**Code No.ES103CE**

**METHODIST COLLEGE OF ENGINEERING & TECHNOLOGY**

**(An Autonomous Institution)**

**B.E. (EEE) I-Semester (AICTE) Examination, March-2023**

**Subject: ENGINEERING MECHANICS**

**Time: 3 hours Max.Marks:60**

**Note: Missing data, if any, maybe suitably assumed.**

**PART-A**

**Answer All the questions.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q.No.** | **Questions** | **Marks** | **CO** | **BTL** |
| **1. a** | State law of transmissibility of forces. | **2** | **1** | **1** |
| **b** | Explain conditions of equilibrium. | **2** | **1** | **1** |
| **c** | Define of cone of friction. | **2** | **2** | **1** |
| **d** | At the impending motion show that angle of repose is equal to angle of friction. | **2** | **2** | **2** |
| **e** | Differentiate between centroid and centre of gravity. | **2** | **3** | **1** |
| **f** | Find polar of moment of inertia of a circular section of diameter 30mm. | **2** | **3** | **2** |
| **g** | A stone is thrown vertically upward and return to earth in 5 seconds. How high it has travelled. | **2** | **4** | **2** |
| **h** | State D Alembert’s principle. | **2** | **4** | **1** |
| **i** | Explain coefficient of restitution. | **2** | **5** | **1** |
| **j** | A body of mass 20kg moving with a speed of 10m/sec. Find its kinetic energy. | **2** | **5** | **2** |

**PART-B**

**Answer Any Five questions**.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q.No.** |  | **Questions** | **Marks** | **CO** | **BTL** |
| **2.** |  | The force system shown in figure (1) has a resultant of 300N acting up to the right with 3H:4V. Find the values of ‘F’ and ‘θ’ required to give this resultant. | **8** | **1** | **2** |
|  | **Figure (1) Figure (2)** |  |  |  |
| **3.** |  | Blocks A and B weighing 1100 N and 2200 N are resting on each as shown in figure (2) and block A is resisted by cable. Find the value of P to maintain the equilibrium. Take coefficient of friction for all contact surfaces as 0.3 | **8** | **2** | **3** |
|  |  |  |  |  |
| **4.** |  | Locate the centroid of the hatched plate about the axes as shown in figure (3)    **Figure (3) Figure (4)** | **8** | **3** | **4** |
|  |  |  |  |  |
| **5.** |  | Assuming the pulleys to be frictionless and weightless find the acceleration of body B as shown in figure (4). | **8** | **4** | **3** |
|  |  |  |  |  |
| **6.** |  | A bullet weighing 0.25N and moving at 800m/sec penetrates a body of 100N which is resting on a horizontal surface with µk= 0.2 and bullet emerges with a velocity of 90m/sec. How far and how long does the body then move? | **8** | **5** | **5** |
|  |  |  |  |  |
| **7.** |  | Determine the resultant of a system of concurrent forces having the following magnitudes and passing through the origin and indicated points P = 28 N (12,6,-4),T = 52 N (-3,-4,12) and F = 27 N (6,-3,-6). | **8** | **1** | **2** |
|  |  |  |  |  |
| **8.** |  | Find the moment of inertia of a symmetrical I section of flanges 200 x 12mm with centrally placed web of 10 x 150mm about its both centroidal axes. | **8** | **3** | **3** |
|  |  |  |  |  |
| **9.** |  | The rectilinear motion of a particle is governed by a= -8S-2where ‘a’ is in m/s2 and ‘S’ is in m, when t = 1s, s= 4m and v =2 m/s. Determine the acceleration of the particle at t= 2 sec. | **8** | **4** | **3** |
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