**20CE203**

**Hall Ticket Number:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |

**I/IV B.Tech (Regular) Degree Examination**

**September, 2021 Civil Engineering**

**Second Semester Engineering Mechanics**

**Time**: Three Hours Maximum: 70 Marks

Answer Question No. 1 compulsory. (1 x 14 = 14 Marks)

Answer ONE Question from each unit. (4 x 14 = 56 Marks)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. | Answer all questions | |  |  |
|  | a) | Define Parallelogram law of forces. | CO1 |  |
|  | b) | State Lami’s theorem | CO1 |  |
|  | c) | Define moment | CO1 |  |
|  | d) | Draw sketches of any two types of supports. | CO1 |  |
|  | e) | State the laws of Coulomb friction. | CO3 |  |
|  | f) | Define coefficient of friction | CO3 |  |
|  | g) | Distinguish between rectilinear motion and curvilinear motion. | CO4 |  |
|  | h) | Define free body diagram. | CO4 |  |
|  | i) | State D-Alembert’s principle. | CO4 |  |
|  | j) | What is the relation between linear velocity and angular velocity? | CO5 |  |
|  | k) | Define angular acceleration. | CO5 |  |
|  | l) | State parallel axis theorem. | CO2 |  |
|  | m) | Define perfect truss. | CO4 |  |
|  | n) | Define radius of gyration. | CO5 |  |
| **Unit-1** | | | | |
| 2. |  | Two identical rollers each of weight 100N are supported by an inclined plane and a vertical wall as shown in figure. Assuming smooth surfaces, find the reactions induced at the points of support A, B and C.  C:\Users\exam\Desktop\123.png | CO1 | 14M |
|  |  | **(OR)** |  |  |
| 3. |  | Find the centroid of shaded area as shown in figure. | CO2 | 14M |
| **P.T.O.**  **20CE203**  **Unit-1I** | | | | |
| 4. |  | Determine the movement of inertia of the T-section shown in figure about the centroidal axes. | CO2 | 14M |
|  |  | **(OR)** |  |  |
| 5. |  | Two blocks are placd against a wall and floor as shown in figure.Determine the minimum horizontal force P required to hold the blocks in equilibrium.Given the coefficient of friction values as 0.1,0.2 and 0.4 respectively for floor,blocks and wall. | CO3 | 14M |
|  |  | **Unit-III** |  |  |
| 6. |  | Determine the axial forces in the members of the given truss using method of joints.  C:\Users\exam\Desktop\MOJ-Example-1.png | CO4 | 14M |
|  |  | **(OR)** |  |  |
| 7. | a) | A car starts from rest on a curved road of 250 m radius and accelerates at a constant tangential acceleration of 0.6 m/s2. Determine the distance and the time for which that car will travel before the magnitude of the total acceleration attained by it becomes 0.75 m/s2. | CO4 | 7M |
|  | b) | A particle moves along a path defined by y=0.12x2 in meters. If the velocity and acceleration along the path are given as 5m/s and 3m/s2 respectively when the particle is at the position x=10m,determine the normal component of acceleration at that instant. | CO4 | 7M |
|  |  | **Unit-IV** |  |  |
| 8. |  | Determine the Mass moment of inertia of a solid cone of base radius ‘r’ and height ‘h’ about its centroidal axes. | CO5 | 14M |
|  |  | **(OR)** |  |  |
| 9. |  | A wheel rotating about a fixed axis at 20 revolutions per minute is uniformly accelerated for 70 seconds during which it makes 50 revolutions. Determine the following: a) the angular velocity at the end of this interval and b) the time required to reach 100 revolutions per minute. | CO5 | 14M |

****