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**

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

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

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| Q. No. | Sub Div. | Questions | Course  Outcome | Marks |
| 1. | a. | What do you mean by constrained motion? What are the different types of constrained motions? Explain each type with examples and neat sketches. | CO2 | 8 |
| b. | Sketch and explain any three inversions of a double slider crank chain. | CO2 | 12 |
| (OR) | | | | |
| 2. |  | Sketch and describe slider crank mechanism. Explain any three inversions of a single slider crank chain. | CO2 | 20 |
| 3. |  | In a four bar chain ABCD, AD is fixed and is 150 mm long. The crank AB is 40 mm long and rotates at 120 rpm clockwise, while the link CD = 80 mm oscillates about D. BC and AD are of equal length. Find the angular velocities of the link CD and BC when angle BAD = 60°. | CO1 | 20 |
| (OR) | | | | |
| 4. |  | In an engine mechanism, the crank CB = 100 mm long and the connecting rod BA = 300 mm with centre of gravity G, which is 100 mm from B. The crank is turned 120° from inner dead centre (i.e. angle ACB = 120°). The crankshaft has a speed of 75 rad/s and an angular acceleration of 1200 rad/s2. Find:1. velocity of G and angular velocity of AB, and 2. acceleration of G and angular acceleration of AB. | CO1 | 20 |
| 5. |  | Explain with sketches the different types of cams and followers. | CO2 | 20 |
| (OR) | | | | |
| 6. |  | A cam is to be designed for a knife edge follower when the axis of the follower is not passing through the axis of the cam shaft but is offset by 20 mm from the axis of the cam shaft with the following data:  i. Follower to move outwards through 40 mm during 60º of cam  rotation,  ii. Dwell for the next 45°.  iii. Follower to return to its original position during next 90º,  iv. 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. | CO2 | 20 |
| 7. | a. | Derive the condition for constant velocity ratio of toothed wheels or Law of gearing. | CO3 | 10 |
|  | b. | Compare the advantages and disadvantages of involute and cycloidal gears. | CO3 | 10 |
| (OR) | | | | |
| 8. | a. | Explain briefly the differences between simple, compound and epicyclic gear trains. What are the special advantages of epicyclic gear trains? | CO3 | 8 |
|  | b. | 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 rpm in the anticlockwise direction about the centre of the gear A which is fixed, determine the speed of gear B. If gear A instead of being fixed, makes 300 rpm in the clockwise direction, what will be the speed of gear B? | CO3 | 12 |
|  | | **Compulsory**: |  |  |
| 9. |  | A multi-disc clutch has three discs on the driving shaft and two on the driven shaft. The outside diameter of the contact surfaces is 240 mm and inside diameter 120 mm. Assuming uniform wear and coefficient of friction as 0.3, find the maximum axial intensity of pressure between the discs for transmitting 25 kW at 1575 rpm. | CO2 | 20 |

ALL THE BEST