

Total No. of Questions :6]

SEAT No. :

P5059

[Total No. of Pages : 2

T.E./Insem.-608
T.E.(Mechanical Automobile) (Semester - I)
THEORY OF MACHINES - II
(2015 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 whenever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of calculator is allowed.*
- 5) *Assume suitable data whenever necessary.*

- Q1)** a) Two 20° involute spur gears have a module of 8mm, The addendum of pinion and gear is standard. The numbers of teeth on pinion are 20 and on gear are 40. Does the interference will occur or not? [6]
b) What is contact ratio? State its significance. [4]

OR

- Q2)** a) Derive an expression for maximum workdone and minimum frictional work by considering friction between gear teeth. [6]
b) A pair of involute gears is in mesh. The application restricts the space to accommodate these gears with a centre distance of 106 mm. If the gears have a module of 3mm and a ratio of speeds of driver to the driven is limited to 2.2:1, determine the number of teeth on these gears. [4]
- Q3)** a) A spiral gear drive with the speed ratio of 3:2 with an angle between the shafts 80° . The approximate centre distance between the shafts is 125mm. The normal pitch of the teeth is 9 mm and gear diameters are equal. Find the number of teeth on each gear, pitch circle diameter and spiral angles. Find the efficiency of the drive if friction angle is 5° . [6]
b) A pair of helical gears is used in machine tool application with a speed reduction of 4.2:1. The gears are to have a normal module of 3mm, a pressure angle of 20° and a helix angle of 30° . If the centre distance between shafts is approximately 400mm, determine the number of teeth on each wheel and the exact centre distance. [4]

P.T.O.

OR

- Q4)** a) A three start worm has a pitch diameter of 85 mm and a pitch of 25 mm. It rotates at 600 rpm and drives worm gear of 40 teeth. Assume coefficient of friction 0.05. [6]

Determine:

- i) Helix angle of worm
 - ii) Speed of the gear
 - iii) Centre distance
 - iv) Efficiency and max. efficiency.
- b) Differentiate between worm and worm gear and bevel gears. [4]

- Q5)** a) In a reverted epicyclic train, the arm E carries two wheels A and D and a compound wheel B-C. The wheel A meshes with wheel B and the wheel D meshes with wheel C. The number of teeth on wheel A, D and C is 78, 46 and 70 respectively. If arm makes 250 rpm and wheel A is fixed, find the speed and directions of wheel D. [6]

- b) Draw and explain epicyclic gear train. [4]

OR

- Q6)** In an epicyclic gear train, the internal gears A and B and compound gears C and D rotate independently about point O. All the gears have same module and the number of teeth are $Z_C = 28$, $Z_D = 26$, $Z_E = Z_F = 18$. The gears E and F rotate on pins fixed to the arm G. Gear E meshes with gear A and C whereas gear F meshes with B and D. Draw the arrangement and find [10]

- i) Number of teeth on gears A and B.
- ii) Speed of gear B if arm G makes 200 rpm clockwise and gear A is fixed.
- iii) Speed of gear B if arm G makes 200 rpm clockwise and gear A makes 20 rpm in anticlockwise direction.

