Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination-April/May-2017**

|  |  |  |  |
| --- | --- | --- | --- |
| **Code :** | **14ME2026** | **Duration :** | **3hrs** |
| **Sub. Name :** | **MECHANICS OF MACHINES** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Q. No. | Sub Div. | Questions | Course  Outcome | Marks |
| 1. | a. | Sketch and describe the four bar chain mechanism. Why it is considered to be the basic chain? | CO2 | 8 |
| b. | Sketch and explain the various inversions of four bar chain. | CO2 | 12 |
| (OR) | | | | |
| 2. |  | Sketch and describe the working of two different types of quick return mechanisms. Give examples of their applications. Derive an expression for the ratio of times taken in forward and return stroke for one of these mechanisms. | CO2 | 20 |
| 3. |  | In a four bar chain ABCD, AD is fixed and is 15 cm long. The crank AB is 4 cm long and rotates at 120 rpm clockwise, while the link CD (= 8 cm) oscillates about D. BC and AD are of equal length. Find the angular velocities of the links CD and BC when angle BAD = 60°. | CO1 | 20 |
| (OR) | | | | |
| 4. |  | The crank of a slider crank mechanism rotates clockwise at a constant speed of 300 rpm. The crank is 15 cm and the connecting rod is 60 cm 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. | CO1 | 20 |
| 5. |  | A cam is to be designed for a knife edge follower when the axis of the follower passes through the axis of cam shaft with the following data:   1. Follower to move outwards through 40 mm during 60º of cam rotation, 2. Dwell for the next 45°. 3. Follower to return to its original position during next 90º, 4. Follower to dwell for the rest of the cam rotation.   The displacement of the follower is to take place with simple harmonic motion during both the outward and return strokes. The least radius of the cam is 50 mm. If the cam rotates at 300 rpm, determine the maximum velocity and acceleration of the follower during the outward stroke and return stroke. | CO2 | 20 |
| (OR) | | | | |
| 6. |  | A cam, with a minimum radius of 50 mm, rotating clockwise at a uniform speed, is required to give a knife edge follower the motion as described below :   1. To move outwards through 40 mm during 100° rotation of the cam; 2. To dwell for next 80°; 3. To return to its starting position during next 90°, and 4. To dwell for the rest period of a revolution i.e. 90°.   Draw the profile of the cam when the line of stroke of the follower passes through the centre of the cam shaft. The displacement of the follower is to take place with uniform acceleration and uniform retardation during both the outward and return strokes. Determine the maximum velocity and acceleration of the follower when the cam shaft rotates at 900 rpm. | CO2 | 20 |
| 7. | a. | With neat sketches describe the classification of gear trains with their applications. | CO3 | 8 |
|  | b. | The arm of an epicyclic gear train rotates at 100 rpm in the anti-clockwise direction. The arm carries two wheels A and B having 36 and 45 teeth respectively. The wheel A is fixed and the arm rotates about the centre of Wheel A. Find the speed of wheel B. What will be the speed of B, if the wheel A instead of being fixed, makes 200 rpm clockwise. | CO3 | 12 |
| (OR) | | | | |
| 8. |  | An epicyclic gear consists of three gears A, B and C. The gear A has 72 internal teeth and gear C has 32 external teeth. The gear B meshes with both A and C and is carried on an arm EF which rotates about the centre of A at 18 rpm. If the gear A is fixed, determine the speed of gears B and C. | CO3 | 20 |
|  | | **Compulsory**: |  |  |
| 9. |  | Calculate the power transmitted by a single plate clutch at a speed of 2000 rpm, if the outer and inner radii of friction surfaces are 150 mm and 100 mm respectively. The maximum intensity of pressure at any point of contact surface should not exceed 0.8 x 105N/m2. Take both sides of the plate as effective and the coefficient of friction = 0.3. Assume uniform wear. | CO2 | 20 |

ALL THE BEST