II/IV 09- MECH SSU

Code No: 54014 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, May - 2016

KINEMATICS OF MACHINERY

(Common to ME, MCT, AME, MSNT)

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. [7+8]

2.a) What are different types of belt drives? Discuss about the effect of slip and creep in belts.

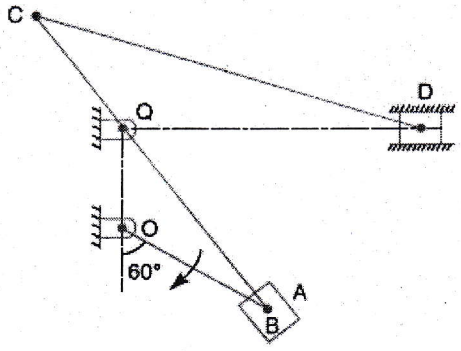
b) A pulley used to transmit power by means of ropes has a diameter of 2.8 m and has 12 grooves of 45^0. The angle of contact is 170^0 and the coefficient of friction between the ropes and the groove sides is 0.30. The maximum possible tension in the ropes is 880 N and the mass of the rope is 1.5 kg per metre length. What is the speed of pulley in rpm and the power transmitted if the condition of maximum power prevails? [7+8]

3.a) What is cam? What are its elements? What are the requirements of a high speed cam?

b) Draw the profile of a cam operating a roller reciprocating follower and with the following data:
Minimum radius of cam is 25 mm, lift is 30 mm, roller diameter is 15 mm. The cam lifts the follower for 120^0 with SHM followed by a dwell period of 30^0. Then the follower lowers down during 150^0 of the cam rotation with uniform acceleration and deceleration followed by a dwell period. If the cam rotates at a uniform speed of 150 rpm, calculate the maximum velocity and acceleration of the follower during the descent period. [7+8]

4.a) How the velocity of a point on a link is determined by instantaneous centre method?

b) This figure shows a whit-worth quick return motion mechanism. The various dimensions in the mechanism are as follows: OQ is 100 mm, OA is 200 mm, QC is 150 mm and CD is 500 mm. The crank OA makes an angle of 60^0 with the vertical and rotates at 120 rpm in the clock wise direction. Locate all the instantaneous centres and find the velocity of ram D. [7+8]



5. With a neat sketch of the straight line motion 'Hart mechanism', prove that it produces an exact straight line motion. [15]

6.a) What are the various types of the torques in an epicyclic gear train?

b) Explain about differential gear for an automobile. Two parallel shafts about 600 mm apart are to be connected by spur gears. One shaft is to run at 360 rpm and the other at 120 rpm. Design the gears, if the circular pitch is to be 25 mm. [7+8]

7.a) Explain why two Hooke's joints are used to transmit motion from the engine to the differential of an automobile.

b) Two shafts are connected by a universal joint. The driving shaft rotates at a uniform speed of 1200 rpm. Determine the greatest permissible angle between the shaft axes so that the total fluctuation of speed does not exceed 100 rpm. Also calculate the maximum and minimum speeds of the driven shaft. [7+8]

8. What is law of gearing? Discuss about interference in gears and derive the condition for minimum number of teeth to avoid interference. [15]

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