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B. Tech. 4th Semester (ME) Examination, May-2016

KINEMATICS OF MACHINE

Paper-ME-204-F

Time allowed : 3 hours]

[Maximum marks : 100

Note : Question 1 is compulsory and attempt any one of the question from each section.

1. Explain the following :
 - (a) Definition of Resistant body.
 - (b) Difference between machine and structure.
 - (c) Degree of freedom.
 - (d) Define Kinematic pair and explain all its types with example.
 - (e) Explain Laws of solid friction.
 - (f) Explain types of Pulleys.
 - (g) Define Module.
 - (h) Define cam and its type. 2.5×8=20

Section-A

2. In a quick return motion mechanism of crank and slotted lever type, the ratio of maximum velocities is 2. If the length of stroke is 25 cm, find
 - (i) The length of the slotted lever.

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- (ii) The ratio of times of cutting and return strokes.
- (iii) The maximum cutting velocity per second if the crank rotates at 30 rpm. 20

3. In a four bar chain ABCD, AD is fixed and is 120 mm long. The crank AB is 30 mm long and rotates at 100 rpm clockwise while the link CD = 60 mm oscillates about D. BC and AD are of equal length. Find the angular velocity of link CD when angle BAD = 60°. 20

Section-B

4. Derive the equation for minimum force required to drag a body on rough horizontal surface. 20
5. Derive the equation of ratio of Driving tensions in flat belt. Also find out the maximum power transmitted by a belt. 20

Section-C

6. The minimum radius, lift and nose radius of a tangent cam are 4.2 cm, 1.4 cm and 1.6 cm respectively. The roller follower axis passes through the cam axis and radius is 2 cm. Semi angle of cam action is 70°. Draw displacement velocity and acceleration diagrams for follower motion for one rotation of the cam. 20

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7. A pair of spur wheels with 14 and 21 teeth are of involute profile and pressure angle 16°. Find maximum addenda on the pinion and gear wheel to avoid interference if module is 6 mm. Also find the maximum velocity of sliding on either side of the pitch point of pinion runs at 300 rpm. 20

Section-D

8. Derive the Freudenstein's equation. 20
9. Two bevel gears A and B having 40 and 30 teeth are rigidly mounted on two co-axial shafts X and Y. A bevel gear C having 50 teeth meshes with A and B and rotates freely on one end of an arm. At the other end of the arm is welded a sleeve and the sleeve is riding freely loose on the axes of the shafts. If the shaft X rotates at 100 rpm clockwise and arm rotates at 100 rpm anticlockwise, find speed of shaft Y. 20