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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**

(a) What is the degree of freedom?

(b) Explain the transmission angle.

(c) Define the term dimensional synthesis.

(d) Write down the equation for coupler curve.

(e) Write the short notes on chebyshev spacing of accuracy points.

(f) What is the coupler curve?

(g) What is the mechanical error in linkage?

(h) What is the approximate mechanism?

(i) Write the Freudenstein's equation for velocity analysis.

(j) Explain exact straight line mechanism.

SECTION – B

2. Attempt any five of the following questions: **5 x 10 = 50**

(a) Discuss the procedure of five accuracy point's synthesis of crank and follower mechanism.

(b) Discuss the procedure of designing a four bar function generator with three accuracy points.

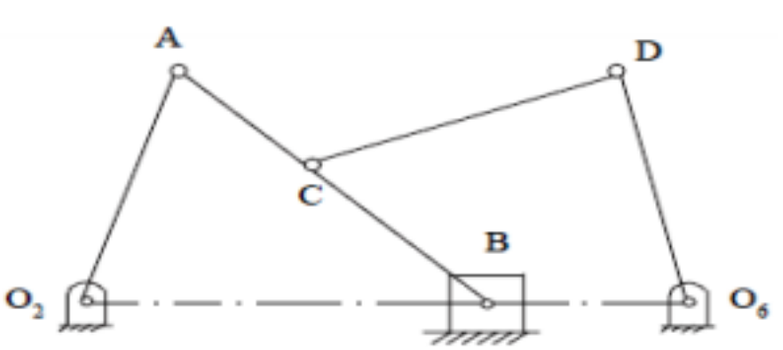
(c) Design a slider crank mechanism in which two successive angular displacements Q_{12} and Q_{23} of the crank produce, respectively two successive linear displacements S_{12} and S_{23} of the follower.

(d) Explain briefly with the help of neat sketches working and application of one planar and one spatial mechanism.

(e) Explain with the help of neat sketches cognate linkages and their applications

(f) Design a four bar linkage to transfer a link AB through three specified positions A_1B_1, A_2B_2 and A_3B_3.

(g) Locate all the instantaneous centres of rotation of the mechanism shown in Fig.



(h) 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 $45° \leq \theta \leq 135°$. 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. $\theta_0 = 30°$, $\varphi_0 = 90°$ and $\Delta\varphi = \Delta\theta = 90°$, where θ_0 and φ_0 respectively represent the initial angular positions of the input and output crank. $\Delta\theta$ and $\Delta\varphi$ 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.