

Code: 9D15102

M.Tech I Semester Supplementary Examinations August 2016

ADVANCED MECHANISMS

(Machine Design)

(For students admitted in 2012, 2013, 2014 & 2015 only)

Time: 3 hours Max. Marks: 60

> Answer any FIVE questions All questions carry equal marks

- 1 (a) Derive the Kutzbach mobility equation for spatial mechanism.
 - (b) Prove that the rocker of a Groshoff linkage can never cross the line of frame.
- 2 What do you mean by inflection circle and explain the Hartmann's method of determining the inflection circle.
- 3 Determine the polode curvatures for the coupler link of a four bar mechanism with the following dimensions:

Flex link (AD) = 100 mm.

Input link (AB) = 30mm.

Coupler (BC) = 40 mm.

Output link (CD) = 60 mm.

Angle DAB = 60° .

- Explain the synthesis of a crank-rocker mechanism for a given degree of quick return action i.e. 4 for the prescribed value of crank angle and rocker angle.
- (a) Write notes on Horne's and Nelson's Motion Atlas' related to path generation.
 - (b) Explain the relative rotocenter method (two positions) for the synthesis of four bar function generator.
- Synthesize a four-bar linkage to meet the following specifications of position, velocity and 6 acceleration:

	Input link	Output link
Position (θ) degree	60	90
Velocity (ω) rad/sec	5	2
Acceleration rad/sec ²	2	7

Assume minimum length of the link = 100 mm.

- (a) Explain the D-H parameters of a spherical arm. 7
 - (b) Sketch and explain PUMA industrial robot manipulator.
- (a) Explain the Jacobian of the two-link revolute joined arm. 8
 - (b) Obtain the singularity of a two-link planar arm.