

Code: 17MEMD2T1

I M.Tech - II Semester – Regular/Supplementary Examinations
OCTOBER - 2020

MECHANISM DESIGN AND SYNTHESIS
(MACHINE DESIGN)

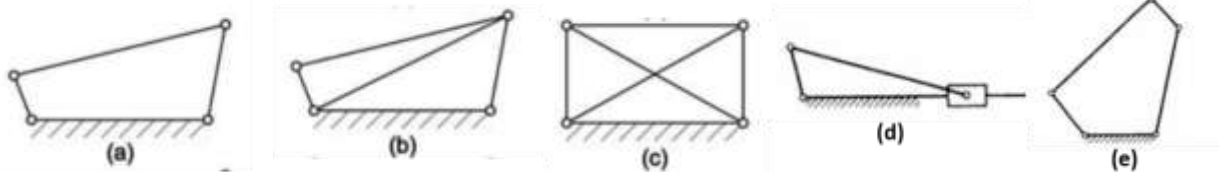
Duration: 3 hours

Max Marks: 60

Answer the following questions

1. a) Calculate the degrees of the freedom for the following.

10 M



b) What is Kutzbach’s criterion for degree of freedom of plane mechanisms? In what way Gruebler’s Criterion is different from it? 5 M

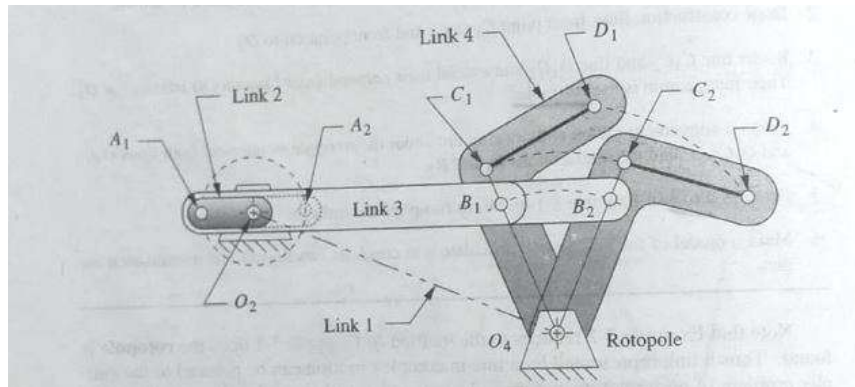
(OR)

2. a) Describe various inversions of single and double slider crank chain mechanisms giving suitable examples. 10 M

b) In four bar mechanism, L_1 and L_3 represent the lengths of fixed link and the coupler. L_2 and L_4 represent the lengths of the other two links (cranks). The table below gives five sets of link dimensions (in mm). What is the resulting mechanism for each set? 5 M

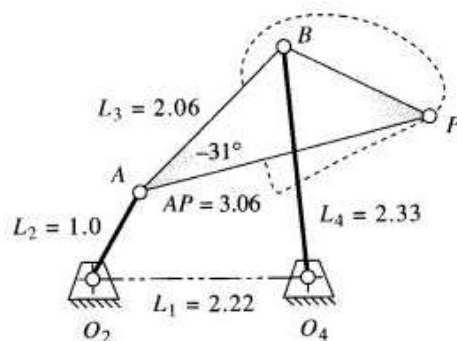
Set	L_1	L_2	L_3	L_4
A	500	20	150	300
B	500	180	20	200
C	20	300	400	200
D	200	20	150	70
E	60	200	180	80

3. Design a four bar linkage to move link CD from C_1D_1 to C_2D_2 by graphical linkage synthesis. 15 M

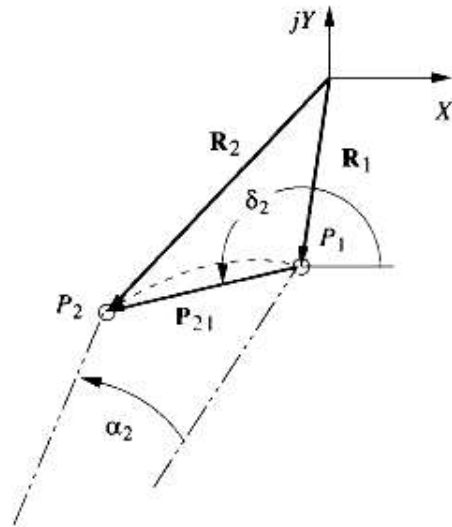


(OR)

4. The linkage shown in figure, calculate and plot the angular displacement of links 3 and 4 and the path coordinates of point P with respect to the angle of the input crank O_2A for one revolution. 15 M

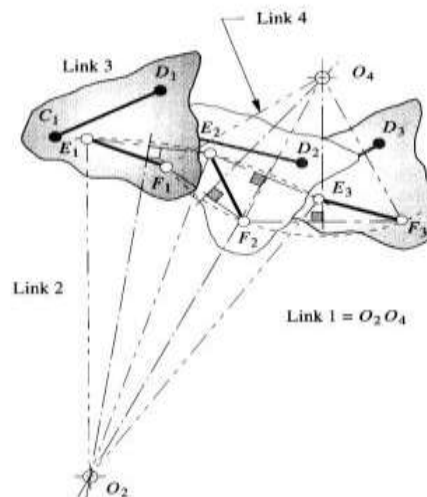


5. Design a four bar linkage which will move a line on its coupler link such that a point P on that line will be first at P_1 and later at P_2 and will also rotate the line through an angle δ_2 between those two precision positions. 15 M



(OR)

6. Design a four bar linkage to move the link CD from the position C_1D_1 to C_2D_2 and then to position C_3D_3 . Use different moving pivots than CD. Find the fixed pivot locations. 15 M



7. a) PQRS is a four bar chain with link PS fixed. The lengths of links are $PQ = 62.5\text{mm}$, $QR = 175\text{mm}$, $RS = 112.5\text{mm}$ and $PS = 200\text{mm}$. The crank PQ rotates at 10 rad/sec clockwise. Draw velocity and acceleration diagram, when angle $QPS = 60^\circ$ and Q and R lie on the same side of PS. Find the angular velocity and angular acceleration of links QR and RS. Choose a suitable scale for configuration of velocity and acceleration diagrams. 10 M

- b) Give the classification of various cam-follower systems.

5 M

(OR)

8. In the steam engine mechanism shown in below figure, the crank AB rotates at 200rpm clockwise. Find the velocities of C, D, E, F and G and acceleration of slider at C. Here lengths of $AB = 12\text{ cm}$, $BC = 48\text{cm}$, $CD = 18\text{cm}$, $DE = 36\text{cm}$, $EF = 12\text{cm}$ and $FG = 36\text{cm}$. 15 M

