PVP 12

Code: **MEMD1T1**

I M.Tech - I Semester - Regular Examinations – April, 2015

ADVANCED MECHANISMS
(MACHINE DESIGN)

Duration: 3 hours Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

1. a) Explain planar, spherical and spatial mechanisms. 7 M

   b) Explain procedure for the determination of instantaneous centers for a complex mechanisms with an example. 7 M

2. a) Explain the Hartman's construction for determining the diameter of inflection circle with suitable example. 6 M

   b) Find the inflection circle for the motion of the coupler of the slider crank linkage as shown in the Figure 1. Given $AO_2 = 50mm$, $AB = 537mm$ 8 M

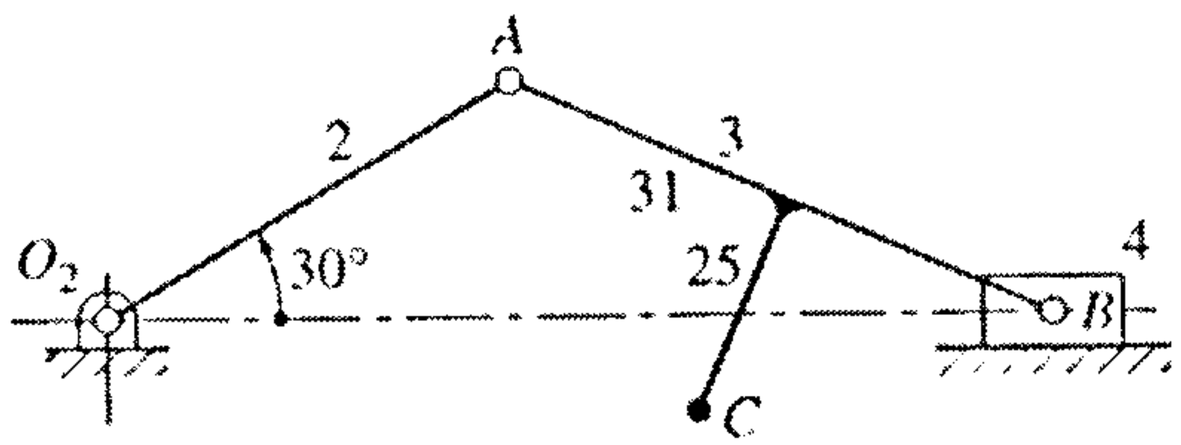

Figure 1

3. Determine the polode curvature for the coupler link of the four bar mechanism shown in Figure 2. All dimensions are in mm. 14 M

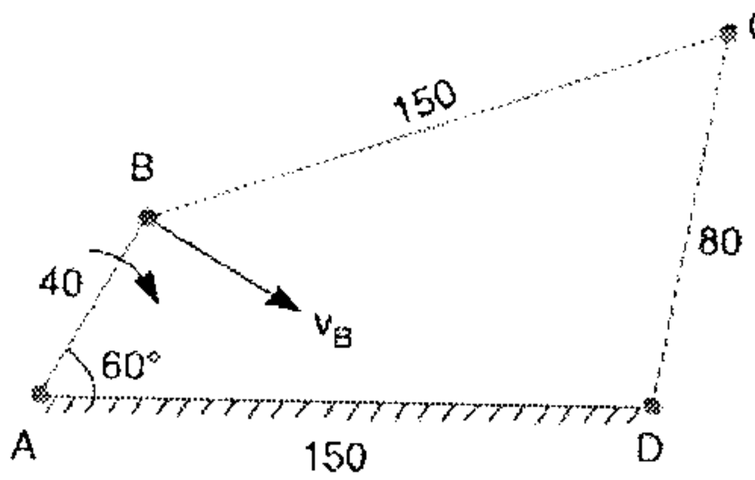

Figure 2

4. a) Explain briefly the construction of Burmester's curve for guiding a body through four distinct positions. 7 M

b) Synthesize a four bar linkage that will satisfy the following relation $y = x^{1.2}$ for $1 \leq x \leq 5$ for three precision points. Take $\varphi_s = 30^o$, $\psi_s = 60^o$ and $\Delta\varphi = \Delta\psi = 90^o$. 7 M

5. a) Explain Overlay's method used for synthesis of mechanisms. 7 M

b) Explain briefly the Roberts' theorem for path generation. 7 M

6. Determine the crank and coupler lengths of a four bar mechanism to meet the following specifications of position, velocity and acceleration (using Freudenstien's Equation)

Input: θ_2= ?, ω_2 = 15 rad/sec, α_2 = 0 rad/sec^2

Output: θ_4 = 45°, ω_4 = 15 rad/sec, α_4 = 0 rad/sec^2

When the lengths of fixed link and the follower are 50 and 60 mm respectively. 14 M

7. a) Explain friction in links. 4 M

b) The four– bar linkage of Figure 3 has crank 2 driven by an input torque M_{12} an external load P = 534 N acts at point Q on link 4 as shown in Figure 3. For the particular position of the linkage shown, find all the constraint forces and their reactions necessary for this to be a position of equilibrium. 10 M

O_2A = 30mm; AB = 100mm; O_4B=50mm; O_2O_4=70mm; O_4Q=25 mm.

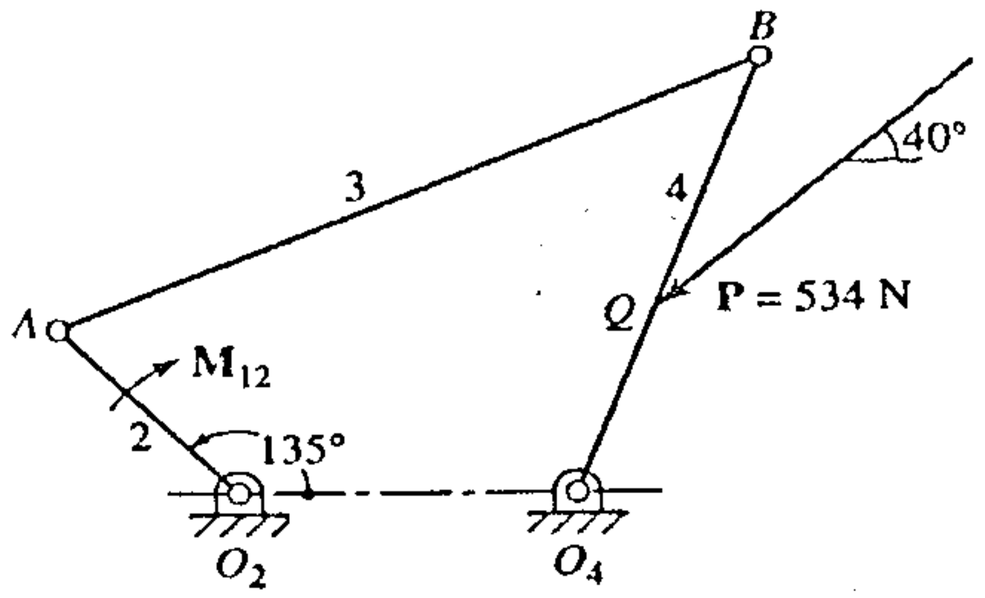

Figure 3

8. Explain with example implementing the DH convention. 14 M