Code No: 154BF

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, August/September - 2022
KINEMATICS OF MACHINERY
(Common to ME, MCT)

Time: 3 Hours **Max.Marks:75**

Answer any five questions
All questions carry equal marks
- - -

1.a) What are the various types of constrained motions?
b) Differentiate between a machine and a structure.
c) What is a kinematic chain? Express the relation between the number of joints, pairs and links. [5+5+5]

2.a) Explain the gruebler's criterion implemented on plane mechanisms.
b) Explain the first inversion(reciprocating engine mechanism) of single slider chain mechanism. [7+8]

3.a) Explain about the three centres in line theorem.
b) Explain the klien's construction for determining the Coriolis acceleration component with a neat sketch. [5+10]

4. The slider C of the toggle mechanism as shown in figure 1 is constrained to move on a horizontal path. The crank O_1A rotates in the counter clockwise direction at a uniform speed of 180 rpm. O_1A=200 mm, AB=400mm, O_2B=300 mm, BC=600 mm. Determine the velocity of the slider, angular velocity of links AB,O_2B and BC, rubbing velocity on the pins of 25 mm diameter at A & C, torque required at crank O_1A for a force of 2 kN at C. [15]

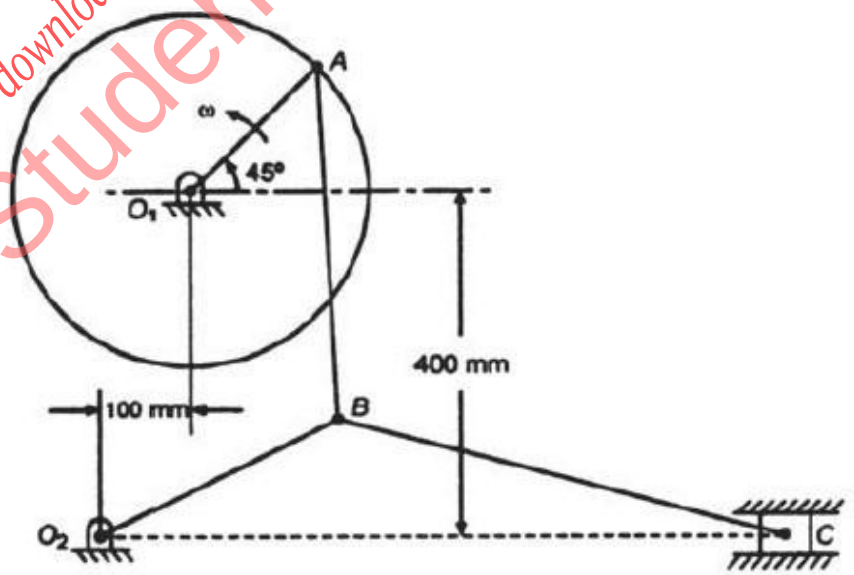

Figure 1

5.a) Explain the constructional details and application of peaucellier mechanism.

b) Derive the condition for correct steering mechanism of Ackermann's steering gear system. [7+8]

6.a) Classify the cam according to the motion of the follower.

b) Analyse the motion of the circular arc cam with flat faced follower. [7+8]

7.a) Derive the path of contact and arc of contact of pinion and gear and pinion and rack arrangement.

b) Write short notes on the following:

i) Forms of teeth

ii) Condition for minimum number of teeth to avoid interference. [7+8]

8. An epicyclic gear train consists of an arm and two gears A & B having 30 & 40 teeth respectively. The arm rotates about the centre of the gear A at a speed of 80 rpm counter clock wise (figure 2). Determine the speed of the gear B if

a) The gear A is fixed

b) The gear A revolves at 240 rpm clockwise instead of being fixed. [7+8]

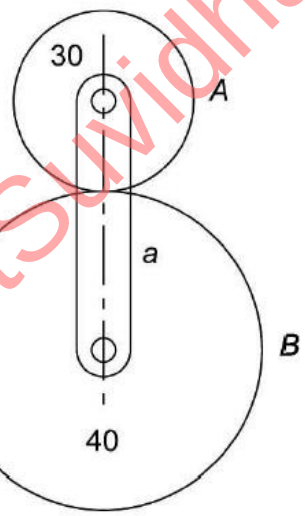

Figure 2

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