

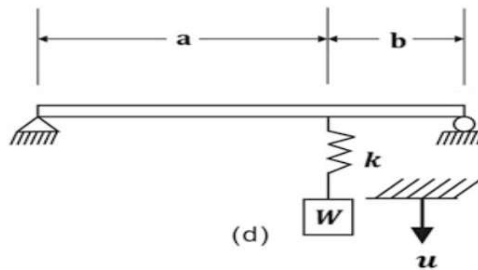


	WINTER-2023		
	Exam Seat No.:		
	Academic Year: 2023-2024	Semester: I	
	Name of Programme: M.Tech	Pattern:2022	
	Name of Course: Structural Dynamics	Course Code: CIV225102	
	Max. Marks:60	Duration: 2.50 Hrs	

	<p><b>Instructions:</b> Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.</p> <ol style="list-style-type: none"><li>1. This question paper contains 02 pages.</li><li>2. Answer to each new question is to be started on a new page.</li><li>3. Assume suitable data wherever required, but justify it.</li><li>4. Draw the neat labelled diagrams, wherever necessary.</li><li>5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.</li></ol>	
--	--	--

**Question No. 1 Attempt following Question**

- 1a) Determine an expression for the natural frequency for the system as shown in Fig. The beams are uniform of cross-sectional moment of inertia  $I$  and modulus of elasticity  $E$ . Neglect the mass of the beams. (6) CO 1



**Question No. 2 Attempt following Question**

- 2a) What is logarithmic decrement? Derive the equation for determining it. (6) CO 1

**Question No. 3 Attempt following Question**

- 3a) Using Duhamel's integral, determine the response of an undamped system to a rectangular pulse force of Magnitude  $P_0$  and duration  $t_d$ . (8) CO 3

**OR**

- 3b) Elaborate Numerical evaluation of Duhamel's Integral for undamped system (8) CO 3

- 3c) Define Response Spectrum. Elaborate construction of Response Spectrum in general. (8) CO 2, CO 3

**OR**

- 3d) Using Duhamel's integral, determine the response of an undamped system to a Triangular pulse force of initial Magnitude  $P_0$  and duration  $t_d$  (8) CO 2, CO 3

**Question No. 4 Attempt following Question**

- 4a) Write a short note on Non linear Analysis using Wilson Theta. (8) CO 3, CO 4

**OR**

- 4b) Derive stiffness formulation of the equations of motion for a three storey shear building. (8) CO 3, CO 4

- 4c) Write a short note on Newmark's method. (8) CO 3, CO 4

**OR**

- 4d) Find natural frequencies and mode shapes for two storey shear building. (8) CO 3, CO 4

**Question No. 5 Attempt following Question**

- 5a) Provide solution of equation of motion under free vibrations for a simply supported beam. (8) CO 3, CO 4

**OR**

- 5b) Which are different types of machine foundations? Explain special considerations while planning block foundation. (8) CO 3, CO 4

- 5c) Derive an expression for natural frequency of simply supported beam. Also evaluate first five natural frequencies. (8) CO 3, CO 4

**OR**

- 5d) Which are different techniques of vibration response control for a superstructure? (8) CO 3, CO 4