

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

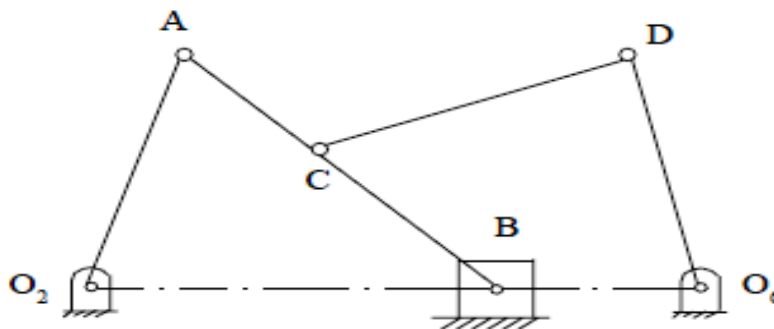
- What is the degree of freedom?
- Explain the transmission angle.
- Define the term dimensional synthesis.
- Write down the equation for coupler curve.
- Write the short notes on chebyshev spacing of accuracy points.
- What is the coupler curve?
- What is the mechanical error in linkage?
- What is the 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° and 30° of the crank produce respectively, two successive angular displacements 10° and 15° of the follower.

SECTION – C

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 θ_0 and ϕ_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.