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

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**End Semester Examination – Apr/May – 2018**

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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. | Resultant of two adjacent force can be obtained from \_\_\_\_\_\_\_\_\_\_ of a parallelogram. | CO1 | 1 |
| 3. | Draw an example of unlike parallel forces. | CO2 | 1 |
| 4. | Define Equilibrium. | CO2 | 1 |
| 5. | What is free body diagram? | CO2 | 1 |
| 6. | For what condition the moment of a force will be zero? | CO2 | 1 |
| 7. | Draw the support reactions of roller,hinged and fixed support? | CO2 | 1 |
| 8. | Coefficient of static friction is \_\_\_\_\_\_\_\_\_\_ than coefficient of dynamic friction. | CO4 | 1 |
| 9. | A body has \_\_\_\_\_\_\_\_\_\_ number of centre of gravity. | CO4 | 1 |
| 10. | Write the D’Alemberts equation? | CO4 | 1 |

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|  | **PART B(5 X 3= 15 MARKS)** | | | |
| 11 | | 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. | CO1 | 3 |
| 12. | | 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 |
| 13. | | Two like parallel forces of 10 N and 30 N acts at the ends of a rod 100 mm long. Find magnitude of the resultant force. | CO1 11 | 3 |
| 14. | | State Varignons theorem. | CO1 | 3 |
| 15. | | A 4.8m beam is subjected to the forces shown in fig. Reduce the given system of forces to a) a single force b) an equivalent force- couple system at A c) 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. | Four forces act on bolt A as shown. Determine the resultant of the forces on the bolt.  C:\Users\Admin\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\Picture4.png | | | CO1 | | 10 |
| b. | A force of magnitude 750N is directed along AB where A is (0.8,0,1.2) m and B is (1.4,1.2,0)m. Write the vector form of the force. | | | 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 | | | | CO1 | 5 |
| 18. | a. | A couple of magnitude, M=300Nm and three forces shown in the figure are applied to an angle bracket. Find the resultant of the system of forces and also locate the points where the line of action of the resultant intersects line AB and line BC.  300 Nm  10N  120mm  45 N  80mm  30 N  30 °  A  C  B | | | | CO2 | 10 |
| b. | Write short notes on parallel axis theorem. | | | | CO2 | 5 |
| (OR) | | | | | | |  |
| 19. | a. | Determine the supports and reactions of the given figure. | | | | CO2 | 5 |
| b. | 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. | | | | CO4 | 10 |
| 20. |  | String AO holds a smooth sphere on an inclined plane ABC, as shown in figure below. Theweight of the sphere is 1000N, and the plane is smooth. Calculate the tension in the string and the reaction at the point of contact B.  12_0 | | | | CO4 | 15 |
| (OR) | | | | | | |  |
| 21. |  | Find the moment of inertia of a un symmetrical I section about its centroidal axes having top flange as 60mm \*20mm, bottom flange as 100mm\*20mm and web is 60mm\*20mm. | | CO3 | | | 15 |
| 22. | a. | Locate the centroid of the sectioned area shown in figure. | | CO3 | | | 10 |
| b. | Write short notes on frictional force effect on an horizontal and inclined plane by drawing a neat sketch. | | CO4 | | | 5 |
| (OR) | | | | | | |  |
| 23. | a. | 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 | | | | 10 |
| b. | What are the dynamic equilibrium conditions? | CO4 | | | | 5 |
| 24. |  | 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 |
| (OR) | | | | | | |  |
| 25. |  | A uniform ladder weighing 100N 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 | | | 15 |