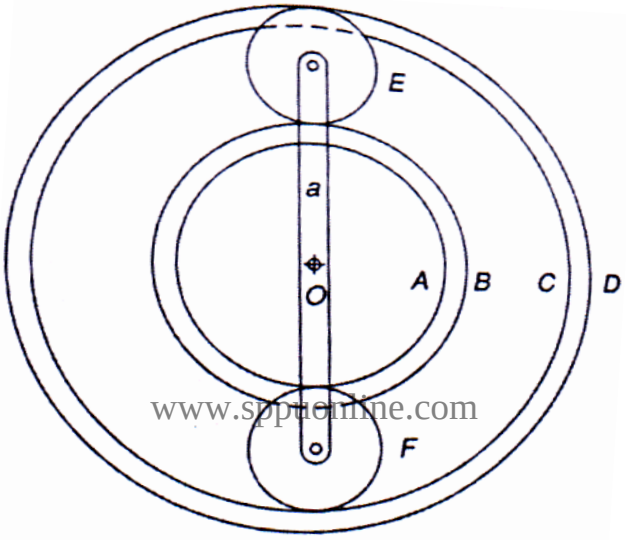

Figure 2