

II B.Tech II Semester Regular/Supplementary Examinations, May 2010
MECHANISMS AND MECHANICAL DESIGN

Aeronautical Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) What is Coriolis component of acceleration.
- (b) Find out the velocity of slider D and angular velocity of CD in the mechanism shown in figure 1 $AA_0 = B_0B = 2\text{cm}$, $A_0B_0 = 4\text{cm}$. [4+12]

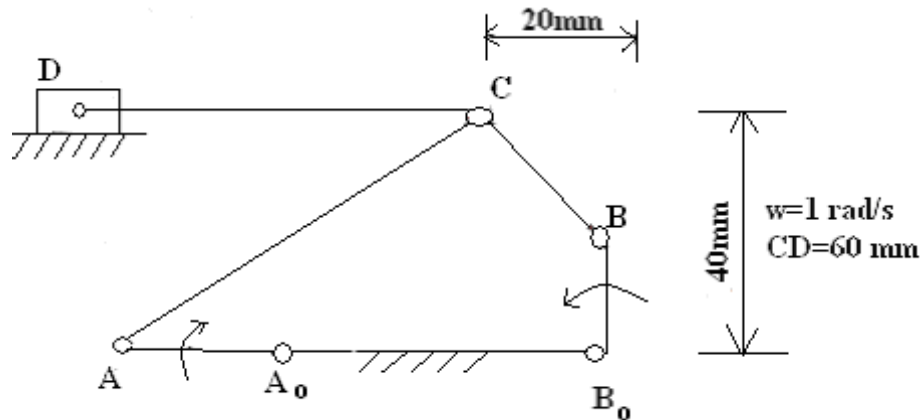


Figure 1

2. Explain tangent cam with roller follower. [16]
3. The rotor of a turbine installed in a boat with its axis along the longitudinal axis of the boat makes 1500 rpm clockwise when viewed from the stern. The rotor has a mass of 750 kg and a radius of gyration of 300mm. If at an instant, the boat pitches in the longitudinal vertical plane so that bow rises from the horizontal plane with an angular velocity of 1 rad/s, determine the torque acting in the boat and the direction in which it tends to turn the boat at the instant. [16]
4. Set out the profile of a cam to give the following motion to a flat mushroom contact face follower:
 - Follower to rise through 24 mm during 150° of cam rotation with SHM.
 - Follower to dwell for 30° of the cam rotation.
 - Follower to return to the initial position during 90° of the cam rotation with SHM.
 - Follower to dwell for the remaining 90° of cam rotation.
 Take minimum radius of the cam as 30 mm. [16]
5. Design of helical compression spring used for operating a valve. The spring is subjected to a load range of 100 to 150 N, i.e., 100 N when the valve is closed, and 150 N when it is open. The deflection of the spring, i.e., the valve lift during the above load range is 7mm. Take spring index as 10. Determine the size of the wire, size and number of coils, and pitch of the coils. [16]

6. Define the term; 'length of arc of contact' and prove that it is equal to length of path of contact divided by cosine of the pressure angle. [16]
7. (a) State and prove Kennedy's theorem.
- (b) A Watt 'walking-beam' mechanism is shown in figure 7b. Determine the velocity of the slider if the crank $O_2A = 2$ cm, $AB = 8.5$ cm, $BC = 7.5$ cm. Use instant centre method. [6+10]

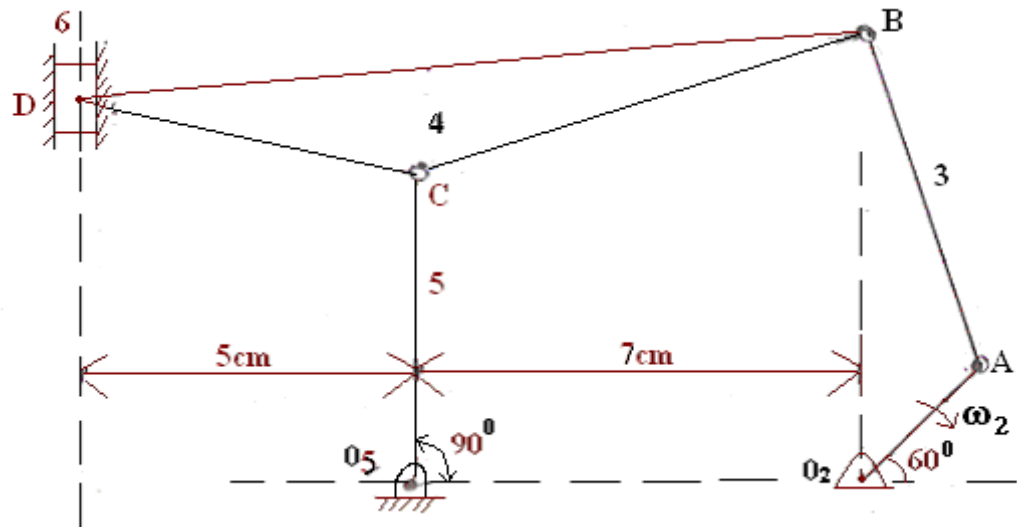


Figure 7b

8. (a) 'Slider-crank mechanism is only a special case of four-bar linkage mechanism.' Justify the statement.
- (b) Define Grashoff chain and inversion of mechanism.
- (c) In a four-bar linkage the lengths of the driver crank, coupler, follower crank and the fixed link are 100 mm, 200 mm, 300 mm and L_0 respectively. Find the range of values for L_0 so as to make it a:
- Crank rocker mechanism and
 - Crank-crank mechanism.

[5+5+6]
