Government college of Engineering, Amravati
Mechanical Engineering Department
CT-2   Subject: Kinematics of Machine (MEU402)

Time: 1 Hr   Marks: 15

Solve any three questions.

Q1. Explain 1) Classification of follower, 2) Cone clutch.

Q2. A cam rotating clockwise at a uniform speed of 1000 rpm is required to give a roller follower the motion defined 1) follower to move outward through 50 mm during 120°.of cam rotation, 2)follower to dwell for next 60° of cam rotation, 3)follower to return to its starting position during next 90° of cam rotation,4)follower to dwell for the rest of the cam rotation.The minimum radius of cam is 50 mm and the diameter of roller is 10 mm . The line of stroke of the follower is off-set by 20 mm from the axis of cam shaft.If the displacement of the follower takes place with uniform and equal acceleration and retardation on both outward and return strokes,draw profile of cam.

Q3. A cam drives a flat reciprocating follower in the following manner: During first 120° rotation of cam ,follower moves outwards through a distance of 20 mm.with SHM.The follower dwells during next 30° of cam rotation .During next 120° of cam rotation,the follower moves inwards with SHM.The follower dwells for next 90°of cam rotation.The minimum radius of the cam is 25mm.Draw the profile of cam

Q4. Derive an expression for Flat pivot bearing.

Government College Of Engineering, Amravati
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Marks : 15

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IV Semester

CT - II   Subject : Kinematics of Machine (ME 402)

Solve **any two** questions from the following :

Q1. Explain types of gear train. (3)

Q2. Explain : a. Pressure Angle   b. Cylindrical Cam   c. Pitch Curve   (3)

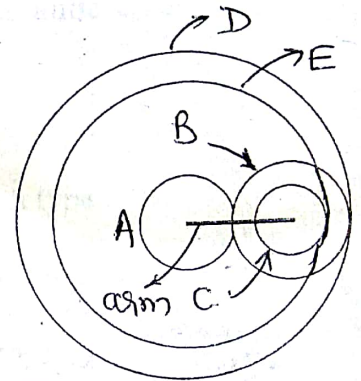**Q3.** Derive an expression for Coriolis component of acceleration. (3)

Solve **any one** question (either **Q4. or Q5.**) from the following:

Q4.a. Fig. shows a epicyclic gear train. Gear A has 15 teeth and wheel B has 20 teeth and gears with A and also with annular fixed wheel D. Gear C has 15 teeth and is integral with B. Gear C-B is compound gear. Gear C meshes with annular gear E which is keyed to machine shaft. The arm rotates about the same shaft on which gear A is fixed. If gear A runs at 1000 rpm, determine the speed of compound gear C-B & gear E. (5)

Q4.b. A reciprocating engine has connecting rod 20 cm long and crank of 5 cm. By using Klein's construction determine the velocity and acceleration of piston and angular acceleration of connecting rod. The crank has turned through 45° from IDC clockwise and rotating at 240 rpm. (4)

Q5.a. Enlist different types of cam based on the shape. (2)

Q5.b. Draw the cam profile for a flat faced mushroom follower with angle of ascent of 120°, dwell of 30° & angle of descent of 120°. The outstroke of the follower is performed with simple harmonic motion and return stroke with equal uniform acceleration and retardation. The minimum radius of cam is 50 mm and the axis of follower is offset by 25 mm rightwards. (7)

Solve **any three** of the following :

Q1. a. Define i. Pitch Curve ii. Number Synthesis (1)

Q1. b. Derive Frudenstein's ecuation for displacement Analysis. (4)

Q2. a Define Pressure angle. (1)

Q2. b. Draw displacement diagram and cam profile for a knife edge follower with outstroke 60° dwell of next 30° and return stroke of 60° with remaining dwell period. The stroke of follower is 40 mm and minimum radius of cam is 50 mm. The follower moves with uniform velocity during both strokes. The follower is offset by 10 mm from the axis of the cam shaft. (4)

Q3. Design a four bar mechanism when motion of input link and output link is governed by the equation $y = x^2$ $0 \le x \le 2$, with an interval of 1. Assume 0 to vary from 50° to 150° while Φ to vary from 80° to 160°. Use Chevbychev's spacing criterion to select one precession point. (5)

Q4. a. Define : i. Dimensional Synthesis   ii. Prime Circle   (1)

Q4. b. Explain different types of follower with neat sketch. (4)

Q5. It is required to set out the profile of a cam to give the following motion to the reciprocating follower with a flat mushroom contact face. Follower to have a lift of 30 mm during 120° of cam rotation. Follower to dwell for 30° and follower to return to it's initial position during 120° of cam rotation and to dwell for the remaining period. The minimum radius of cam is 35 mm. The outstroke of the follower is performed with simple harmonic motion and the return stroke with equal uniform acceleration and retardation. (5)
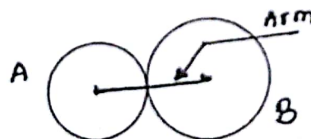
Solve any three questions each question carries equal mark

1. Draw the profile of the disc cam to give uniform motion during outstroke of 25 mm to a knife edge follower during the first half of cam revolution. The return of cam also takes place with uniform motion during the remaining half of cam revolution. Minimum radius of the cam, is 25mm. Draw the shaft on which the cam is mounted showing the position of the key, shaft diameter = 25 mm. the axis of the knife edge follower passes through the axis of the cam.

2. With the help of neat sketches explain the types of cams and followers.

3. Explain how gear trains are classified. Give at least one distinguishing feature of each type.

4. Two spur gears A & B of an epicyclic gear train as shown in figure have 24 & 30 teeth respectively. The arm rotates at 100 r.p.m in clockwise direction. Find the speed of gear B on its own axis, when gear A is fixed. If instead of being fixed, the wheel A rotates at 200 r.p.m. in the counterclockwise direction, what will be the speed of B?