

NATIONAL INSTITUTE OF TECHNOLOGY DURGAPUR**Even Semester End-term Examination, 2021-22****Course Code:** CEO440

Full Marks: 30

Course Name: Introduction to Earthquake Engg.

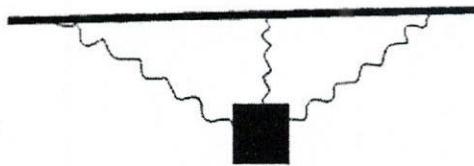
Time: 90 Minutes

Question Paper No.: NITDGP/CEO/1

Date of Exam: 29/04/2022

Instructions: Answer ANY THREE

Materials to be supplied: Graph paper shall be supplied, if required.

Question No.	Body of the Question	Marks	Mapped CO
1	A vibrating system consisting 1000kN weight and spring stiffness 80kN/m viscously damped so that ratio of two consecutive amplitude 1:0.85. Determine damping coefficient, damped frequency, and static displacement.	10	CO1
2	The natural frequency of a high-level light post to be 0.5Hz. Given that the total weight of the light 500kg, what earthquake force the post will attract if it is located highest seismic zone of India. Also find the base moment, if the height of the post is 15m. Assume $I=1.0$, $R=5$ and other suitable data. $S_a/g = 1+15T \text{ for } T=0-0.1$ $= 2.5 \text{ for } T=0.1-0.55$ $= 1.36/T \text{ for } T=0.55-4$	10	CO3
3	Write the free downward vibration differential equation for the spring-mass system shown in the figure below, with equal 'k'. Two springs making equal angle ' α ' with the horizontal and one vertical. Take mass of the block 'M'. Hence, find the natural frequency of the vibratory system. 	10	CO1
4	Design the spring constant of the vehicle suspension system (4 nos.) to give 80% isolation. The vehicle of mass 2T has to run at a speed of 30 kmph with road profile consisting pot holes (half sinusoids) with maximum depth and width, 0.1m and 0.5m, respectively.	10	CO1

Course Outcomes

- CO1: APPLYING ENGG. MATHEMATICS IN SOLVING VIBRATION PROBLEM
 CO2: ABILITY TO DESIGN A BUILDING EARTHQUAKE RESISTANT
 CO3: LEARN BASIC OF EARTHQUAKE ENGINEERING
 CO4: ABILITY TO MANAGE DISASTER