Reg. No. :

Question Paper Code: 34072

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

Fourth Semester

Mechanical Engineering

01UME402 – KINEMATICS OF MACHINERY

(Regulation 2013)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. State the Kutzbach criterion.

2. Define: kinematic pair and kinematic chain.

3. Define Kennedy's theorem.

4. What is transmission angle?

5. Define pressure angle in cam. State its importance.

6. Define the term trace point.

7. How epicyclic gear train differs from the other type of gear trains?

8. What are the different types of gears?

9. What do you mean by dry friction?

10. Differentiate: slip and creep of belt.

PART - B (5 x 16 = 80 Marks)

11. (a) Summarize the different kinds of kinematic pairs with examples.   (16)

Or

(b) Discuss about clamping and indexing mechanisms with neat sketches. (16)

12. (a) In the toggle mechanism shown in figure, the slider *D* is constrained to move on a horizontal path. The crank *OA* is rotating in the counter clockwise direction at a speed of 180 *r.p.m.* The dimensions of the various links are as follows: *OA* = 180 *mm*; *CB* = 240 *mm*; *AB* = 360 *mm*; and *BD* = 540 *mm*. For the given configuration, find velocity of slider *D* and angular velocity of links *AB*, *CB* and *BD*. (16)
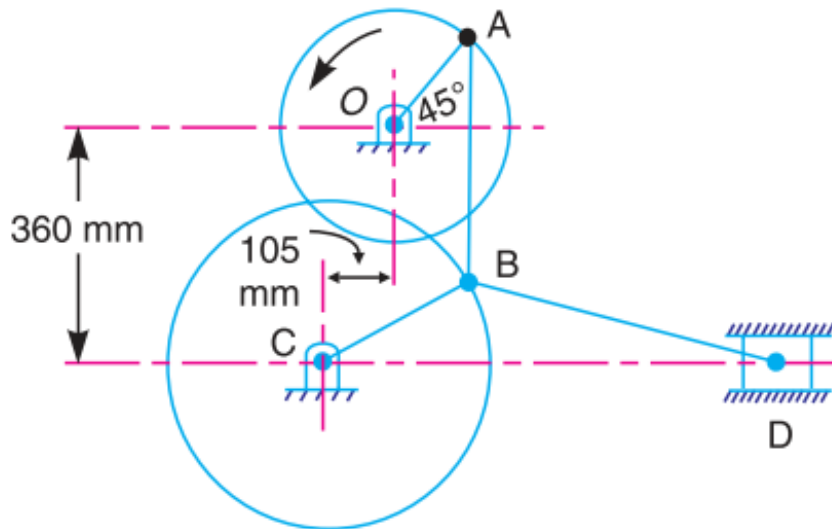
Or

(b) PQRS is a four bar chain with link PS fixed as shown in figure. The length of the links are PQ = 62.5 *mm*; QR = 175 *mm*; RS = 112.5 *mm*; and PS = 200 *mm*. The crank PQ rotates at 10 *rad/s* clockwise. Draw the velocity and acceleration diagram when angle QPS = 60^0 and Q and R lie on the same side of PS. Find the angular velocity and angular acceleration of the links QR and RS. (16)
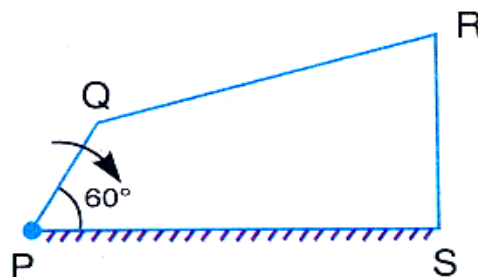
13. (a) The following data relates in a cam profile in which the follower moves with uniform acceleration and deceleration during an ascent and descent: Minimum radius of cam = 25*mm*, Roller radius = 7.5*mm*, Lift = 28*mm*, Offset of follower axis = 12*mm*

34072

towards the right, Angle of ascent = 60^0, Angle of descent = 90^0, angle of dwell between and Ascent and descent = 45^0,Speed of the cam = 200*rpm*. Draw the profile of the cam and determine the maximum velocity and uniform acceleration of the follower during the outstroke and return stroke. (16)

Or

(b) A symmetrical circular cam operating a flat faced follower has the following particulars: minimum radius of the cam 30 *mm*; total lift 20 *mm*; angle of lift 75°; Nose radius 5 *mm*; speed 600 *rpm*. Find the principal dimensions of the cam. (16)

14. (a) Two 20˚ involute spur gears have a module of 10 *mm*. The addendum is one module. The larger gear has 50 teeth and pinion 13 teeth. Does the interference occur? If it occurs, to what value should the pressure angle be changed to eliminate interference. (16)

Or

(b) Two mating gears have 20 and 40 in-volute teeth of module 10*mm* and 20° pressure angle. The addendum on each wheel is to be made of such a length that the line of contact on each side of the pitch point has half the maximum possible length. Determine the addendum height for each gear wheel, length of the path of contact, arc of contact and contact ratio. (16)

15. (a) A load of 15 *kN* is raised by means of a screw jack. The mean diameter of the square threaded screw is 42 *mm* and the pitch is 10 *mm*. A force of 120 *N* is applied at the end of a lever to raise the load. Determine the length of the lever to be used and the mechanical advantage obtained. Is the screw self locking? Take $\mu = 0.12$. (16)

Or

(b) A pulley is driven by a flat belt, the angle of lap being 1200. The belt is 100*mm* wide by 6*mm* thick and density 1000*Kg/m*^{3}. If the coefficient of friction is 0.3 and the maximum stress in the belt is not to exceed 2*MPa*, find the greatest power which the belt can transmit and the corresponding speed of the belt. (16)

_____

34072

34072