Code No: 154BF

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, July/August - 2021
KINEMATICS OF MACHINERY
(Common to ME, MCT)

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

Answer any five questions
All questions carry equal marks
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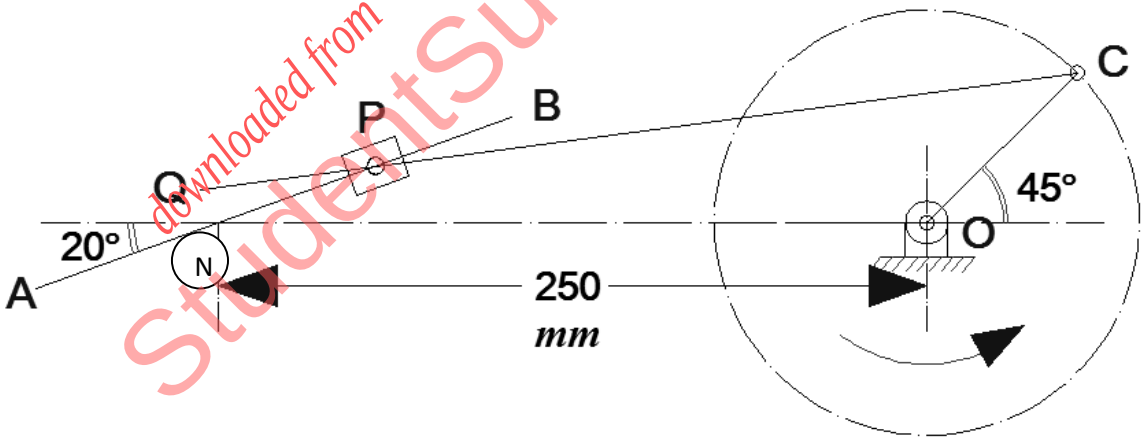
1. Distinguish between the terms 'Mobility' and 'Moveability'. State Gruebler's criterion for the mobility of a mechanism. [15]

2.a) A double slider mechanism is used to draw an ellipse with major axis equal to 20 cm and minor axis 15 cm. Set out the mechanism, and draw the locus of the points tracing the required ellipse.

b) Explain the different types of constraints between kinematic pairs, and give two examples for each. [8+7]

3. In the mechanism shown in figure, the crank OC is 75 mm long and makes 250 rpm. The link CP is 250 mm long, Q lies on the extension of CP, 62.5 mm from P, and the pin P is attached to a block which slides along AB. The link AB is pivoted at N. Find the velocity and acceleration of Q, and the angular velocity and angular acceleration of CQ for the position shown. [15]



4. A Hooke's joint connects two shafts which are having 160 ^{0} as the included angle. The driving shaft rotates uniformly at 1500 rpm. Find the maximum angular acceleration of the driven shaft, and the maximum torque required if the driven shaft carries a flywheel of mass 12 kg and 100 mm radius of gyration. [15]

5.a) Explain how the gear trains are classified. Give at least one distinguished feature of each type.

b) A pinion of 20 involute teeth and 125 mm pitch circle diameter drives a rack. The addendum of both pinion and rack is 6.25 mm. What is the least pressure angle which can be used to avoid interference? With this pressure angle, find the length of the arc of contact and the minimum number of teeth in contact at a time. [7+8]

6.a) Compare the merits and demerits of the different types of followers used with cams.

b) A symmetric tangent cam operates a roller follower. Least radius of the cam = 30 mm; Roller radius = 15 mm; Angle of ascent = 75 ^{0}; Total lift = 15 mm; Speed of camshaft = 600 rpm; Determine the principal dimensions of the cam. [7+8]

7. Compare spur gears, helical gears, and bevel gears with regard to their applications, advantages, and limitations. [15]

8. The lengths of crank and connecting rod of a horizontal reciprocating engine are 100 mm and 500 mm respectively. The crank rotates at 400 rpm clockwise. Determine analytically the position of crank from the inner dead center for zero acceleration of the piston.[15]

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