SHRI RAMSWAROOP MEMORIAL UNIVERSITY

End Semester Examination (2021-22)-Odd Semester

M. Tech (Structural Engineering) – I Year (I Sem)	
Course Name: Structural Dynamics	**Code: MCE1012**
Time: 02 Hours	**Max Marks: 60**

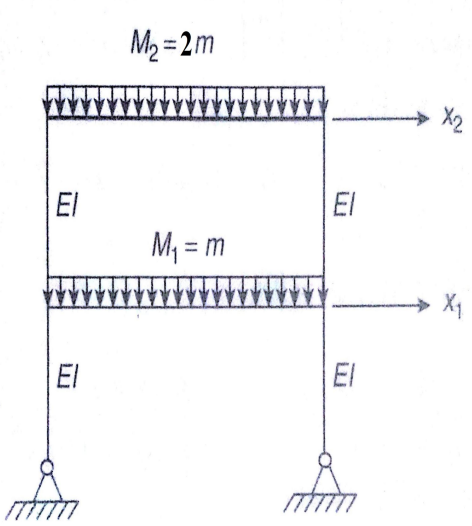
University Roll No.															
(To be filled by the Student)															

Note: Please read instructions carefully:

a) The question paper has 03 sections and it is compulsory to attempt all sections.

b) All questions of Section A are compulsory; questions in Section B and C contain choice.

Section A: Very Short Answer type Questions **Attempt all the questions.**		**BL**	**CLO**	**Marks (10)**
1.	Explain the concept of stiffness in case of dynamic systems.	BL2	CLO1	02
2.	Write a short note on 'mode superposition method'.	BL1	CLO2	02
3.	List the applications of finite element method in case of structural dynamics.	BL1	CLO3	02
4.	Give the equation governing the transverse vibration of a straight beam without damping subjected to an external force	BL1	CLO4	02
5.	What do you understand by single degree of freedom system?	BL1	CLO4	02
Section B: Short Answer Type Questions **Attempt any 03 out of 06 questions.**		**BL**	**CLO**	**Marks (30)**
1.	Explain the consequences of vibration in the structure.	BL2	CLO1	10
2.	In an experiment to determine the damping characteristics of a system, a viscously damped mass of 3 kg undergoes resonant amplitude of 1.5 m and has a time period of 0.2 seconds, when subjected to a harmonically excited force of 250 N. Calculate the damping coefficient.	BL3	CLO2	10
3.	Illustrate the concept of wind loads. What are the different parameters used for determining the wind speed?	BL4	CLO3	10
4.	Explain critical damping, under damping and over damping in a damped vibrating SDOF system.	BL2	CLO4	10

5.	How the formation of damping matrix occurs for a structure from the modal damping ratios?	BL3	CLO4	10
6.	Discuss the procedure for matrix iteration method in detail.	BL2	CLO4	10
Section C: Long Answer Type Questions/Case Study **Attempt any 01 out of 03 questions.**		**BL**	**CLO**	**Marks (20)**
1.	Determine the natural frequencies and modes for the shear frame shown below in Figure 1 and prove the orthogonality of modes.  Figure 1	BL5	CLO1	20
2.	Derive the Fourier series expression for the given periodic loading function and write the expression for the steady state response of a SDOF system. There are two phases in the given system. $p(t) = \begin{cases} P_0 & 0 \le t \le \pi \\ -\frac{P_0}{2} & \pi \le t \le 2\pi \end{cases}$	BL6	CLO4	20
3.	A SDOF system consists of mass with weight 6 kN and spring with stiffness 5 N/mm. The system has the damping force of 200N with a velocity of 250 m/s. Evaluate: i) Damping ratio ii) Damped frequency iii) Logarithmic decrement iv) Ratio of two consecutive amplitudes	BL5	CLO4	20
