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



**End Semester Examination – Nov/Dec– 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. | Explain the term kinematic link. Give the classification of kinematic link | CO1 | 3 |
| b. | Draw the acceleration diagram of a slider crank mechanism. | CO1 | 5 |
| c. | In a slider crank mechanism, the length of crank OB and connecting rod AB are 125 mm and 500 mm respectively. The center of gravity CG of the connecting rod is 275 mm from the slider A. The crank speed is 600 rpm clockwise. When crank has turned 45o from the inner dead center position. Determine velocity of slider, velocity of point G and angular velocity of the connecting rod AB | CO2 | 12 |
| (OR) | | | | |
| 2. | a. | In what way a mechanism differ from a machine? | CO1 | 4 |
| b. | Sketch and describe the four bar chain mechanism. Why is it considered to be the basic chain? | CO1 | 6 |
| c. | Sketch and explain the various inversions of slider crank chain. | CO1 | 10 |
| 3. | a. | Write short notes on Cams and followers. | CO1 | 7 |
|  | b. | A disc cam is to give uniform motion to a knife edge follower during out stroke of 50 mm during the first half of the cam revolution. The follower again returns to its original position with uniform motion during the next half of the revolution. The minimum radius of the cam is 50 mm and the diameter of the cam shaft is 35 mm. Draw the profile of the cam when axis of the follower passes through the axis of the cam shaft. | CO1 | 13 |
| (OR) | | | | |
| 4. | a. | Why roller follower is preferred to that of knife-edged follower? | CO1 | 6 |
|  | b. | A cam rotating clockwise at a uniform speed of 200 rpm is required to move an offset roller follower with a uniform and equal acceleration and retardation on both outward and return strokes. The angle of ascent, the angle of dwell (between ascent and descent) and the angle of descent are 120o, 60o and 90o respectively. The follower dwells for the rest of the cam rotation. The least radius of the cam is 50 mm, the lift of the follower is 25 mm and the diameter of the roller is 10 mm. The line of stroke of the follower is offset by 20 mm from the axis of the cam. Draw the cam profile and find the maximum velocity and acceleration of the follower during the outstroke. | CO1 | 14 |
| 5. | a. | What do you understand by the term ‘interference’ as applied to gears? | CO3 | 5 |
|  | b. | The pitch circle diameter of the smaller of the two spur wheels which mesh externally and have involute teeth is 100 mm. The number of teeth are 16 and 32. The pressure angle is 20o  and the addendum is 0.32 of the circular pitch. Find the length of the path of contact of the pair of teeth. | CO3 | 12 |
|  | c. | State the law of gearing. | CO3 | 3 |
| (OR) | | | | |
| 6. | a. | Explain the terms Module, Pressure angle and Addentum. | CO3 | 4 |
|  | b. | A pair of gears having 40 and 30 teeth respectively are of 25o involute form. The addentum length is 5 mm and the module pitch is 2.5 mm. If the smaller wheel is the driver and rotates at 1500 rpm, find the velocity of sliding at the point of engagement and at the point of disengagement. | CO3 | 12 |
|  | c. | Which profile do you prefer involute profile or cycloidal profile ? Explain. | CO3 | 4 |
| 7. | a. | Discuss briefly the various types of friction experienced by a body. | CO4 | 6 |
|  | b. | A square thread screw of mean diameter 25 mm and pitch of thread 6 mm is utilized to lift a weight of 10 kN by a horizontal force applied at the circumference of the screw. Find the magnitude of the force if the coefficient of friction between the nut and the screw is 0.02 | CO4 | 7 |
|  | c. | A single plate clutch (both sides effective) is required to transmit 26.5 kW at 1600 rpm. The outer diameter of the plate is limited to 300 mm and intensity of pressure between the plates is not to exceed 68.5 kN/m2 . Assuming uniform wear and a coefficient of friction 0.3, show that inner diameter of the plates is approximately 90 mm. | CO4 | 7 |
| (OR) | | | | |
| 8. | a. | Explain Limiting friction, Angle of friction and coefficient of friction. | CO4 | 6 |
|  | b. | A bolt with a square threaded screw has a mean diameter of 25 mm and a pitch of 3 mm. It carries an axial thrust of 10 kN on the bolt head of 25 mm mean radius. If the coefficient of friction is 0.12, find the force required at the end of spanner 450 mm long, in tightening up the bolt | CO4 | 7 |
|  | c. | A multi plate clutch has three pairs of contact surfaces. The outer and inner radii of the contact surfaces are 100 mm and 50 mm respectively. The maximum axial spring force is limited to 1kN . If the coefficient of friction is 0.35 and assuming uniform wear, find the power transmitted by the clutch at 1500 rpm. | CO4 | 7 |
|  | | **Compulsory**: |  |  |
| 9. | a. | What do you understand about ‘gear train’ ? Discuss the various types of gear trains. | CO3 | 7 |
|  | b. | In an epicyclic gear train as shown in figure, the number of teeth on wheels A, B and C are 48, 24 and 50 respectively. If the arm rotates at 400 rpm, clockwise find speed of wheel C when A is fixed, and Speed of wheel A when C is fixed. | CO3 | 13 |

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