

**R07**

Code: R7220302

B.Tech II Year II Semester (R07) Supplementary Examinations December/January 2015/2016

**KINEMATICS OF MACHINERY**

(Mechanical Engineering)

(For 2008 regular admitted batch only)

Time: 3 hours

Max. Marks: 80

Answer any FIVE questions

All questions carry equal marks

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- 1 (a) Explain with the help line diagram the 'Oscillatory cylinder engine' mechanism.  
(b) A crank and slotted lever mechanism used in a shaper has a centre distance of 300 mm between the centre of oscillation of the slotted lever and the centre of rotation of the crank. The radius of the crank is 120 mm. Find the ratio of the time of cutting to the time of return stroke.
- 2 (a) Explain the mechanism which can be used to copy the existing diagram to a reduced scale. How do you find the reduction factor of the diagram?  
(b) Prove that Hart's exact straight line motion mechanism traces mathematically correct straight line path.
- 3 (a) State and prove the three centers inline theorem.  
(b) A four bar kinematic chain is represented by a quadrilateral ABCD in which AD is fixed and is 200 mm long. The crank AB 40 mm long rotates in a clockwise direction at 60 r.p.m and drives the link CD 60 mm long by means of the connecting link BC 175 mm long. Determine the angle through which CD oscillates and find the angular velocities of the links BC and CD in one of the positions when BC is perpendicular to AB.
- 4 (a) Derive an expression for the ratio of shafts velocities for Hooke's joint and draw the polar diagram depicting the salient features of driven shaft speed.  
(b) What is the condition for correct steering? Sketch and show the two main types of steering gears and discuss their relative advantages.
- 5 Determine the profile of cam to give oscillatory motion to the follower, with uniform angular velocity about its pivot. One oscillation is completed in one revolution of the cam. The distance between the cam centre and the pivot of the follower is 50 mm. The base circle diameter is 40 mm. Angle of oscillation is  $30^\circ$ . The length of the oscillating lever is 50 mm with roller of 5 mm diameter at the end.
- 6 (a) Find an expression for the length of the path of contact between two mating spur gears.  
(b) What do you mean by 'interference' between two mating gears? Explain.
- 7 A rope drive is required to transmit 230 kW from a pulley of 1 meter diameter running at 450 r.p.m. The safe pull in each rope is 800 N and the mass of the rope is 0.46 kg per meter length. The angle of lap and the groove angles are  $160^\circ$  and  $45^\circ$  respectively. If the coefficient of friction between the rope and the pulley is 0.30, find the number of ropes required.
- 8 (a) Explain the term, Sun and planet gears. With a neat sketch explain the working of an epicyclic gear train with a sun and planet gear.  
(b) Two parallel shafts are to be connected by spur gearing. The approximate distance between the shafts is 600 mm. If one shaft runs at 120 r.p.m and other at 360 r.p.m. Find number of teeth on each wheel if module is 8 mm. Also determine the exact distance apart of the shafts.

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