

Code: MEMD1T1

I M.Tech-I Semester-Regular Examinations-April 2013

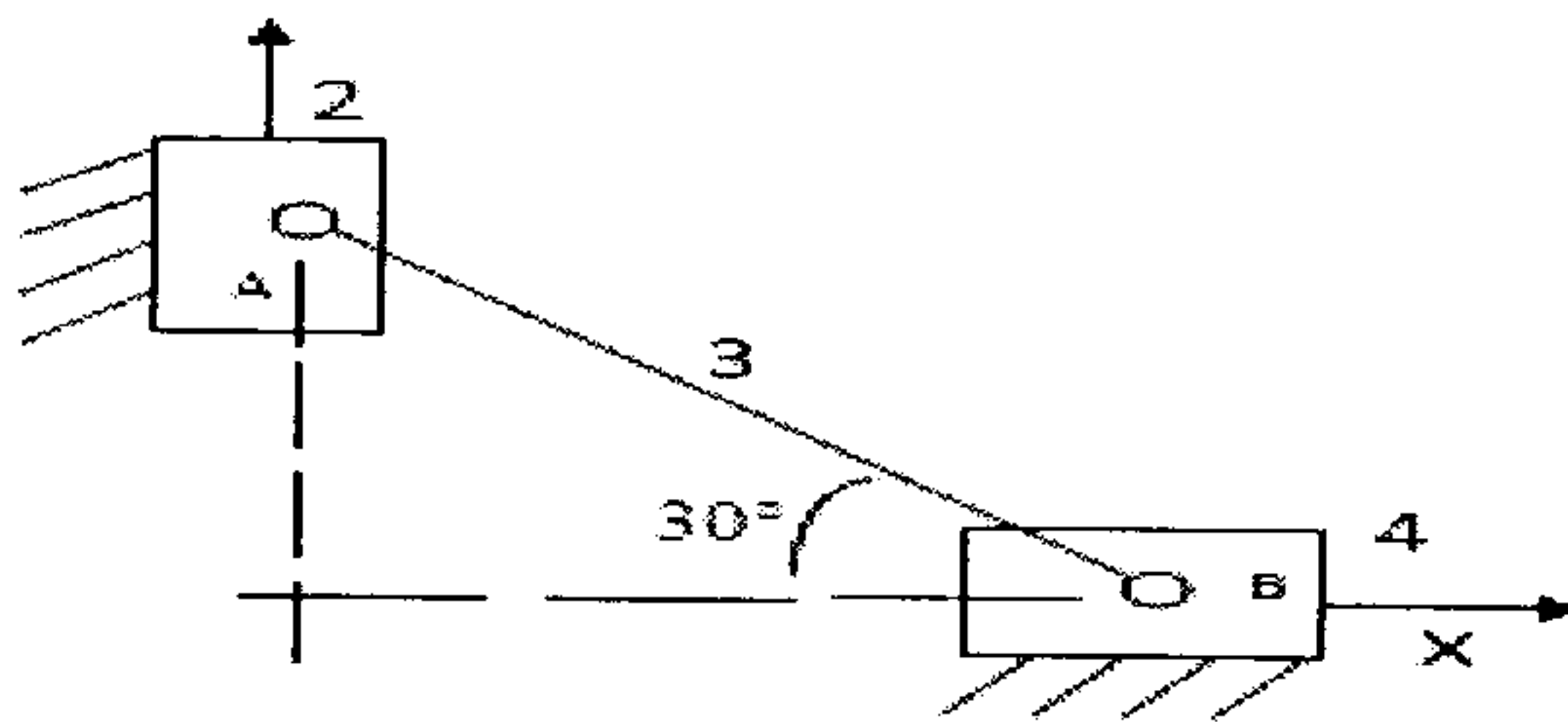
**ADVANCED MECHANISMS
(MACHINE DESIGN)**

Duration: 3 hours

Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

1. Find the inflection circle for motion of the coupler of the double-slider mechanism shown in the figure, select several points on the centrode normal and find their conjugate points. Plot portions of the paths of these points to demonstrate for yourself that the conjugates are indeed the centers of curvature. 14 M



2. (a) Explain position analysis of an elbow manipulator with a neat sketch. 7 M
- (b) Explain spherical mechanism? Determine instantaneous center for complex mechanism. 7 M

3. In a slider crank mechanism the length of the crank and connecting rod are 200mm and 800mm respectively locate all the I-centers of the mechanism for the position of the crank when it has turned 30° from the inner dead center also find the velocity of the slider and the angular velocity of the connecting rod if the crank rotates 48 rad/s. 14 M
4. (a) Explain Bobillier's construction for locating the inflection circle. 7 M
- (b) Explain Polode curvature in the four bar mechanism. 7 M
5. (a) Explain Roberts-Chebyshev Theorem for cognate linkage. 7 M
- (b) Synthesis a Four bar linkage to give the following values for the angular velocity and the accelerations $\omega_2 = 200$ rad/s, $\omega_3 = 85$ rad/s, $\omega_4 = 130$ rad/s, $\alpha_2 = 0$ rad/s, $\alpha_3 = -1000$ rad/s, $\alpha_4 = -1600$ rad/s 7 M
6. Synthesize a function generator to solve the equation $y = 1/x$ over the range $1 \leq x \leq 2$ using three precision positions. 14 M
7. A gear train is composed of three helical gears with soft centers in line. The driver is a right hand helical gears

having a pitch radius of 2 inches a transverse pressure angle of 20° and the helix angle of 30° an idler gear in the train has the teeth cut left hand and pitch radius of 3.25 inch the idler transmits no power to its shaft. The driven gear in the train has the teeth cut right hand and a pitch radius of 2.50 inch if the transmitted force is 600 lb find the shaft forces acting on each gear. 14 M

8. (a) Explain DENAVIT-HARTENBERG notation with a neat sketch. 7 M
- (b) Explain Matrix velocity and acceleration analysis. 7 M