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R09

Code No: R09220302

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B.Tech II Year II Semester Examinations, May-2013

Kinematics of Machinery

(Common to ME, MCT, AME, MIM)

Time: 3 hours **Max. Marks: 75**

Answer any five questions

All questions carry equal marks

1.a) Define: Kinematic link, Kinematic pair and Kinematic chain.

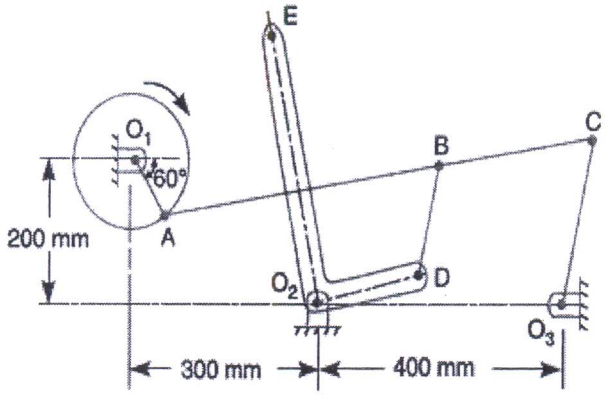
b) Describe various inversions of a slider crank mechanism giving examples. [15]

2.a) Describe the Watt's parallel mechanism for straight line motion and derive the condition under which the straight line is traced.

b) Sketch a pantograph and explain its working principle. [15]

3.a) Discuss the three types of instantaneous centres for a mechanism.

b) The mechanism of a wrapping machine as shown below has the following dimensions: O_1A is 100mm, AC is 700mm, BC is 200mm, O_3C is 200mm, O_2E is 400mm, O_2D is 200mm and BD is 150mm. The crank O_1A rotates at a uniform speed of 100rad/sec. Find the velocity of the point E of the bell crank lever by instantaneous centre method. [15]



4.a) What is the condition for correct steering? Sketch and show the two main types of steering gears and discuss their relative advantages.

b) A double universal joint is used to connect two shafts in the same plane. The intermediate shaft is inclined at an angle of 20^0 to the driving shaft as well as the driven shaft. Find the maximum and minimum speed of the intermediate shaft and the driven shaft if the driving shaft has a constant speed of 500rpm. [15]

5.a) What is a displacement diagram? Why is it necessary to draw it before drawing a cam profile?

b) Draw the profile of a cam operating a knife edge follower having a lift of 30mm. The cam raises the follower with SHM for 150^0 of the rotation followed by a period of dwell for 60^0.

The follower descends for the next 100^0 rotation of the cam with uniform velocity, again followed by a dwell period. The cam rotates at a uniform velocity of 120rpm and has a least radius of 20mm. What will be the maximum velocity and acceleration of the follower during the lift and the return? [15]

6.a) Derive the condition for constant velocity ratio for transmission of motion through gear drives.

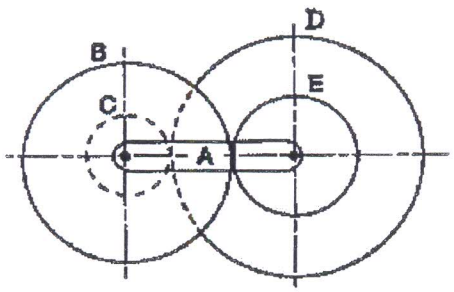
b) State and explain various methods of interference briefly. [15]

7.a) What is centrifugal tension in a belt? How does it affect the power transmitted?

b) A pulley used to transmit power by means of ropes has a diameter of 3.6m and has 15 grooves of 45^0. The angle of contact is 170^0 and the coefficient of friction between the ropes and the groove sides is 0.28. The maximum possible tension in the ropes is 960N and the mass of the rope is 1.5kg per metre length. What is the speed of pulley in rpm and the power transmitted if the condition of maximum power prevail? [15]

8.a) Explain with a neat sketch the sun and planet wheel.

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 100rpm clockwise. [15]



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