PVP 12

Code: **MEMD1T1**

I M.Tech - I Semester - Regular Examinations – February-2016

ADVANCED MECHANISMS
(MACHINE DESIGN)

Duration: 3 hours Max. Marks: 70

Answer any FIVE questions. All questions carry equal marks

1. a) Define spherical mechanism and explain any one spherical mechanism with neat sketch. 7 M

   b) Define degrees of freedom. Explain the significance of negative degrees of freedom. 7 M

2. Find the inflection circle for motion of the coupler of the double slider mechanism shown in the Figure-1. Given AB= 125 mm. 14 M

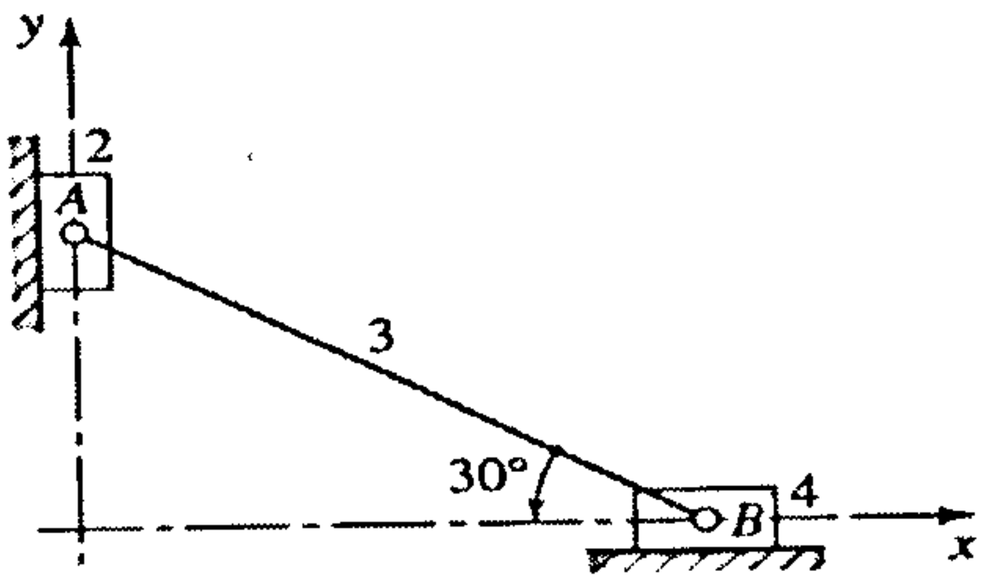

Figure-1

3. a) Derive Hall's equation. 7 M

b) State and prove Freudenstein's collineation axis theorem. 7 M

4. Design a four bar mechanism to coordinate the motions of the input and the output links governed by a function $y=2\log x$ for $2 < x < 12$. Take $\Delta x = 1$. Assume suitable ranges for θ and φ. 14 M

5. Design a slider crank mechanism to have the following coordinated motion of slider and the crank: (use graphical method) 14 M

$\varphi_{12}= 50^{o}$, $\varphi_{13}= 110^{o}$, $S_{12}= 2cm$, $S_{13}=4cm$

6. Synthesize a four bar mechanism which will satisfy the following specifications using method of components

$\omega_2 = 1$ rad/s, $\omega_3 = -2$ rad/s, $\omega_4 = 3$ rad/s,

$\alpha_2 = 3$ rad/sec^2, $\alpha_3 = 1$ rad/sec^2, $\alpha_4 = 2$ rad/sec^2

Take the distance between the pivoted points as 10 units. 14M

7. The slider-crank mechanism of Figure-2 has an external load P= 445 N acting horizontally at point Q on link 4. Determine the torque that must be applied to link 2 to hold the mechanism in static equilibrium. 14 M

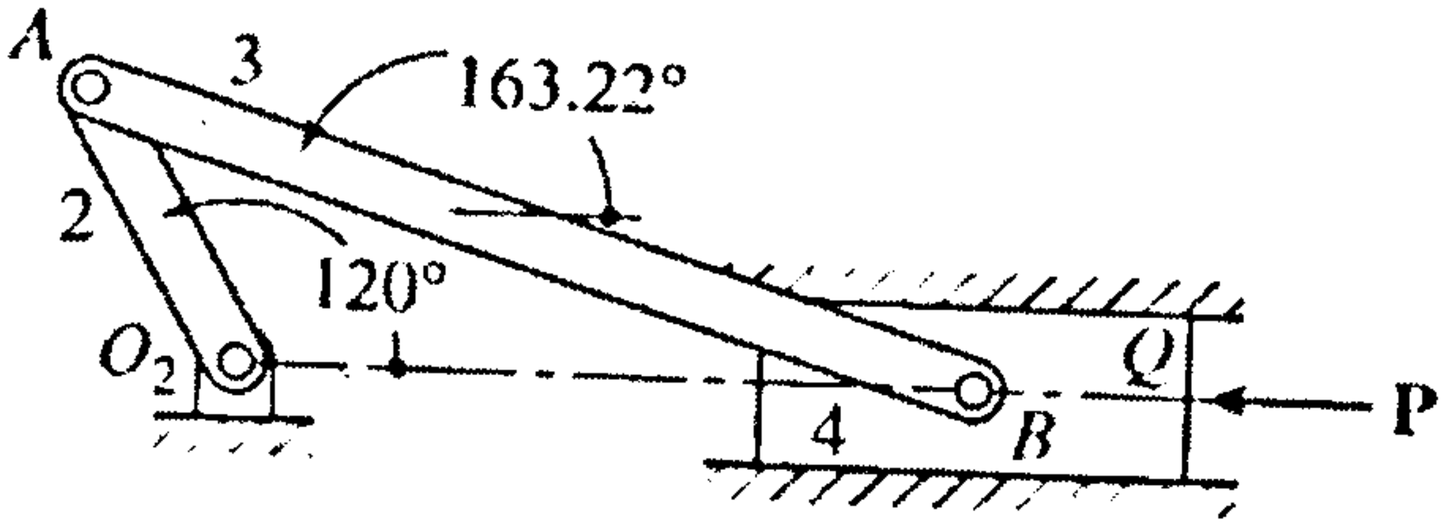

Figure- 2

8. Explain direct and inverse kinematic analysis of serial manipulators. 14 M