Ex/CE/PE/B/T/421A/2023

B.E. Civil Engineering - Fourth Year - Second Semester Examination, 2023

Structural Dynamics

Time: Four Hours Full Marks 100

[IS1893 is allowed]

No. of questions	Answer *All* Questions	Marks (100)
CO-1 1)	a) What is resonance? Explain mathematically for damped harmonic excitation. Derive dynamic modification factor.	15
CO-1 2)	Define different Lagrangian coordinates. Derive equation of motion of of a simple pendulam having mass M and length L and find time period using Lagrangian method.	5+10
CO-2 3)	Consider a two bay two storey R.C. framed building as shown in figure1. The floor is rigid. The mass at the first floor and at roof are 75 kN/m^2 and 50 kN/m^2 respectively. Area of floor is 10 m^2 The column size at ground floor is 250X250 and at first floor is 350X350. Floor to floor height is 3m in each floor. The building is located at Kolkata. Determine the storey stiffness, frequencies and mode shapes. Compute also the storey shears and floor forces. Assume M25 grade of concrete. 	20
CO-4 2 (a)	Derive the equation of motion in free vibration of a flexural uniform beam.	10
(b)	Determine the natural frequencies and mode shape for uniform beam with both end simply supported.	10

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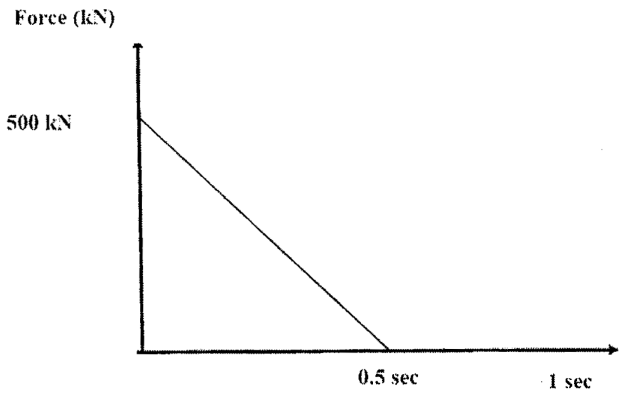
No. of questions		Marks (100)
CO-5 3)	 An 5% damped SDOF system has a mass of 9800N, stiffness 20 kN/m. It is subjected to a triangular force as shown in above figure. The initial displacement and velocity are zero. Determine the displacement time history by a) Any Explicit Algorithm b) Any Implicit Algorithm	10 +10
CO-4 6)	Write a short note with mathematical expressionany any one of the following. a)Base Isolation b)Rotating unbalance mass due to machine.	10