

Total No. of Questions - [06]

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May 2022 / INSEM+ENDSEM
F. Y. M. TECH. (MECHANICAL DESIGN ENGINEERING)
(SEMESTER - II)
COURSE NAME: ANALYSIS AND SYNTHESIS OF
MECHANISM
COURSE CODE: MEPA12203
(PATTERN 2020)

Time: [3 Hours]

[Max. Marks: 60]

(*) Instructions to candidates:

- 1) All Questions are compulsory
- 2) Figures to the right indicate full marks.
- 3) Use of scientific calculator is allowed
- 4) Use suitable data where ever required

Q.1) a) Determine degree of freedom of mechanism shown in figure 1 6 Marks

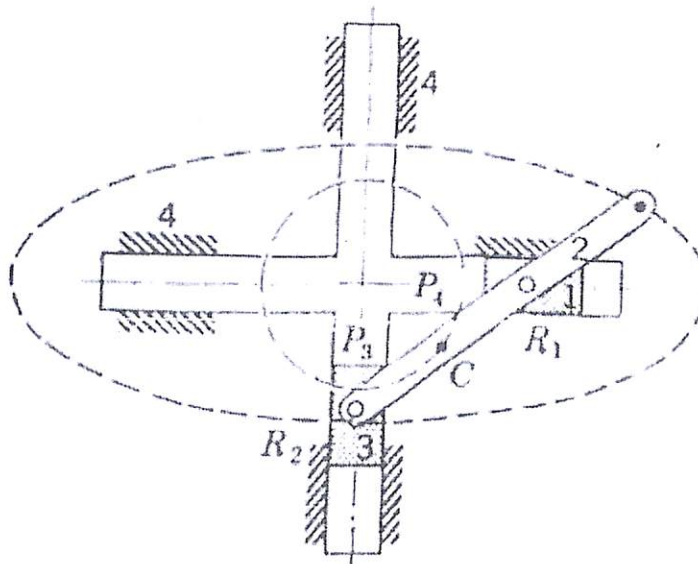


Figure 1

b) What is the Kinematic Analysis of Planar Mechanisms? 4 Marks
Explain in brief.

Q 2) a) A mechanism is shown in figure 2. Determine angular velocity 6 Marks
of O_6D . Take $\omega_2 = 10 \text{ rad/sec}$.

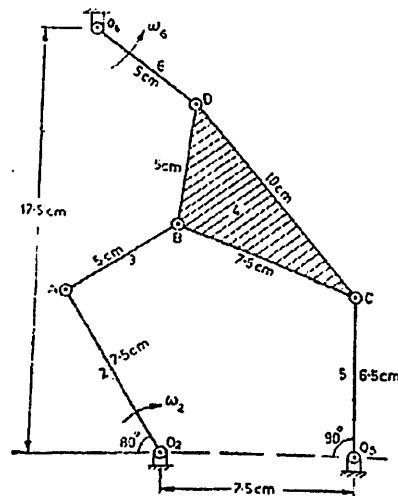


Figure 2

b) Determine the angular velocity of BCD link for **the question 2 a**. 4 Marks

Q.3) a) Explain in detail Bobillier construction. 6 Marks
b) Describe Euler-Savary equation. 4 Marks

Q.4) a) Design a slider-crank mechanism to coordinate three positions of the input link and the slider for the following angular and linear displacements of the input link and the slider respectively:
 $\theta_{12} = 40^\circ, \theta_{13} = 120^\circ, s_{12} = 180 \text{ mm}$ and $s_{13} = 300 \text{ mm}$
Take eccentricity of the slider as 20 mm. 6 Marks

b) Determine the link lengths of the designed slider-crank mechanism and draw the neat sketch for **question 4 a**. 4 Marks

Q.5) a) Design a four-link mechanism using analytical method to coordinate three positions of the input and the output links for the following angular displacements:
 $\theta_1 = 20^\circ, \theta_2 = 35^\circ, \theta_3 = 50^\circ, \phi_1 = 25^\circ, \phi_2 = 35^\circ$ and $\phi_3 = 50^\circ$ 6 Marks

b) Determine the link lengths of the designed four bar linkage and draw the neat sketch for **question 5 a**. 4 Marks

Q.6) a) Explain in detail the equation of coupler curve. 6 Marks
b) What is double points and symmetry? 4 Marks