Code No: R2021034 **R20** SET - 1

II B. Tech I Semester Supplementary Examinations, July - 2023
KINEMATICS OF MACHINERY
(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions each Question from each unit
All Questions carry **Equal** Marks
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UNIT-I

1 a) Explain the different types of constraints between Kinematic pairs, and give two examples for each. [7M]

b) A double slider mechanism is used to draw an ellipse with major axis equal to 20 cm and minor axis 15 cm. Set out the mechanism, and draw the locus of the points tracing the required ellipse. [7M]

Or

2 a) Define Grashof's. State how is it helpful in classifying the four-link mechanisms into different types. [7M]

b) Write the inversions of double slider crank mechanism and explain any two of them with neat sketches. [7 M]

UNIT-II

3 a) Sketch a Paucellier mechanism. Show that it can used to trace a straight line. [7M]

b) Derive the expression for the ratio of angular velocities of shafts of a Hooke's joint. [7M]

Or

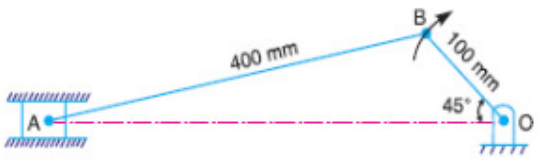
4 a) What is Scott-Russel mechanism? What are its limitations? How is it modified? [7M]

b) Explain why two Hooke's joint are used to transmit motion from the engine to the differential of a automobile. [7M]

UNIT-III

5 a) What is the Coriolis acceleration component? In which cases does it occur? How is it determined? [6M]

b) Locate all the instantaneous centres of the slider crank mechanism as shown in figure. The lengths of crank OB and connecting rod AB are 100 mm and 400mm respectively. If the crank rotates clockwise with an angular velocity of 10 rad/s, find i) Velocity of the slider A and ii) angular velocity of the connecting rod AB. [8M]



Or
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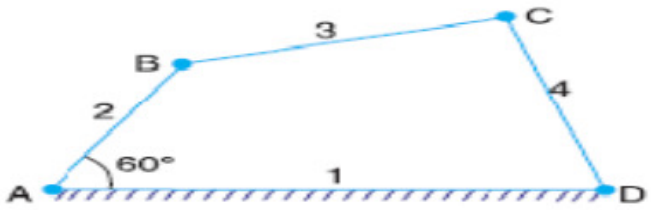
6 a) Explain the procedure to construct Klein's construction to determine the Velocity and acceleration of a slider-crank mechanism. [7M]

b) Locate all the instantaneous centres for a four bar mechanism as shown in figure. The lengths of various links are : AD=125 mm; AB=62.5 mm ; BC=CD=75 mm. If the link AB rotates at a uniform speed of 10 rpm in the clockwise direction, find the angular velocity of the links BC and CD. [7M]



UNIT-IV

7 a) Explain various types of follower motions used in cam mechanisms. [6M]

b) Use the following data in drawing the profile of a cam in which a knife-edged follower is raised with uniform acceleration and deceleration and is lowered with simple harmonic motion: [8M]
Least radius of cam = 60 mm
Lift of follower = 45 mm
Angle of ascent = 60^0
Angle of dwell between ascent and descent = 40^0
Angle of descent = 75^0
If the cam rotates at 180 rpm, determine the maximum velocity and acceleration during ascent and descent.

Or

8 a) Draw the Displacement diagram for Uniform and unequal acceleration and retardation motion of a Follower, e.g., the acceleration being twice the retardation. Assume the necessary data. [6M]

b) The follower of a tangent cam is operated through a roller of 50 mm diameter and its line of stroke intersects the axis of the cam. Minimum radius of the cam is 40 mm, nose radius is 12 mm, and the lift is 25 mm. If the speed of rotation of the cam is 800 rpm, find the velocity and acceleration of the follower at the instant when the cam is 250 from the full – lift position. [8M]

UNIT-IV

9 a) What is interference? Derive the relation for the minimum number of teeth for a pair of involute profile of teeth to avoid interference. [6M]

b) Deduce an expression for the velocity ratio of two mating helical gears in terms of their helix angles. Also prove that the VR is equal to 1 2 T T, where T1 and T2 are the number of teeth on the driver and follower wheels. [8M]

Or

10 a) Compare involute and cycloidal gear tooth profile. [6M]

b) The arm of an epicyclic gear train rotates at 100 rpm anti-clockwise. The arm carries two wheels A and B, having 36 and 45 teeth respectively, and meshing with each other. Wheel A makes 200 rpm clockwise, and the arm rotates about the center of wheel A. Find the speed of wheel B. [8M]