

Code No: 154BF

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, August/September - 2021

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 is the significance of degrees of freedom of a kinematic chain when it functions as a mechanism? Give examples.
b) Sketch and explain various inversions of a four bar chain. [5+10]
- 2.a) Explain Grubler's criterion for determining degree of freedom for mechanisms.
b) In a crank and slotted lever quick return motion mechanism, the distance between the fixed centres is 240 mm and the length of the driving crank is 120 mm. Find the inclination of the slotted bar with the vertical in the extreme position and the time ratio of cutting stroke to the return stroke. If the length of the slotted bar is 450 mm, find the length of the stroke if the line of stroke passes through the extreme positions of the free end of the lever. [7+8]
- 3.a) What is Coriolis component of acceleration? How is it determined? Explain.
b) Explain the procedure to determine the velocity and acceleration of a slider crank mechanism by Klein's construction. [7+8]
4. What is the condition for correct steering? Sketch and show the two main types of steering gears and discuss their relative advantages. [15]
5. List the names of approximate straight line motion mechanisms and explain each one of them. [15]
6. A tangent cam with a base circle radius of 25 mm operates a roller follower whose radius is 10 mm. The line of stroke of the follower passes through the axis of the cam. The angle between the tangential faces of the cam is 60° , speed of the cam is 200 r.p.m and the lift of the follower is 15 mm. Calculate the principal dimensions of the cam. Also, determine the accelerations of the follower at the beginning of the lift and at the apex of the circular nose. [15]
- 7.a) Discuss briefly the various types of belts used for the transmission of power.
b) Two parallel shafts, whose centre lines are 4.8 m apart, are connected by open belt drive. The diameter of the larger pulley is 1.5 m and that of smaller pulley 1 m. The initial tension in the belt when stationary is 3 kN. The mass of the belt is 1.5 kg / m length. The coefficient of friction between the belt and the pulley is 0.3. Taking centrifugal tension into account, calculate the power transmitted, when the smaller pulley rotates at 400 r.p.m. [7+8]
- 8.a) Differentiate between helical gears and bevel gears.
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]