

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E.

Branch: Mechanical Engineering

Course Code: 19ME4DCKOM / 15ME4DCKOM

Course: Kinematics of Machines

Semester: IV

Duration: 3 hrs.

Max Marks: 100

Date: 21.09.2023

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1	a) Distinguish between Rigid link and Flexible link with an example. 06
	b) What is Kutzback's criterion for degree of freedom of plane mechanism? In what way Gruebler's criteria is different from it? Compute degree of freedom of two spur gear in contact. 07
	c) With a neat sketch explain the working of an Oldham's coupling. Justify how it can be considered as an inversion of double slider crank chain. 07

OR

2 a) Explain with a neat labeled sketch, the principle and working of Whitworth quick return motion mechanism. **08**

b) Neatly sketch and explain the working of Peaucellier's mechanism. Also, prove that it traces a straight line. **08**

c) Derive the expression for necessary condition of correct steering. **04**

UNIT - II

3 In the toggle mechanism shown in Figure 1, the crank OA rotates at 210 rpm counter-clockwise increasing at the rate of 60 rad/s^2 . For the given configuration, determine: (i) Velocity of the slider D and the angular velocity of the link BD, and (ii) Acceleration of slider D and the angular acceleration of the link BD. 20

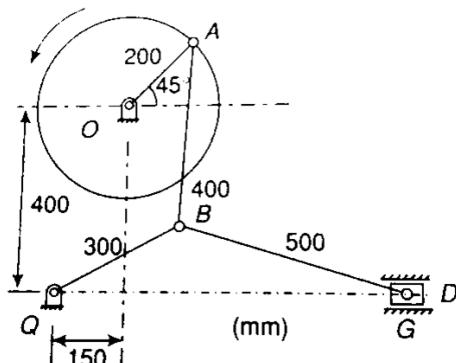


Figure 1

OR

4 Figure 2 shows the link mechanism of a quick-return mechanism of the slotted lever type, the various dimensions of which are, OA=400mm, OP=200mm, AR=700mm, RS=300mm. For the configuration shown determine the acceleration of the cutting tool at S and the angular acceleration of the link RS. The crack OP rotates at 210 rpm.

20

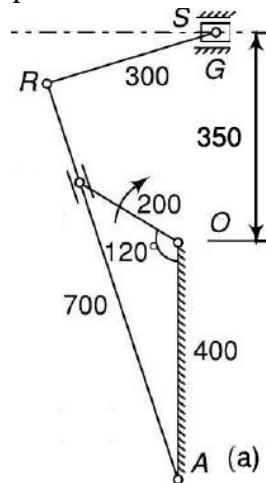


Figure 2

UNIT - III

5 a) What is arc of contact? Derive relation for its magnitude. **07**

b) With a neat sketch, describe the procedure for determining the velocities of links in a slider crank chain mechanism by using Klein's Construction method. **06**

c) Two 20^0 involute spur gears have a module of 10mm. The addendum is equal to one module. The larger gear has 40 teeth while the pinion has 20 teeth. Will the gear interfere with the pinion? **07**

UNIT - IV

6 a) Write short notes on: i) Simple Gear Train & ii) Compound Gear Train. **06**

b) Gear Train shown in Fig.3, in which gears D-E and F-G are compound gears. D gears with A and B; E gears with F; and G gears with C. The numbers of teeth on each gear are A=60, B=120, C=135, D=30, E=75, F=30, G=60. If the wheel A is fixed and the arm makes 20 revolutions clockwise, find the revolutions of B and C. **14**

If the arm is applied a turning moment of 1kNm, determine the turning moment on the shaft supporting the wheel C.

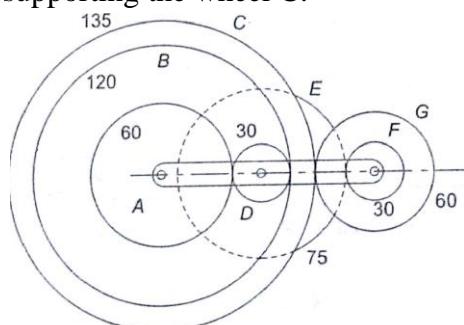


Figure 3

UNIT - V

7 A knife edged follower is operated by a uniformly rotating cam. Draw the cam profile for following conditions: follower rises by 24mm with SHM in $1/4^{\text{th}}$ rotation, dwells for $1/8^{\text{th}}$ rotation and then raises again by 24mm with UARM in $1/4^{\text{th}}$ rotation and dwells for $1/16^{\text{th}}$ rotation before returning with SHM. Base circle radius= 30mm. Speed of cam=200rpm. Find the maximum velocity and acceleration during out stroke and return stroke. 20

SUPPLEMENTARY EXAMS 2023