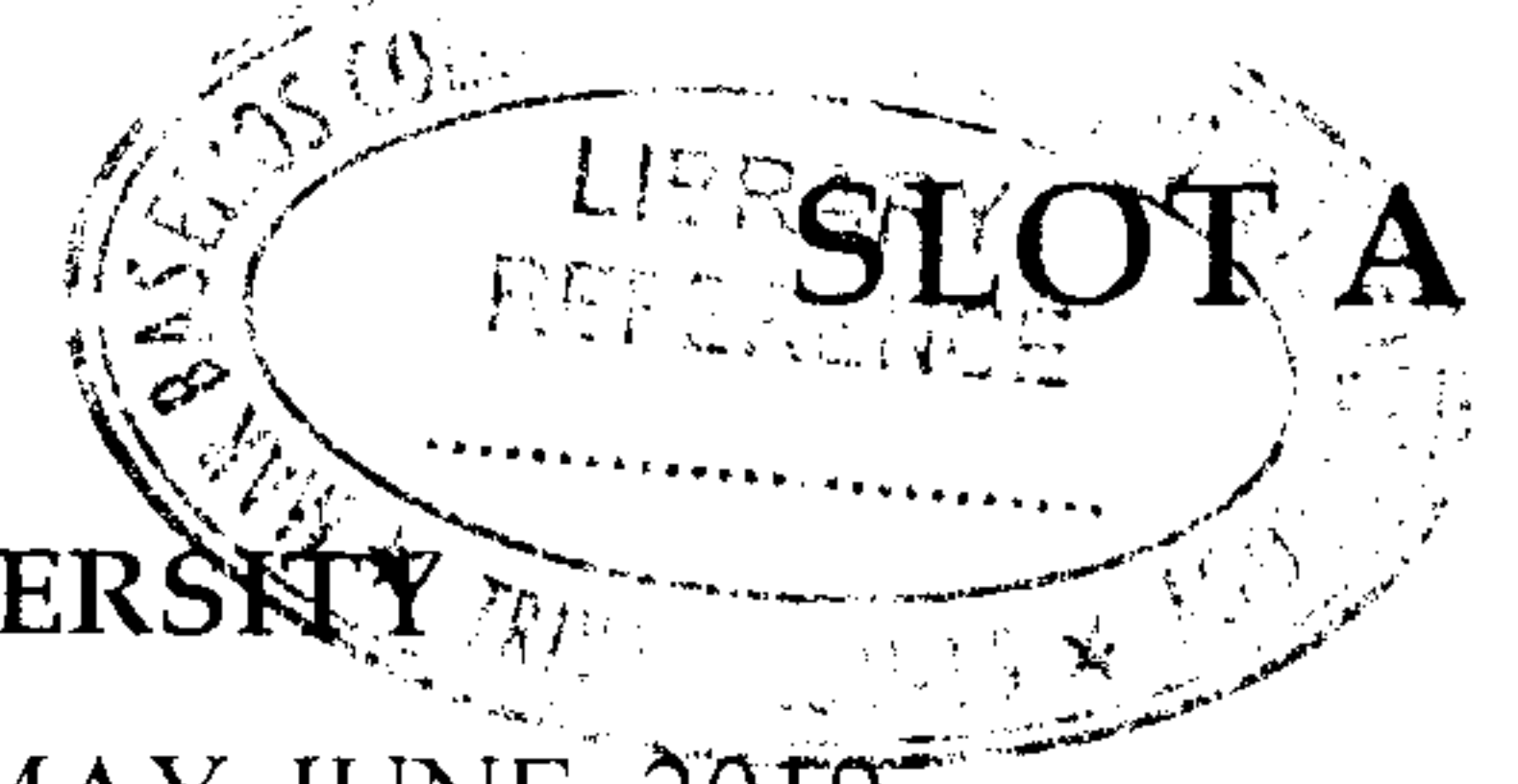


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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SECOND SEMESTER M.TECH DEGREE EXAMINATION, MAY-JUNE 2019

Branch: Mechanical Engineering

Stream(s):

Machine Design

Course Code & Name: 01ME6102 - ADVANCED THEORY OF MECHANISMS

Answer *any two full* questions from *each* part

Limit answers to the required points.

Max. Marks: 60

Duration: 3 hours

PART A

1. a. Derive the velocity and acceleration relationships for a slider crank mechanism using vector approach.(7 marks)
b. Explain Inflection circle (2 marks)
2. a. Explain ~~Bobilliers~~ ~~theorem~~.(2 marks)
b. Applying suitable geometrical construction to a four bar mechanism, prove Bobilliers theorem.(5 marks)
c. Explain collinear axis and Centre of curvature (2 marks)
3. a. What do you understand by the term complex mechanisms? Explain. (3 marks)
b. Derive the equation for the cubic of stationary curvature. (6 marks)

PART B

4. a. Explain multiple points and circle of foci (2 marks)
b. Define Robert Chebychev theorem.(2 marks)
c. Construct the four bar and five bar cognates of a four bar mechanism (5 marks)
5. a. Explain cross over shock and jump (2 marks)

- b. A dwell rise dwell cam has a rise of 3 cm with a cycloid motion of 140° of cam rotation. The follower is assembled with a 400 N/cm retaining spring which has sufficient pre load to prevent jumping. The follower train has an equivalent mass of 300 gm and equivalent stiffness of 7000 N/cm. Determine the follower response for a cam speed of 3000 r.p.m. (7 marks)
6. a. Explain position error (2 marks).
 b. Derive the equation for the contact force of an eccentric cam. (4 marks)
 c. Draw the dynamic behavior of polydyne cams. (3 marks)

PART C

7. a. How will you find out the minimum transmission angle of a four bar mechanism. (2 marks)
 b. Design a double lever mechanism to meet the following requirements. Also find the minimum transmission angle. Take the fixed link length as 75 mm. Show the designed mechanism in different positions. (10 marks)

Input angle (cw)			Output angle (cw)		
Θ_{12}	Θ_{13}	Θ_{14}	Φ_{12}	Φ_{13}	Φ_{14}
20°	50°	90°	10°	25°	45°

8. a. Derive the angular momentum of a rigid body in three dimensions. (8 marks)
 b. Explain the principle of impulse and momentum (2 marks)
 c. Explain Eulerian angles. (2 marks)
9. a. Derive Euler's equation of motion in three dimension.(7 marks)
 b. Explain steady precision of a gyroscope (2 marks)
 c. Explain the motion of an axi- symmetrical body under no force. (3 marks)