

ME sem I | CBCS | mech | FH2019

28/05/2019  
Max Marks: 80

**Duration:** 3 hours

**Note:** Attempt any 4 questions

Figures to the right indicate full marks

Assume data wherever required and mention it clearly

- (i) Derive two point coupler curvature equation 10
- Q1 (ii) Design Four Bar Linkage to meet the following requirements 10

Input Crank	Output Crank
$\Phi = 30^\circ$	$\Psi = 120^\circ$
$\Phi^0 = 1\text{rps}$	$\Psi^0 = 5\text{rps}$
$\Phi^{00} = 0\text{rps}^2$	$\Psi^{00} = 15\text{rps}^2$

- Q2 (i) Short note on the following 10

(i). Lower pairs and higher pairs with sketches. (ii). Crubler Criterion

(iii) Degrees of freedom

- (ii) Q2 Synthesis a slider crank mechanism using relative pole techniques. The positions are 10

$$\Theta_{12} = 30^\circ$$

$$\Theta_{12} = 45^\circ$$

$$S_{12} = 25\text{mm}$$

$$S_{23} = 25\text{mm}$$

Off s off set == 10mm The input  $\Theta$  moves in counter clockwise direction and the slider over moves away from the fixed center

- Q3 (i) Design Four Bar Linkage to meet the following requirements 10

Input Crank	Output Crank
$50^\circ$	$45^\circ$
$70^\circ$	$75^\circ$
$90^\circ$	$120^\circ$

- (ii) Derive two point coupler curvature equation 10

- Q4 The coordinates of six poles corresponding to four successive finite positions  $(P P P P)$  of a moving plane are as follows:- 20

$$P_{12}(50, 94), P_{13}(71, 65), P_{14}(38, 63)$$

$$P_{23}(62, 42), P_{24}(00, 45), P_{34}(118, 0)$$

Select one of the opposite pole quadrilateral and construct circle point curve for the first position of the coupler (Take minimum 8 points other than poles). Select the circle point C at  $P_{24}$  and locate the corresponding center point  $C_0$ . all coordinates are in mm.

- Q5 Design four bar linkages to generate the function  $y = x^{3/2}$  for the range  $x = 2$  to  $x = 6$ . 20  
The input and output sectors of angles are  $60^\circ$  and  $90^\circ$  respectively. Determine angle co-ordination. Take three accuracy points
- Q6 Write short notes on (Any Two)
- (i) Explain the procedure to get approximate dwell linkages using four accuracy points with suitable sketches 10
- (ii) Explain the following 10  
(i). Classification of Mechanisms  
(ii). Equivalent mechanisms
- (iii) (i) Synthesis of a mechanism 10  
(ii) Properties of a pole triangle

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