

## B. Tech Odd Semester Examination, February, 2023

### Agricultural Engineering

(5th Semester)

Course No.: AE-501

**(Kinematics and Theory of Machines)**

*Full Marks: 50*

*Pass Marks: 25*

*Time: 2 hours*

- Radius of crank is 120 mm. Find the ratio of time of cutting to the return stroke. 10
4. Define Governor. Explain the working principle of governor. What are the types of Governor? Classify dynamometers with suitable examples. 10
5. What are the different types of friction clutches? Considering uniform pressure theory and uniform wear theory find the expressions for Torque, Mean radius. 10
6. A dry plate clutch transmits 7.5 kW at 900 rpm. The axial pressure is limited to  $0.07 \text{ N/mm}^2$ . If the coefficient of friction is 0.25. Find:
- Mean radius and face width of the friction lining assuming the ratio of the mean radius to the face width as 4, and
  - Outer and inner radii of the clutch plate. 10
7. What are the different types of gears? Find train value and velocity ratio of each. In an epicyclic gear train, an arm carries two gears A and B having 36 teeth and 45 teeth respectively. If the arm rotates at 150 rpm in anticlockwise direction about the centre of the gear A which is fixed, determine the speed of gear B. If gear A instead of being fixed makes 300 rpm in clockwise direction, what will be the speed of gear B? 10
8. What is Corrioli's acceleration component? In which cases does it occurs? How is it determined? Enumerate different types of cams and followers. 10

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- Note:**
- Attempt any five questions.
  - Begin each answer in a new page.
  - Answer parts of a question at a place.
  - Assume reasonable data wherever required.
  - The figures in the right margin indicate full marks for the question.
  - All the mathematical symbols and abbreviations have their usual meanings.
1. Define kinematic link. What are its types? Enumerate about lower pair and higher pair. 10
2. Define degree of freedom. State Grubler's criterion for degree of freedom of planar mechanism. Find degree of freedom, rotation, translation, constraint for
- Sphere on a plane
  - Cylinder inside a block
  - Sphere on sphere 10
3. Explain the crank & slotted quick return motion mechanism. A crank and slotted lever mechanism used in shaper has a centre at a distance of 300 mm between the center of oscillation of crank.

Turn Over