**Code No.ES202ME**

**METHODIST COLLEGE OF ENGINEERING & TECHNOLOGY**

**(An Autonomous Institution)**

**B.E. (MECH) II-Semester (Regular) Examination, SEPTEMBER-2023**

**Subject: ENGINEERING MECHANICS-II**

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

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

**PART-A**

**Answer All the questions.(10X2M=20M)**

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| --- | --- | --- | --- | --- |
| **Q.No.** | **Questions** | **Marks** | **CO** | **BTL** |
| **1. a** | Define Maximum Height and time of flight | **2** | **1** | **1** |
| **b** | Can you write about Projectile? | **2** | **1** | **2** |
| **c** | Define D Alembert’s Principle? | **2** | **2** | **1** |
| **d** | Write about angle of banking? | **2** | **2** | **2** |
| **e** | What is Work -Energy Principle? | **2** | **3** | **1** |
| **f** | What is work-energy principle for rotation bodies? | **2** | **3** | **2** |
| **g** | Mention the forces which are generally omitted while applying the principle of virtual work | **2** | **4** | **2** |
| **h** | Write the impulse-momentum equation and mention its application | **2** | **4** | **2** |
| **i**  **j** | Explain the difference between simple pendulum and compound pendulum with a neat sketch?  Define the following terms (i) Amplitude (2) Period of Time | **2**  **2** | **5**  **5** | **2**  **2** |

**PART-B**

**Answer Any Five questions**.**(5X8M=40M)**

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| --- | --- | --- | --- | --- | --- |
| **Q.No.** |  | **Questions** | **Marks** | **CO** | **BTL** |
| **2.** | **a** | A ball is dropped from the top of a tower 30 m high. At the same instant a second ball is thrown upward from the ground with an initial velocity of 15 m/sec. When and where do they cross and with what relative velocity? | **4** | **1** | **3** |
| **b** | A projectile is aimed at a target on the horizontal plane and falls 12 m short when the angle of projection is 15°, while it overshoots by 24 m when the angle is 45°. Find the, angle of projection to hit the target. | **4** | **1** | **3** |
| **3.** |  | A body weighing 1200 N rests on a rough plane inclined at 12° to the horizontal. It is pulled up the plane by means of a light flexible rope running parallel to the plane and passing over a light frictionless pulley at the top of the plane as shown in Fig. The portion of the rope beyond the pulley hangs vertically down and carries a weight of 800 N at its end. If the coefficient of friction for the plane and the body is 0.2,  find: (a) tension in the rope (b) acceleration with which the body moves up the plane, and (c) the distance moved by the body in 3 seconds after starting from rest. | **8** | **2** | **3** |
|  |  |  |  |  |
| **4.** |  | Two bodies weighing 300 N and 450 N are hung to the ends of a rope passing over an ideal pulley as shown in Fig. How much distance the blocks will move in increasing the velocity of system from 2 m/sec to 4 m/sec? How much is the tension in the string? Use work energy method. | **8** | **3** | **3** |
|  |  |  |  |  |
| **5.** |  | A stone is dropped into a well and sound of splash is heard after 4 seconds. Assuming velocity of sound to be 350 m/s, make calculations for the depth of the well. Assume g=9.81 m/s2 | **8** | **4** | **3** |
|  |  |  |  |  |
| **6.** |  | A particle is in simple harmonic motion. It has a velocity of 0.5 m/sec when it is 0.2 m from its static equilibrium position and has a velocity of 0.35 m/sec when it is 0.3 m from the equilibrium position. Determine the maximum velocity, maximum acceleration and the frequency of vibration. | **8** | **5** | **3** |
|  |  |  |  |  |
| **7.** |  | Find the least initial velocity with which a projectile is to be projected so that it clears a wall 4 m heigh located at a distance of 5m, and strikes the ground at a distance 4 m beyond the wall as shown in Fig. The point of projection is at the same level as the foot of the wall. | **8** | **3** | **4** |
|  |  |  |  |  |
| **8.** |  | Determine the reactions RA and RB developed in the simply supported beam shown in Fig. using virtual work. | **8** | **4** | **3** |
|  |  |  |  |  |
| **9.** |  | A body weighing 300 N is pushed up a 30° plane by a 400 N force acting parallel to the plane. If the initial velocity of the body is 1.5 m/sec and coefficient of kinetic friction is µ = 0.2, what velocity will the body have after moving 6 m? | **8** | **5** | **3** |
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