

**B.TECH.**

**THEORY EXAMINATION (SEM-VIII) 2016-17**

**ADVANCE SYNTHESIS OF MECHANISMS**

**Time : 3 Hours**

**Max. Marks : 100**

**Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.**

**SECTION – A**

**1. Attempt the following:**

**10 x 2 = 20**

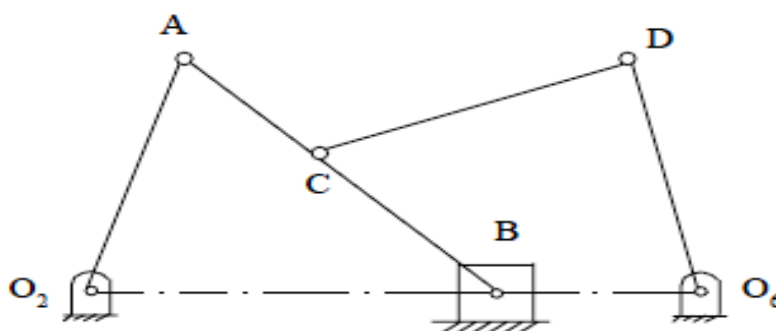
- What is the degree of freedom?
- Explain the transmission angle.
- Define the term dimensional synthesis.
- Write down the equation for coupler curve.
- Write the short notes on chebyshev spacing of accuracy points.
- What is the coupler curve?
- What is the mechanical error in linkage?
- What is the approximate mechanism?
- Write the Freudenstein's equation for velocity analysis.
- Explain exact straight line mechanism.

**SECTION – B**

**2. Attempt any five of the following questions:**

**5 x 10 = 50**

- Discuss the procedure of five accuracy point's synthesis of crank and follower mechanism.
- Discuss the procedure of designing a four bar function generator with three accuracy points.
- Design a slider crank mechanism in which two successive angular displacements  $Q_{12}$  and  $Q_{23}$  of the crank produce, respectively two successive linear displacements  $S_{12}$  and  $S_{23}$  of the follower.
- Explain briefly with the help of neat sketches working and application of one planar and one spatial mechanism.
- Explain with the help of neat sketches cognate linkages and their applications
- Design a four bar linkage to transfer a link AB through three specified positions  $A_1B_1$ ,  $A_2B_2$  and  $A_3B_3$ .
- Locate all the instantaneous centres of rotation of the mechanism shown in Fig.



- Design a four bar linkage in which two successive clockwise angular displacements of  $20^\circ$  and  $30^\circ$  of the crank produce respectively, two successive angular displacements  $10^\circ$  and  $15^\circ$  of the follower.

**Attempt any two of the following questions:****2 x 15 = 30**

3. Design a slider crank mechanism so that the displacement of the slider is proportional to the square of crank rotation in the interval  $45^\circ \leq \theta \leq 135^\circ$ . Use the three point Chebyshev's spacing.
4. Synthesize a four bar linkage that will generate a function  $Y = X^{1.5}$ ,  $1 \leq X \leq 4$ . Take three accuracy points.  $\theta_0 = 30^\circ$ ,  $\phi_0 = 90^\circ$  and  $\Delta\phi = \Delta\theta = 90^\circ$ , where  $\theta_0$  and  $\phi_0$  respectively represent the initial angular positions of the input and output crank.  $\Delta\theta$  and  $\Delta\phi$  are respectively the ranges of angular movements of the input and output crank.
5. Explain with the help of neat sketches one approximate and one exact straight line mechanism.

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