

R09

Code No: 09A40302

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B.Tech II Year II Semester Examinations, June-2014

KINEMATICS OF MACHINERY

(Common to ME, MCT, AME, MIM, MS & NT)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

- 1.a) Distinguish between completely constrained motion, incompletely constrained motion, and successfully constrained motion, with one example for each.
 - b) With a neat sketch, describe the working of a Whitworth quick return motion Mechanism.
- 2.a) Derive the condition to be satisfied by a mechanism required to produce an exact straight line motion.
 - b) A T.Chebicheff mechanism is shown in the Figure: 1 below. Show that, the ratio of the link lengths $AB : OO_1 : OA :: 1 : 2 : 2.5$ for the point P to move in an approximate straight line path.

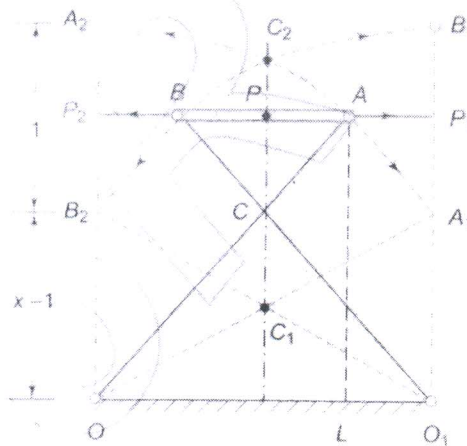


Figure: 1

- 3.a) Describe, with a suitable sketch, the Klein's construction for velocity diagram of single slider crank chain.
- b) For the four-bar chain shown in Figure 2, find the linear velocities of sliders C and D , and the angular velocities of links AC and BD , using *Instantaneous Centre method*.

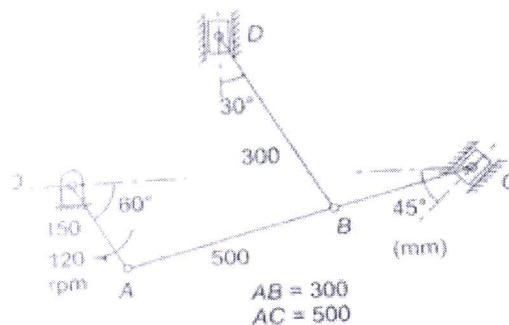


Figure: 2

- 4.a) For a Hooke's joint, prove that the speeds of the two shafts will be equal if
- $$\tan \theta = \pm \sqrt{\cos \alpha},$$
- where α angle of inclination of the driven shaft with the driving shaft, and θ is the angle turned by the driving shaft at any instant.
- b) Draw a neat diagram of the Davis steering gear, and prove that it exactly satisfies the condition for correct steering.
5. Draw the profile of a cam with roller follower for the following data:
 Base circle radius of cam = 14 mm; Roller radius = 4 mm; Outward stroke of follower through 30 mm during 180° of cam rotation with SHM. Dwell after Outstroke for 20° of cam rotation. Return stroke during the remaining 160° of cam rotation with uniform and equal acceleration and retardation. Also, find the velocity and acceleration of the follower during the return stroke, if the cam is rotating at 1500 rpm clockwise.
- 6.a) Derive an expression for the tensions on the tight side and slack side of a V-belt drive.
- b) A chain drive is used for speed reduction from 240 rpm to 110 rpm. The number of teeth on the driving sprocket is 22. The centre-to-centre distance between the sprockets is 540 mm, and the pitch circle diameter of the driven sprocket is 480 mm. Find the number of teeth on the driven sprocket, and the pitch of the chain.
- 7.a) Compare and contrast the involute and cycloidal profiles for the shape of gear teeth with respect to their merits and demerits.
- b) With neat sketches, describe the Spiral gears, Bevel gears, and Worm gears.
- 8.a) What is the difference between Compound, Reverted, and Epicyclic gear trains? Explain with relevant sketches.
- b) Explain, with a suitable neat sketch, the working of the differential gear of an automobile.