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PRESIDENCY UNIVERSITY, BENGALURU
SCHOOL OF ENGINEERING

Max Marks: 80

Max Time: 120 Mins

Weightage: 40 %

ENDTERM FINAL EXAMINATION

I Semester AY 2017-18

Course: **MEC 202 KINEMATICS OF MACHINES**

18 DEC 2017

Instructions:

- i. Write legibly
 - ii. Scientific and non programmable calculators are permitted
 - iii. No exchange of drawing instruments is allowed
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Part A

[4 Q x 6 M= 24 Marks]

1. Explain any one exact straight line mechanism with a neat sketch. Mention the number of links, relationship between the links and the link/point which is following straight line motion.
2. Derive the fundamental equation of correct gearing with the help of a neat sketch. Mention the two main types of steering gears.
3. Explain the application area and working of a Single Hooke's joint with a neat sketch. Mention the conditions for a Double Hooke's joint to have a constant velocity ratio.
4. Compare Spur Gears and Helical Gears.

Part B

[2 Q x 8 M= 16 Marks]

5. Define the following terms associated with a gear and represent them on a neat sketch:
(a) Circular Pitch (b) Diametrical Pitch (c) Module (d) Addendum (e) Dedendum (f) Full Depth of Teeth (g) Clearance (h) Face (i) Flank
6. Define the following terms associated with a cam and represent them on a neat sketch:
(a) Base circle (b) Trace point (c) Pitch Curve (d) Pressure angle (e) Pitch Point (f) Pitch Circle
(g) Prime Circle

Part C

[2 Q x 20 M= 40 Marks]

7. Draw the profile of a cam operating a roller reciprocating follower and with the following data:
Minimum radius of the cam = 30mm, Lift = 30mm and Roller diameter = 10mm.
The cam lifts the follower for 180° of the cam rotation with simple harmonic motion (SHM), followed by a dwell period of 30° . Then the follower lowers down during the next 120° rotation of the cam with simple harmonic motion (SHM) followed by a dwell period.

8. An epicyclic gear train is shown in figure 1. Determine the following:

Case 1: The speed and direction of the rotation of the ring gear D, if the arm rotates 90rpm anti-clockwise and gear A is fixed.

Case 2: The speed and direction of the rotation of the arm, if the ring gear D is fixed and the gear A is rotating at 46rpm clockwise.

Draw the motion analysis table for solving the same.

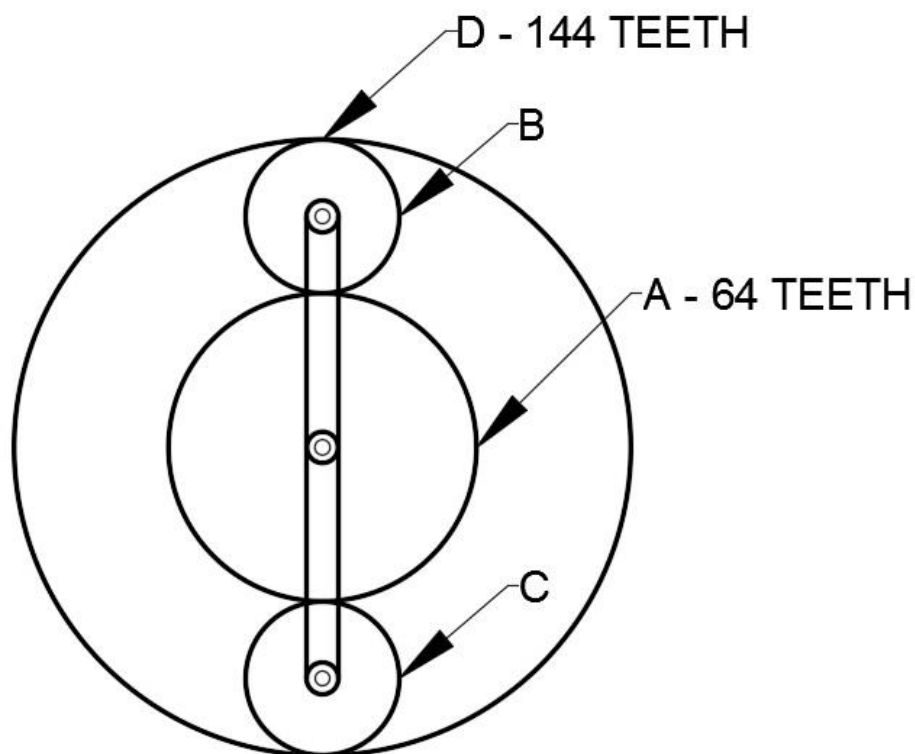


Figure. 1

TEST 2

Instructions:

- i. Write legibly
- ii. Scientific and non programmable calculators are permitted
- iii. Exchange of geometric instruments is not allowed

Part A

(10 Marks)

1. Find the absolute velocity of the **shaded** sliding link using a velocity polygon for the mechanism given in Figure 1.

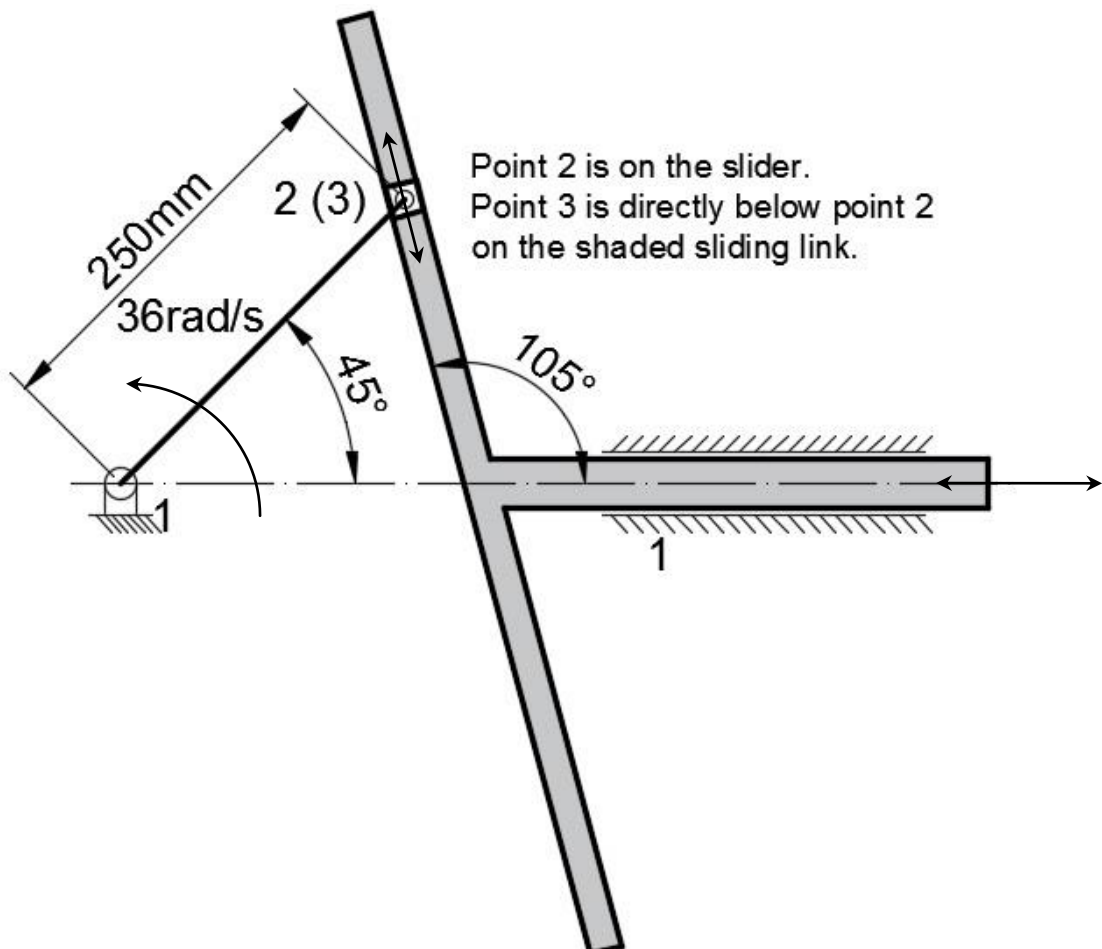


Figure 1

Part B

(12 Marks)

2. Find the absolute acceleration of the slider for the arrangement given in figure 2. At this instant, the slider moves with a sliding velocity of 0.5m/s towards A with a linear (sliding) **retardation** of 20m/s^2 . The link AD is rotating at 20rad/s in the clock-wise direction with an angular **retardation** of 100rad/s^2 .

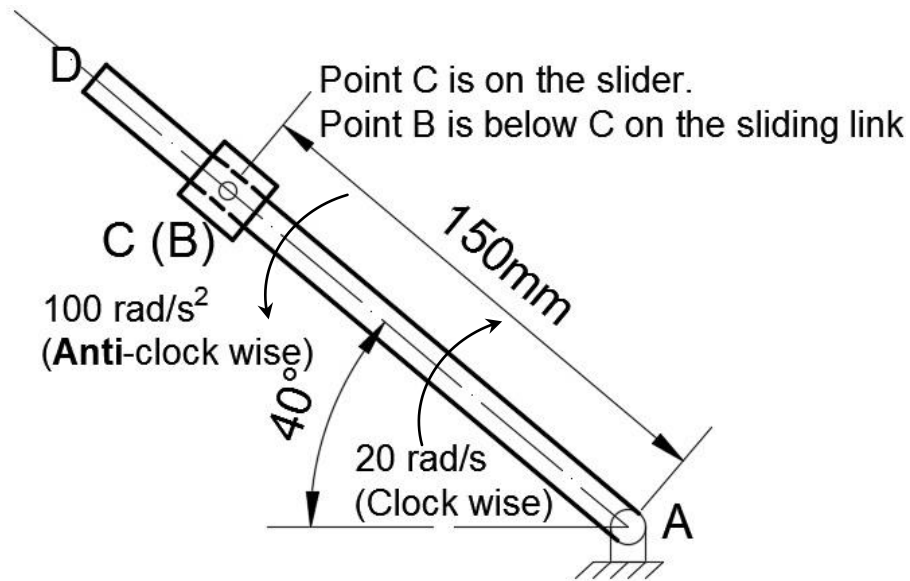


Figure 2

Part C

(18 Marks)

3. Find the absolute acceleration of the slider, for the mechanism shown in figure 3, using the construction of velocity and acceleration polygons.

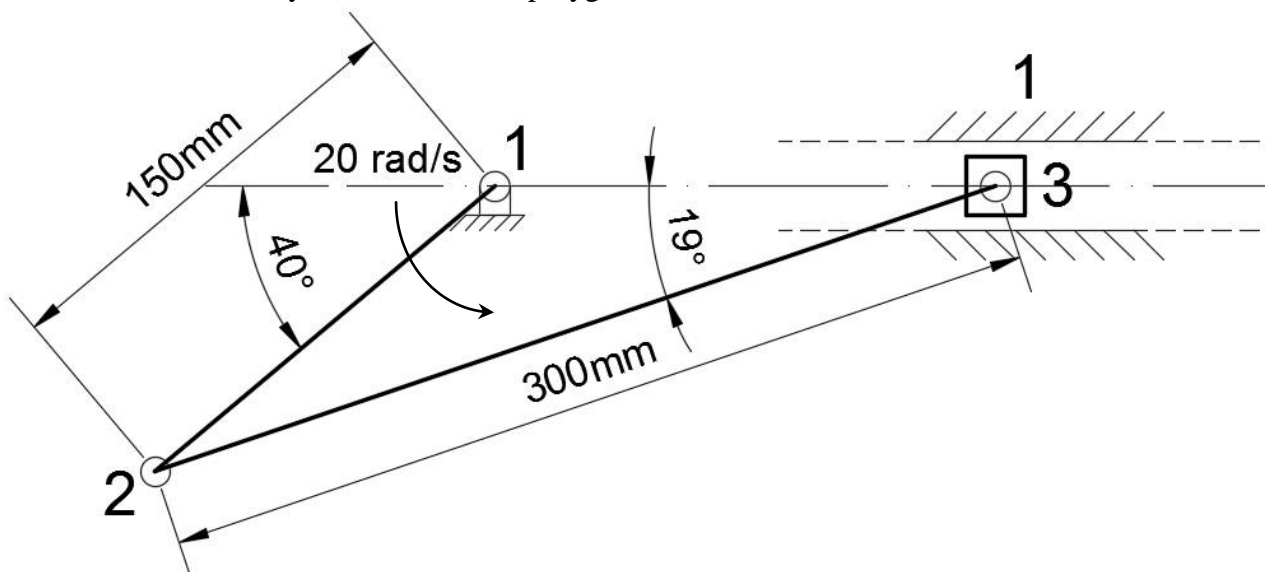


Figure 3