PVP 12

Code: **MEMD1T1**

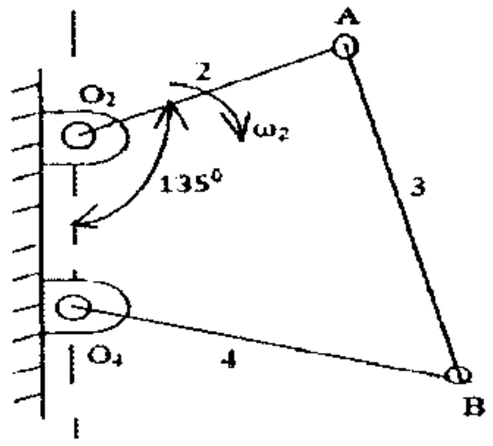
## I M.Tech - I Semester - Regular Examinations – March 2014

## ADVANCED MECHANISMS
### (MACHINE DESIGN)

Duration: 3 hours Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

1. The angular velocity of link 2 of the drag-link mechanism shown in the figure is 16 rad/s . Plot a polar velocity diagram for the velocity of point B for all crank positions. Check the positions of maximum and minimum velocities by using Freudenstein's theorem.




$R_{AO2}$=350mm, $R_{BA}$ = 425mm,
$R_{O4O2}$ = 100mm, $R_{BO4}$ = 400mm. 14 M

2. Explain the following
   a) Application of inflection circle to kinematic analysis. 7 M
   b) Hartmann's construction. 7 M

3. Design a spring-operated four-bar linkage to support a heavy lid like the trunk lid of an automobile. The lid is to swing through an angle of 80° from the closed to the open position. The springs are to be mounted so that the lid will be held closed against a stop, and they should also hold the lid in a stable open position without the use of a stop. 14M

4. a) A rocker of a crank-rocker linkage is to have a length of 500 mm and swing through a total angle of 45° with a time ratio of 1.25 Determine a suitable set of dimensions for $r_1$, $r_2$ and $r_3$. 7 M

b) Explain Burmester's curve with a neat sketch. 7 M

5. a) Explain FREUDENSTEIN'S EQUATION and derive it? 7 M

b) Derive the ROBERTS-CHEBYCHEV theorem? 7 M

6. Explain the function of Relative- rotocenter and Overlay's methods with neat sketch? 14 M

7. Explain the following

a) Static force analysis with friction. 7 M

b) Force and moment balancing of linkages. 7 M

8. a) Find the Denavit-Hartenberg parameters for the Hooke. 7 M

b) Explain Direct and Inverse Kinematic analysis. 7 M