# C:\Users\sec.registraracad\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Outlook\H8M811DG\logo.jpg

# Faculty of Engineering Technology

|  |  |
| --- | --- |
| **Department** | **: Mathematics and Statistics** |
| **Programme** | **: B. Tech. (All Branches)** |
| **Semester / Batch** | **: 2 / 2023** |
| **Course Code** | **: MTF111A** |
| **Course Title** | **: Engineering Mathematics - 2** |

**Tutorial – 3: Application of second order ordinary differential equation**

|  |  |
| --- | --- |
| **Sl No** | **Questions** |
| **1.** | A weight is placed upon the lower end of a coil spring suspended from the ceiling. The weight comes to rest in its equilibrium position, thereby stretching the spring . The weight is then pulled down below its equilibrium position and released from rest at with an initial velocity of . Determine the displacement of the weight as a function of the time; determine the amplitude, period, and frequency of the resulting motion. (Assume that the acceleration value due to gravity is,  Soln: - , amplitude=,. Time period and frequency= . |
| **2.** | A weight is attached to the lower end of a coil spring suspended from the ceiling and comes to rest in its equilibrium position, thereby stretching the spring The weight is then pulled down below its equilibrium position and released at with an initial velocity of . The resistance of the medium in kilograms is numerically equal to , where is the instantaneous velocity in . Determine the displacement of the weight as a function of the time. (Assume that the acceleration value due to gravity is,  Soln: . |
| **3.** | A 5 weight is attached to the lower end of a coil spring suspended from the ceiling, the spring constant being 4 . The weight comes to its equilibrium position, thereby stretching the spring beginning at time an external force given by is applied to the system. Determine the resulting motion if damping force is numerically equal towhere is the instantaneous velocity. (Assume that the acceleration value due to gravity is,)  Soln: |
| **4** | A weight is hung on the lower end of a coil spring suspended from the ceiling, the spring constant of the spring being . The weight comes to rest in its equilibrium position, and beginning at an external force given by is applied to the system. The medium offers resistance in kilograms numerically equal to , where is the instantaneous velocity in . Determine the displacement of the weight as a function of time. (Assume that the acceleration value due to gravity is,  Soln: **)** |
| **5** | A weight is placed upon the lower end of a coil spring suspended from the ceiling. The weight comes to rest in its equilibrium position, thereby stretching the spring . The weight is then pulled down 0.05 below its equilibrium position and released from rest at . Determine the displacement of the weight as a function of the time; determine the amplitude, period, and frequency of the resulting motion. (Assume that the acceleration value due to gravity is,  Soln: - , amplitude=. Time period and frequency=. |
| **6** | A weight is hung on the lower end of a coil spring suspended from the ceiling, the spring constant of the spring being . The weight comes to rest in its equilibrium position, and beginning at an external force given by is applied to the system. The medium offers resistance in kilograms numerically equal to 5, where is the instantaneous velocity in . Determine the displacement of the weight as a function of time. (Assume that the acceleration value due to gravity is,  Soln: |