

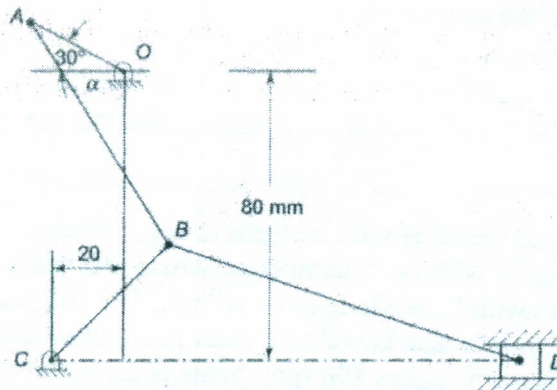
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
III.B.TECH - I SEMESTER REGULAR EXAMINATIONS NOVEMBER, 2009
KINEMATICS OF MACHINERY
MECHANICAL ENGINEERING
(MECHATRONICS)

Time: 3hours

Max.Marks:80

Answer any FIVE questions
All questions carry equal marks

- 1.a] Describe with a neat sketch the scotch yoke mechanism as an inversion of the double slider crank chain.
- b] In a crank and slotted lever mechanism, the driving crank is 40 mm long, and the time ratio of cutting stroke to return stroke is 2. If the length of working stroke of the ram is 110 mm, find the distance between the fixed centres, and the slotted lever length. [8+8]
- 2.a] What do you understand by straight line motion mechanisms? Name the different mechanisms which are used for achieving approximate straight line motion.
- b] Derive the condition to be satisfied by a mechanism required to produce an exact straight line motion. [8+8]
3. The dimensions of the various links of the mechanism shown in Fig.1 are OA = 30mm. AB = 75 mm, BC = 5mm, and BD = 100mm. The crank OA rotates at 120rpm. Determine the velocity of slider D and angular speeds of links AB, BC and BD. [16]



4. The angle between the axes of two horizontal shafts to be connected by Hooke's joint is 150° . The speed of driving shaft is 150 rpm. The driven shaft carries a flywheel weighing 98.0 N and having a radius of gyration of 10 cm. If the forked end of the driving shaft rotates 30° from the horizontal plane, find the torque required to drive the shaft to overcome the inertia of the flywheel. [16]
5. A disc cam is to give uniform motion to a knife edge follower during out stroke of 50mm during first half of the cam revolution. The follower again returns to its original position with uniform motion during the next half of the revolution. The minimum radius of the cam is 50mm and the diameter of the cam shaft is 35mm. Draw the profile of the cam when
 i) The axes of the follower passes through the axes of the cam shaft, and
 ii) The axes of the follower is offset by 20mm from the axes of the cam shaft. [16]
- 6.a) What are the advantages and disadvantages increasing the centre distance of gearing?
 b) Two equal gear wheels of 15 cm pcd and 4mm module are in mesh. The teeth are of involute form of 20° angle of obliquity. Determine the maximum addendum necessary if there are always atleast two pairs of teeth to be in contact. If the gear wheels rotate at 110 rpm and 6kW is being transmitted, find the normal force between the teeth, assuming the total force is equally divided between the pairs of teeth. Neglect friction. [6+10]
- 7.a) How does idler pulley increase the lift of the belt? How does it accommodate or achieve a large velocity ratio?
 b) Calculate the centrifugal tension in a belt which runs over two pulleys at a speed of 28 m/s. the belt is 200mm wide and 8mm thick the density of the belt is 1020 kg/m^3 , if the belt embraces an angle of 165° , coefficient of friction is 0.25 and the maximum permissible stress in the belt material is 2.5 Mpa, calculate the power transmitted at the above speed. [8+8]
8. An internal wheel B with 80 teeth is keyed to shaft F. A fixed internal wheel C with 82 teeth is concentric with B. A compound wheel DE gears with 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 co-axial with F. If all the wheels have the same pitch and the shaft A makes 800 rpm. What is the speed of F? [16]
