



# SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

AN AUTONOMOUS INSTITUTION



Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai

1. (i) Derive an expression for the relationship between the angular velocities of links in terms of known link lengths, angular positions of links and angular velocity of input link, for a four—bar linkage. (6)  
(ii) In a slider crank mechanism, the length of crank OB and connecting rod AB are 125 mm and 500 mm respectively. The centre of gravity G of the connecting rod is 275 mm from the slider A. The crank speed is 600 rpm clockwise. When the crank has turned  $45^\circ$  from the inner dead centre position, determine velocity of the slider A, Velocity of the point G and Angular velocity of the connecting rod AB (10)
2. By analytical method, Derive the velocity and acceleration for the reciprocating steam engine mechanism.
3. (i) The crank AB of four bar mechanism shown in figure. 3. Rotates at 60 rpm clockwise. Determine the relative angular velocities of the coupler to the crank and the lever to the coupler. Find also the rubbing velocities at the surface.  
(ii) Locate the instantaneous centre's of the slider crank mechanism shown in fig.4. Find the velocity of the slider.
7. In a four bar chain ABCD, AD is fixed and is 120 mm long. The crank AB is 30 mm long and rotates at 100 rpm clockwise while the link CD = 60 mm oscillates about D; BC = 120 mm. Using graphical method, find the angular velocity and angular acceleration of link BC when angle BAD =  $60^\circ$ . (16)
8. Derive the expressions for the velocity and acceleration of the piston of a reciprocating engine mechanism.  
(8)  
In a reciprocating engine mechanism, the lengths of the crank and connecting rod are 150 mm and 600 mm respectively. The crank position is  $60^\circ$  from inner dead centre. The crank shaft speed is 450 r.p.m. (clockwise). Using analytical method, determine
  - 1) velocity of the piston (2)
  - 2) Acceleration of the piston (2)
  - 3) Crank angle for maximum velocity of the piston and the corresponding velocity. (4)
9. A four bar chain is represented by a quadrilateral ABCD in which AD is fixed and is 0.6 m long. The crank AB = 0.3 m long rotates in a clockwise direction at 10 rad/s and with an angular acceleration both clockwise. The crank drives the link CD (= 0.36 m) by means of the connecting link BC (= 0.36 m). The angle BAD =  $60^\circ$ . Using graphical method, determine the angular velocities and angular accelerations of CD and BC. (16)
10. A four-bar mechanism, with O2A as the input link,.
  - i. Using analytical method, derive the equations for the angular velocity of the output link and of the connecting link AB. (8)
  - ii. If the coordinates of the pin joints are O2 (0,0), A (-15, 26), B(75, 70) and O4(50, 0) and the input link rotates at 2 rad/s counter-clockwise, find the angular velocities of AB and of O4B . (8)
11. A slider crank mechanism has a crank of 30 mm length and connecting rod 50 mm length. The angular velocity of crank is 10 rad/sec(ccw). The angular acceleration of the crank is 1200 rad/sec<sup>2</sup>. The crank makes an angle of  $90^\circ$ -- with the line of strike. Determine the acceleration of slider and angular acceleration of connecting rod.