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



**End Semester Examination – Nov/Dec - 2017**

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| **Code :** | **14ME2001** | **Duration :** | **3 hrs** |
| **Sub. Name :** | **ENGINEERING MECHANICS** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | **Course outcome** | **Marks** |
| **PART-A(10X1=10 MARKS)** | | |  |
| 1. | \_\_\_\_\_\_\_\_\_ is the measure of duration between successive event. | CO1 | 1 |
| 2. | What are the branches in rigid body mechanics? | CO1 | 1 |
| 3. | Draw an example of unlike parallel forces. | CO2 | 1 |
| 4. | State the principle of resolution? | CO1 | 1 |
| 5. | Define moment of a force. | CO2 | 1 |
| 6. | What is the difference between the centroid and center of mass? | CO3 | 1 |
| 7. | What is impending motion? | CO4 | 1 |
| 8. | Moment of inertia of a composite figure is determined by \_\_\_\_\_\_\_\_\_ theorem. | CO3 | 1 |
| 9. | Define cone of friction. | CO4 | 1 |
| 10. | Write the work energy equation. | CO4 | 1 |

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| **PART B(5 X 3= 15 MARKS)** | | |  |
| 11. | Two like parallel forces of 10 N and 30 N acts at the ends of a rod 200 mm long. Find magnitude of the resultant force. | CO1 | 3 |
| 12. | Force AB of 12N joins the points of co-ordinates A(6,5,3) and B(3,5,9). Express the force in Cartesian co-ordinates. | CO1 | 3 |
| 13. | Find the resultant of an 800N force acting towards eastern direction and a 500N force acting towards north eastern directions with an angle 45°. | CO1 | 3 |
| 14. | State Varignon’s theorem. | CO2 | 3 |
| 15. | A 4.8m beam is subjected to the forces shown in fig. Reduce the given system of forces to i. a single force ii. an equivalent force- couple system at A iii. force couple system at B. (Neglect the reactions in supports)  123 | CO2 | 3 |

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| **PART C(5 X 15= 75 MARKS)** | | | |  |
| 16. | a. | Three coplanar concurrent forces are acting at a point shown in the figure. Determine the resultant in magnitude and direction. | CO1 | 10 |
| b. | Draw the free body diagram of the figure. | CO1 | 5 |
| (OR) | | | |  |
| 17. | a. | The tension in cables AB and AC are 100N and 120N respectively as shown in figure below. Determine the magnitude of the resultant force acting at A.  49_0 | CO1 | 10 |
| b. | Draw the free body diagram of the following object.  21_0 | CO2 | 5 |
| 18. | a. | Determine the magnitude and line of action of the resultant of forces shown in fig. | CO2 | 10 |
| b. | Determine the supports and reactions of the given figure. | CO2 | 5 |
| (OR) | | | |  |
| 19. | a. | Find the moment of inertia of a unsymmetrical I section about its centroidal axes having top flange as 60mm \*20mm, bottom flange as 100mm\*20mm and web is 60mm\*20mm. | CO3 | 10 |
| b. | Locate the centroid of the lamina shown in the figure. | CO3 | 5 |
| 20. |  | Two weights W1 and W2 are connected by a string and move along a horizontal plane under the action of force P = 200N applied horizontally to the weight W1. The coefficient of friction between the weights and the plane is 0.25. Determine the acceleration of the weights and tension in the string.  WP_20161102_10_19_35_Pro | CO4 | 15 |
|  |  | (OR) |  |  |
| 21. | a. | A block of weight 150N is resting on a rough inclined plane as shown in the fig. The block is tied up by a horizontal string, which has a tension of 50N. Find i. the frictional force on the block ii. the normal reaction of the inclined plane iii. the co-efficient of friction between the surfaces of contact.  Untitled 1 | CO4 | 5 |
| b. | Locate the centroid of the sectioned area shown in the figure. | CO3 | 10 |
| 22. |  | A body weighing 400N is resting on a rough inclined plane at 30° to horizontal. It is pulled up by a light flexible rope running to the plane and passes over a frictionless pulley at top as shown in the figure. The portion of the rope beyond hangs vertically and carries a weight of 300N at the end. If μ=0.2, find the i. tension in the rope ii.acceleration iii.distance moved up by the body in 3 seconds starting from rest.  Picture1.png | CO4 | 15 |
| (OR) | | | |  |
| 23. | a. | What horizontal force is needed to give the 50 kg block an acceleration of 3 m/s2 up the 20° plane? Assume a coefficient of friction between the block and the plane is 0.25. | CO4 | 10 |
| b. | Write short notes on the angle of repose and cone of friction. | CO4 | 5 |
| 24. | a. | A uniform ladder weighing 200N and 5 meters long has lower end B resting on the ground and upper end A resting against a vertical wall as shown in fig. The inclination of the ladder with horizontal is 60°. If the coefficient of the friction at all surfaces of contact is 0.25, determine how much distance up long the ladder a man weighing 600N can ascent without causing it to slip. | CO4 | 10 |
|  | b. | List the kinetic equilibrium conditions of connected bodies. | CO4 | 5 |
| (OR) | | | |  |
| 25. |  | A horizontal force P= 600N is exerted on block A of mass 120kg as shown in fig. The coefficient of friction between the block A and the horizontal plane is 0.25. Block B has a mass 30kg and the coefficient of friction between it and the plane is 0.4. The wire between the two blocks makes 30° with the horizontal. Calculate the tension in the wire. | CO4 | 15 |

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