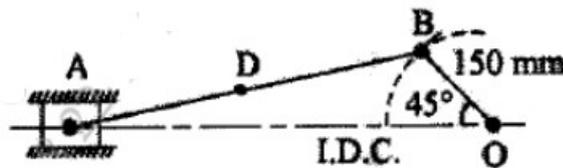
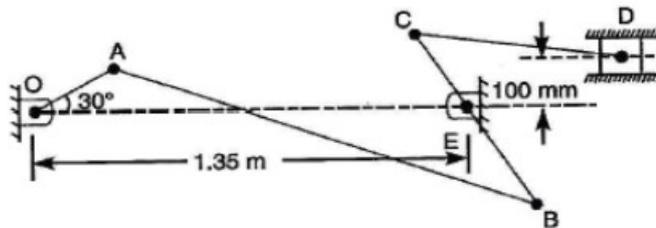


**S.E. (Mechanical and Automobile Engineering)**  
**KINEMATICS OF MACHINERY**  
**(2019Pattern) (Semester-II)**

1. Explain in brief relative and absolute velocity?
2. A four bar mechanism is used to generate a function  $y = x + 5$  in the range of  $0 \leq x \leq 8$ , find three precision positions From chebychev's spacing graphically. If grounded link is horizontal & its length is 100 mm, synthesize the mechanism using obtained precision positions of the mechanism using inversion method. Assume crank length of 60mm.
3. Explain two position syntheses for crank and rocker mechanism.
4. A function varies from 0 to 8. Find the chebychev spacing for four precision positions by using graphical method.
5. The crank of slider crank mechanism shown in figure rotates clockwise at a constant speed of 300 rpm. The crank is 150 mm and connecting rod is 600 mm long. Determine a) Linear velocity and acceleration of the midpoint of the connecting rod. b) Angular velocity and angular acceleration of the connecting rod at a crank angle of  $45^\circ$  from IDC. Solve using relative velocity and acceleration method.



6. A mechanism as shown in Fig. has the following dimensions:  $OA = 200$  mm,  $AB = 1500$  mm,  $BC = 600$  mm,  $CD = 500$  mm,  $BE = 400$  mm. Locate the instantaneous centre. If crank  $OA$  rotates uniformly at 120 r.p.m., find velocity of  $B$ ,  $D$  and  $C$  and the angular velocity of link  $AB$ ,  $BC$  and  $CD$ .



7. Write Short note on i) Function Generation ii) Path Generation
8. Derive the relation for virtual number of teeth of helical gear.
9. A cam rotating clockwise with a uniform speed is to give the roller follower of 30 mm diameter with the following motion: (a) Follower to move outwards through a distance of 30 mm during  $120^\circ$  of cam rotation; (b) Follower to dwell for  $60^\circ$  of cam rotation ; (c) Follower to return to its initial position during  $90^\circ$  of cam rotation ; and (d) Follower to dwell for the remaining  $90^\circ$  of cam rotation. The minimum radius of the cam is 40 mm and the line of stroke of the follower is offset 15 mm from the axis of the cam and the displacement of the follower is to take place with simple harmonic motion on both the outward and return strokes. Draw the cam profile.
10. Explain classification of follower in detail.

11. Draw the profile of a cam, offset 20mm to the right of the center of the camshaft. The base circle diameter is 75 mm and the diameter of the roller is 10mm. The follower is to move outward a distance 40mm with S.H.M. In 140° of the cam rotation to dwell for 40° of cam rotation to move inward with 150° of cam rotation with uniform acceleration and retardation, acceleration being  $\frac{2}{3}$  of retardation. Calculate the maximum velocity and acceleration of the follower during outstroke if the camshaft rotates at 90 rpm.
12. Explain i) Precision Points ii) Structural Error
13. State and Explain the Types of Automation
14. Differentiate between worm and worm gear and bevel gears.
15. For mechanism shown Fig. crank rotates in clockwise direction with angular velocity of 80 rad/s . Determine velocity of piston E, angular velocity magnitude and direction for of link BC and DE, using three centers method. Also state the corollary used to decide the direction of angular velocity.

