

Code No: R1622031

**R16****SET - 1****II B. Tech II Semester Supplementary Examinations, November - 2018****KINEMATICS OF MACHINERY**

(Com to ME, AME, MIN)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. Answer **ALL** the question in **Part-A**3. Answer any **FOUR** Questions from **Part-B**

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**PART -A**

1. a) Explain the terms : (i) Mechanism (ii) Higher pair (3M)
- b) What are the disadvantages of a Davis steering gear mechanism? (2M)
- c) How do you determine the direction of coriolis component of acceleration? (2M)
- d) Define the following terms for a cam mechanism: pressure angle, base circle, angle of ascent and offset. (3M)
- e) What do you understand by the term 'interference' as applied to gears? (2M)
- f) Explain the phenomena of 'slip' and 'creep' in a belt drive. (2M)

**PART -B**

2. a) Explain different types of constrained motion. (7M)
- b) Describe the inversions of slider crank chain when (7M)
  - i) Sliding pair is fixed
  - ii) crank is fixed
3. a) Show that the pantograph can produce paths exactly similar to the ones traced out by a point on a link on an enlarged or a reduced scale. (7M)
- b) Two shafts are connected by a Hooke's joint. The driving shaft revolves uniformly at 500rpm. If the total permissible variation in speed of a driven shaft is not to exceed = 6% of the mean speed, find the greatest permissible angle between the center lines of the shafts. Also determine the maximum and minimum speeds of the driven shaft. (7M)
4. a) In a Whitworth Quick return motion, a crank AB rotates about a fixed center A. The end B operates a slider reciprocating in a slotted link, rotating about a fixed center D, 40 mm vertically above A. The crank AB which is 90mm long rotates in a clockwise direction at a speed of 150rpm. Find the angular acceleration of the slotted link for the configuration in which AB has turned an angle of 45° past its lowest position. (7M)
- b) Explain in brief about instantaneous center of rotation (7M)

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5. A cam, with a minimum radius of 50 mm, rotating clockwise at a uniform speed, is required to give a knife-edged follower the motion as described below: (a) To move outwards through 40 mm during  $100^\circ$  rotation of the cam; (b) to dwell for next  $80^\circ$  (c) To return to its starting position during next  $90^\circ$  and (d) To dwell for the rest period of revolution. Draw the profile of the cam (i) When the line of stroke of the follower passes through the centre of the cam shaft and (ii) When the line of stroke of the follower is to take place with Uniform acceleration and uniform retardation. Determine the maximum velocity and acceleration of the follower when the cam shaft rotates at 900 r.p.m. (14M)
6. a) Derive a relation for minimum number of teeth on a gear wheel to avoid interference. (7M)
- b) Two  $20^\circ$  involute spur gears have a module of 6mm. The larger wheel has 36 teeth and the pinion has 16 teeth. If the addendum is one module, will the interference occur? What will be the effect if the number of teeth on the pinion is reduced to 14? (7M)
7. a) Discuss briefly the various types of belts used for the transmission of power (7M)
- 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. (7M)