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

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**End Semester Examination – Nov/Dec – 2018**

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| **Code :** | **17ME2001** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ENGINEERING MECHANICS** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome** | **Marks** |
|  | **PART-A(20X1=20 MARKS)** | | |
| 1. | A force F has components Fx = 36 N & Fy = - 60 N . The magnitude F is \_\_\_\_\_\_\_\_\_\_. | CO1 | 1 |
| 2. | State the requirements for equilibrium of a body acted upon by a parallel force system. | CO1 | 1 |
| 3. | One joule is equal to \_\_\_\_\_\_\_\_\_. | CO1 | 1 |
| 4. | Two forces of same magnitude and opposite direction are said to form \_\_\_\_\_\_\_\_\_\_. | CO1 | 1 |
| 5. | The load which is distributed over area is \_\_\_\_\_\_\_\_\_. | CO2 | 1 |
| 6. | Force AB of 12N joins the points of co-ordinates A(1,3,4) and B(4,6,9). Express the force in cartesian co-ordinates. | CO2 | 1 |
| 7. | Other name of the pinned support is \_\_\_\_\_\_\_\_\_\_\_\_. | CO2 | 1 |
| 8. | Define moment of inertia. | CO2 | 1 |
| 9. | State True or Fasle:  Friction always opposes the motion or attempted motion | CO3 | 1 |
| 10. | The angle of inclination of the plane at which the body begins to move down the plane, is called \_\_\_\_\_\_\_\_\_. | CO3 | 1 |
| 11. | Maximum height by a ball thrown upward is \_\_\_\_\_\_\_\_\_\_\_\_. | CO4 | 1 |
| 12. | The rate of change of displacement of a body is called \_\_\_\_\_\_\_\_\_\_. | CO4 | 1 |
| 13. | Write the expressions for velocity and acceleration in cartesian system. | CO4 | 1 |
| 14. | State D’Alembert’s principle. | CO5 | 1 |
| 15. | Write work energy equation. | CO5 | 1 |
| 16. | Write the equation for law of conversation of momentum. | CO5 | 1 |
| 17. | Differentiate between central impact and non-central impact. | CO5 | 1 |
| 18. | What is the unit of energy? | CO5 | 1 |
| 19. | List out the methods of kinetic analysis of rigid body motion. | CO6 | 1 |
| 20. | Write the kinetic equations for motion of rigid bodies in pure translation and pure rotation. | CO6 | 1 |

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|  | **PART B(10 X 5= 50 MARKS)**  **(Answer any 10 from the following)** | | |
| 21. | Determine the resultant of the three forces shown. | CO1 | 5 |
| 22. | Two cables are tied together at *C* and are loaded as shown. Determinethe tension (*a*) in cable *AC*, (*b*) in cable *BC*. | CO1 | 5 |
| 23. | Find the moment of force 50 N about point O. | CO2 | 5 |
| 24. | ABCD is a weightless rod under the action of four forces P,Q,S and T as shown in figure. If P = 10 N, Q = 4 N, S = 8 N and T = 12 N, calculate the resultant and mark the same in the direction with respect to the end A of the rod. | CO2 | 5 |
| 25. | A cylinder of mass 50 kg is resting on a smooth surface which are inclined at 30 deg and 60 deg to the horizontal as shown in figure. Determine the reaction at contact A and B. | CO2 | 5 |
| 26. | Calculate the support reactions for the beam shown. | CO2 | 5 |
| 27. | A block of weight 150 N is resting on a rough inclined plane which is at an angle 30 deg with the floor as shown in figure. The block is tied up by a horizontal string, which has a tension of 50 N. Find the frictional force on the block and the normal reaction of the inclined plane. | CO3 | 5 |
| 28. | A train starts from rest and attains a velocity of 45 km per hour in 2 minutes, with uniform acceleration. Calculate acceleration, distance travelled in this time (2 mins), time required to reach a velocity of 56 km per hour. | CO4 | 5 |
| 29. | A particle is projected with an initial velocity of 12 m/s at an angle α with the horizontal. After some time, the position of the particle is observed by its x and y distances of 6m and 4m respectively from the point of projection. Find the angle of projection. | CO4 | 5 |
| 30. | A car of mass 150 kg is travelling on a horizontal track at 36 km/hr. Determine the time needed to stop the car. The co-efficient of friction between the tyres and the road is 0.45. | CO5 | 5 |
| 31. | A rigid body rotates about a fixed axis and slows down from 300 rpm to 150 rpm in 2 minutes. Determine the angular acceleration. Also, determine the number of revolutions completed in 2 minutes. | CO6 | 5 |
| 32. | A block of 500 N is suspended by a tight rope wound round the pulley of weight 200N and radius 0.5 m. Determine the acceleration of the weight and the tension in the rope. | CO6 | 5 |

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|  | | **PART C(2 X 15= 30 MARKS)**  **(Answer any 2 from the following)** | | | |
| 33. | a. | | A transmission tower is held by three guy wires anchored by boltsat B, C, and D. If the tension in wire AB is 525 lb, determine the components of the force exerted by the wire on the bolt at B. | CO2 | 8 |
| b. | | The ladder shown in the figure is 4m long and is supported by a horizontal floor and vertical wall. The coefficient of friction at the wall is 0.25 and at the floor is 0.5. The weight of the ladder is 200N, concentrated at G. The ladder supports a vertical load of 1000N at C. Determine reactions at A and B, and compute least value of α at which the ladder may be placed without slipping to right. | CO3 | 7 |
| 34. | a. | | Locate the centroid of the figure given below: | CO3 | 5 |
| b. | | Determine the moment of inertia of the shaded area with respect to the *x* axis. | CO3 | 10 |
| 35. | a. | | Two blocks of weight 150 N and 50 N are connected by a string and passing over a frictionless pulley as shown in figure. Determine the acceleration of the blocks A and B and the tension in the string. Also determine the velocity of 150 N block after 4 seconds. | CO4 | 10 |
| b. | | A sphere of mass 1 kg moving with a velocity 2 m/s impinges directly on a sphere of mass 2 kg at rest. If the first sphere comes to rest after the impact, find the velocity of the second sphere and the co-efficient of restitution | CO5 | 5 |