

Reg. No. :

--	--	--	--	--	--	--	--	--	--

Question Paper Code: 54702

B.E./B.Tech. DEGREE EXAMINATION, DEC 2020

Fourth Semester

Mechanical Engineering

15UME402 – KINEMATICS OF MACHINERY

(Regulation 2015)

Duration: One hour

Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. In a kinematic chain, a quaternary joint is equivalent to CO1-R
(a) one binary joint (b) two binary joints
(c) three binary joints (d) four binary joints
2. Which of the following is an inversion of single slider crank chain? CO1-R
(a) Beam engine (b) Watt's indicator mechanism
(c) Elliptical trammels (d) Whitworth quick return motion mechanism
3. The component of the acceleration, perpendicular to the velocity of the particle, at the given instant is called as CO2-R
(a) Radial component (b) Acceleration
(c) Tangential component (d) None of these
4. The component of the acceleration, parallel to the velocity of the particle, at the given instant is called CO2-R
(a) radial component (b) tangential component
(c) coriolis component (d) none of these
5. The cam follower extensively used in air-craft engines is CO3-R
(a) knife edge follower (b) flat faced follower
(c) spherical faced follower (d) roller follower

6. For high speed engines, the cam follower should move with CO3-R
 (a) uniform velocity (b) simple harmonic motion
 (c) uniform acceleration and retardation (d) cycloidal motion
7. The radial distance of a tooth from the pitch circle to the bottom of the tooth, is called CO4-R
 (a) dedendum (b) addendum (c) clearance (d) working depth
8. The contact ratio for gears is CO4-R
 (a) zero (b) less than one (c) greater than one (d) none of these
9. When the axes of first and last gear are co-axial, then gear train is known as CO5-R
 (a) simple gear train (b) compound gear train
 (c) reverted gear train (d) epicyclic gear train
10. A differential gear in an automobile is a CO5-R
 (a) simple gear train (b) compound gear train
 (c) reverted gear train (d) epicyclic gear train

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. Explain the following inversions of four bar chain mechanism with application: crank lever, double crank and double lever mechanism. CO1-App (8)
12. The crank of a slider crank mechanism rotates clockwise at a constant speed of 300 r.p.m. The crank is 150 mm and the connecting rod is 600 mm long. Determine: 1. Linear velocity and acceleration of the midpoint of the connecting rod, and 2. angular velocity and angular acceleration of the connecting rod, at a crank angle of 45° from inner dead centre position. CO2-App (8)
13. Draw the profile of a cam operating a knife-edge follower having a lift of 30 mm. the cam raises the follower with SHM for 150° of the rotation followed by a period of dwell for 60°. The follower descends for the next 100° rotation of the cam with uniform velocity, again followed by dwell period. The cam rotates at a uniform velocity of 120 rpm and has a least radius of 20 mm. what will be the maximum velocity and acceleration of the follower during lift and return. CO3-Ana (8)

14. A pair of gears, having 40 and 20 teeth respectively, are rotating in mesh, the speed of the smaller being 2000 r.p.m. Determine the velocity of sliding between the gear teeth faces at the point of engagement, at the pitch point, and at the point of disengagement if the smaller gear is the driver. Assume that the gear teeth are 20° involute form, addendum length is 5 mm and the module is 5 mm. Also find the angle through which the pinion turns while any pairs of teeth are in contact. CO4-U (8)
15. In an epicyclic gear train, an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 r.p.m. in the anticlockwise direction about the centre of the gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed makes 300 r.p.m. in the clockwise direction, what will be the speed of gear B? CO5-U (8)