School of Engineering
B.TECH Mechanical Engineering
Mid Term Examination - Nov 2023

Duration : 90 Minutes
Max Marks : 50

Sem V - G3UB501T - Kinematics of Machines

General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1) Compare the higher pair with lower pair interns of contact — K2 (2)

2) Write about mobility of mechanism. — K1 (3)

3) Enumerate the difference between a machine and a structure. — K2 (4)

4) A crank and slotted lever mechanism used in a shaper has a centre distance of 300 mm between the centre of oscillation of the slotted lever and the centre of rotation of the crank. The radius of the crank is 120 mm. Find the ratio of the time of cutting to the time of return stroke. — K2 (6)

5) Select appropriate link lengths and apply Grashoff's law to optimize the mobility of a specific four-bar linkage design. — K3 (6)

6) Utilize the derived stroke length expression to design and analyze crank and slotted lever mechanisms tailored to meet desired performance requirements. — K3 (9)

7) Categorize the inversions of the four-chain mechanism into distinct classes and examine their functions. — K4 (8)

8) PQRS is a four bar chain with link PS fixed. The lengths of the links are PQ = 62.5 mm ; QR = 175 mm ; RS = 112.5 mm ; and PS = 200 mm. The crank PQ rotates at 10 rad/s clockwise. Draw the velocity and acceleration diagram when angle QPS = 60° and Q and R lie on the same side of PS. Apply the kinematic analysis to find the angular velocity of links QR and RS in the mechanism. — K4 (12)

OR

In a four bar chain ABCD, AD is fixed and is 150 mm long. The crank AB is 40 mm long and rotates at 120 r.p.m. clockwise, while the link CD = 80 mm oscillates about D. BC and AD are of equal length. Analyze the angular velocity of link CD when angle BAD = 60°. — K4 (12)