

Code No: 114CZ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, April - 2018

KINEMATICS OF MACHINES

(Common to ME, MCT)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

- 1.a) Classify the kinematic pairs. [2]
- b) What are equivalent mechanisms? [3]
- c) What is Coriolis acceleration? [2]
- d) Describe one application of relative velocity method. [3]
- e) What is the purpose of pantograph mechanism? [2]
- f) Describe one application of hook's joint. [3]
- g) Differentiate radial and cylindrical cams. [2]
- h) When does the maximum velocity is attained in SHM during forward stroke. [3]
- i) What is the phenomenon of interference? [2]
- j) What method is followed in drawing an involute profile? [3]

PART-B

(50 Marks)

- 2. Describe all the possible inversions of double slider crank chain mechanism. Give atleast one practical application for each inversion. [10]

OR

- 3.a) What is the mechanical advantage of a mechanism? [5]
- b) Find the maximum and minimum transmission angle for the mechanism as shown in figure 1. [5]

AB = 4 cm
 AD = 12 cm
 BC = 10 cm
 CD = 7 cm

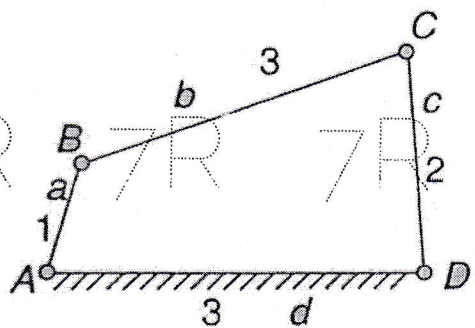


Figure: 1

4. In a four bar chain ABCD, AB is the driving link, CD the driven link and AD the fixed link. Show that the angular velocity of CD is to that of AB as QA is to QD, where Q is the point of intersection of BC and AD, produced if necessary. When the links AB, BC, CD and DA are respectively 62 mm, 175 mm, 112 mm and 200 mm long, the angle BAD is 60° , AB and DC are on opposite sides of AD and the velocity of B is 3m/sec, find the velocity of C and the angular velocity of BC. [10]

OR

5. The mechanism of a whitworth quick return motion is shown in figure 2. The distance between the fixed centres O and C is 37 mm. The driving crank CP is 125 mm long, the slotted link OQ is 4 in long and the connecting link QR is 375 mm long. If CP makes 60 rpm, find for the given position the acceleration of R. What is the acceleration of R when it occupies the same position but is on the return stroke? [10]

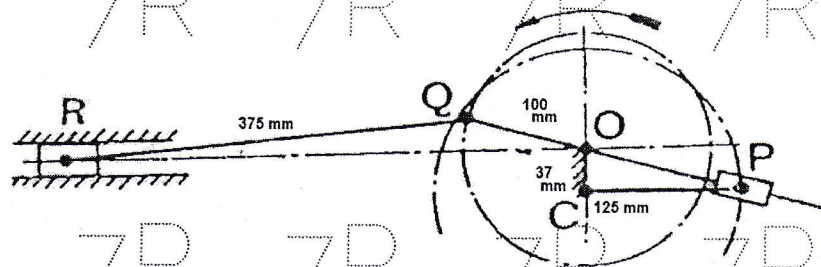


Figure: 2

- 6.a) Differentiate approximate and exact straight line mechanism.
b) Explain the principle of hart mechanism. [5+5]

OR

7. Explain the Peaucellier and Tchebicheff's straight line motion mechanisms. [10]
8. Construct the displacement diagram and cam profile for a plate cam with an oscillating radial flat face follower that rises through 30° with cycloidal motion with 150° of counter clockwise cam rotation, then dwells for 30° , return with cycloidal motion with in 120° and dwells for 60° . Determine the necessary length of the follower face allowing 5 mm clearance at each end. The prime circle radius is 30 mm and the follower pivot is 120 mm to the right. [10]

OR

- 9.a) Analyze the tangent cam with roller follower.
b) How many types of follower are used with the cam? Sketch and explain the same. [5+5]

10. An internal wheel B with 80 teeth is keyed to a shaft F. A fixed internal wheel C with 82 teeth is concentric with B. A compound wheel DE gears with the two internal wheels: D has 28 teeth and gears with C, while E gears with B. The compound wheel revolves freely on a pin which projects from a disc keyed to a shaft A coaxial with F. If the wheels all have the same pitch and the shaft A makes 800 rpm, what is the speed of shaft F? If torque input to shaft A is 60 N.m, what is the load torque on shaft F and the holding torque on Wheel C? [10]

OR

11. Two involute gears in a mesh have a module of 8 mm and a pressure angle of 20° . The larger gear has 57 while the pinion has 23 teeth. If the addenda on pinion and gear wheels are equal to one module, find the a) Contact ratio b) Angle of action of the pinion and the gear wheel c) Ratio of the sliding to rolling velocity at the beginning of contact, pitch point and end of contact. [10]