

Code No: RT22031

R13**SET - 1****II B. Tech II Semester Supplementary Examinations, November – 2017****KINEMATICS OF MACHINERY**

(Com. to ME, AME, MM)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**
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PART -A

1. a) Define Kinematic Chain
- b) Write down the Grashof's law for a four bar mechanism?
- c) What are the different motions of the follower?
- d) Write down the difference between involute and cycloidal tooth profile.
- e) What is the externally applied torques used to keep the gear train in equilibrium?
- f) A Hook's joint is used to connect two shafts. The driving shaft is rotating uniformly with a speed of 4000 rpm. The maximum speed of the driven shaft is 420 rpm. Determine the greatest permissible angle between the two shafts. Also find the minimum speed of the driven shaft.

PART -B

2. Sketch and explain the various inversions of a slider crank chain.
3. a) Two inclined shafts are connected by means of a universal joint. The speed of the driving shaft is 1000 r.p.m. If the total fluctuation of speed of the driven shaft is not to exceed 12.5% of this, what is the maximum possible inclination between the two shafts? With this angle, what will be the maximum acceleration to which the driven shaft is subjected and when this will occur?
- b) What is the condition for correct steering? Sketch and show the two main types of steering gears and discuss their relative advantages
4. Derive Coriolis Component of Acceleration
5. Following is the data for a circular arc cam working with a flat faced reciprocating follower :
Minimum radius of the cam = 30 mm; Total angle of cam action = 120° ; Radius of the circular arc = 80 mm; Nose radius = 10 mm.
 - a) Find the distance of the centre of nose circle from the cam axis
 - b) Draw the profile of the cam to full scale;
 - c) Find the angle through which the cam turns when the point of contact moves from the junction of minimum radius arc and circular arc to the junction of nose radius arc and circular arc; and
 - d) Find the velocity and acceleration of the follower when the cam has turned through an angle of $\theta = 20^\circ$. The angle θ is measured from the point where the follower just starts moving away from the cam. The angular velocity of the cam is 10 rad/s

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6. a) Derive the condition for transmitting the maximum power in a flat belt drive.
- b) A flat belt is required to transmit 35 kW from a pulley of 1.5 m effective diameter running at 300 r.p.m. The angle of contact is spread over $11/24$ of the circumference and the coefficient of friction between belt and pulley surface is 0.3. Determine, taking centrifugal tension into account, width of the belt required. It is given that the belt thickness is 9.5 mm, density of its material is 1.1 Mg/m^3 And the related permissible working stress is 2.5 MPa
7. a) Derive an expression for minimum number of teeth required on a pinion to avoid interference when it gears with a rack.
- b) In a reverted epicyclic gear train, the arm A carries two gears B and C and a compound gear D - E. The gear B meshes with gear E and the gear C meshes with gear D. The number of teeth on gears B, C and D are 75, 30 and 90 respectively. Find the speed and direction of gear C when gear B is fixed and the arm A makes 100 r.p.m. clockwise

