**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 the term time of flight. | **2** | **1** | **2** |
| **b** | Define the term trajectory? | **2** | **1** | **2** |
| **c** | Write laws of motion?  | **2** | **2** | **1** |
| **d** | A motorist travelling at a speed of 70 kmph suddenly applies brakes and halts after skidding 50 m. Determine the time required to stop the car. | **2** | **2** | **2** |
| **e** | Define the terms (i) Work (ii) Energy. | **2** | **3** | **2** |
| **f** | If a stone falls past a window of 2.45 m height in half a second, find the height from which the stone fell. | **2** | **3** | **2** |
| **g** | What are the virtual work approaches? | **2** | **4** | **2** |
| **h** | The amplitude of a particle in simple harmonic motion is 0.75 m and the period is 1.2 sec. Determine the maximum velocity and the maximum acceleration. | **2** | **4** | **2** |
| **i****j** | Differentiate between Natural vibrations and forced vibrations. What is simple and compound pendulums?  | **2****2**  | **5** **5** | **1** **2** |

**PART-B**

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

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| --- | --- | --- | --- | --- | --- |
| **Q.No.** |  | **Questions** | **Marks** | **CO** | **BTL** |
| **2.** |  |  |  |  |  |
|  | In what distance will body A of Fig. attain a velocity of 3 m/sec. starting from rest?  | **8** | **1** | **3** |
| **3.** |  | Determine the tension in the string and accelerations of blocks A and B weighing 1500 N and 500 N connected by an inextensible string as shown in Fig. Assume pulleys as frictionless and weightless | **8** | **2** | **4** |
|  |  |  |  |  |
| **4.** |  | A 3000 N block starting from rest as shown in Fig. 16.17 slides down a 50° incline. After moving 2 m it strikes a spring whose modulus is 20 N/mm. If the coefficient of friction between the block and the incline is 0.2, determine the maximum deformation of the spring and the maximum velocity of the block. | **8** | **3** | **3** |
|  |  |  |  |  |
| **5.** |  | A 1500 N block is in contact with a level plane, the coefficient of friction between two contact surfaces being 0.1. If the block is acted upon by a horizontal force of 300 N, what time will elapse before the block reaches a velocity of 16 m/sec starting from rest? If 300 N force is then removed, how much longer will the block continue to move? Solve the problem using impulse momentum equation. | **8** | **4** | **3** |
|  |  |  |  |  |
| **6.** |  | A particle moves along a straight line and its motion is represented by equation S=6t + 4t2 - 3t3 . Where t is in seconds and S is in meters. Determinea)Displacement, velocity and acceleration 3 sec after start.b) Displacement and acceleration when velocity equal to zero.c) Displacement and velocity when acceleration equal to zero | **8** | **5** | **4** |
|  |  |  |  |  |
| **7.** | **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 curve in the road is in the form of an arc of a circle of radius 400 m. At what angle should the surface of the road be laid inclined to the horizontal so that the resultant reaction of the surface acting on a car running at 120 km/h is normal to the surface of the road?** | **4** | **2** | **3** |
| **8.** |  | A particle in SHM has an amplitude of 15 cm and a period of $π$/2 sec. Find the velocity and acceleration of the particle, when it has travelled 9 cm to the right of the center of its path. What time is required for this displacement. | **8** | **3** | **3** |
|  |  |  |  |  |
| **9.** |  | For the system of connected bodies as shown in Fig. Determine the force P required to make the motion impending to the left. Coefficient of friction for all contacting surfaces is 0.25. Pulleys are smooth. | **8** | **4** | **3** |
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