Code No: RT22031 | R13 | | SET - 1 |

II B. Tech II Semester Supplementary Examinations, November - 2018
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) Explain the terms: i) Kinematic chain, ii) Inversion.   (4M)

    b) Explain about peaucellier straight line mechanism   (3M)

    c) Discuss about the instantaneous centre of rotation.   (4M)

    d) What are the different types of motion with which a follower can move ?   (3M)

    e) Define i) normal pitch, and ii) axial pitch relating to helical gears   (4M)

    f) Explain what you understand by 'initial tension in a belt'.   (4M)

PART -B

2. a) Sketch slider crank chain and its various inversions, stating actual machines in which these are used in practice.   (8M)

    b) Explain the application of Kutzbach criterion to plane mechanisms.   (8M)

3. List the names of approximate straight line motion mechanisms and explain each one of them   (16M)

4. PQRS is a four bar chain with link PS fixed. The lengths of the links are PQ = 62.5 mm; QR = 175 mm; RS = 112.5 mm; and PS = 200 mm. The crank PQ rotates at 10 rad/s clockwise. Draw the velocity and acceleration diagram when angle QPS = 60° and Q and R lie on the same side of PS. Find the angular velocity and angular acceleration of links QR and RS.   (16M)

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5. A cam operating a knife-edged follower has the following data :   (16M)

a) Follower moves outwards through 40 mm during 60° of cam rotation.

b) Follower dwells for the next 45°.

c) Follower returns to its original position during next 90°. (d) Follower dwells for the rest of the rotation.

The displacement of the follower is to take place with simple harmonic motion during both the outward and return strokes. The least radius of the cam is 50 mm. Draw the profile of the cam when i) the axis of the follower passes through the cam axis, and ii) the axis of the follower is offset 20 mm towards right from the cam axis. If the cam rotates at 300 r.p.m., determine maximum velocity and acceleration of the follower during the outward stroke and the return stroke.

6. a) Derive an expression for minimum number of teeth required on a pinion to avoid interference when it gears with a rack.   (8M)

b) A pair of 20° full depth involute spur gears having 30 and 50 teeth respectively of module 4 mm are in mesh. The smaller gear rotates at 1000 r.p.m. Determine :   (8M)
i) Sliding velocities at engagement and at disengagement of pair of a teeth, and
ii) Contact ratio.

7. a) Obtain an expression for the length of a belt in an open belt drive.   (8M)

b) An open belt running over two pulleys 240 mm and 600 mm diameter connects two parallel shafts 3 metres apart and transmits 4 kW from the smaller pulley that rotates at 300 r.p.m. Coefficient of friction between the belt and the pulley is 0.3 and the safe working tension is 10N per mm width. Determine :i) minimum width of the belt, ii) initial belt tension, and iii) length of the belt required   (8M)