JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2026

MTech-I Semester (SE)

COURSE CODE (CREDITS): 25M1CE112 (3) MAX. MARKS: 15

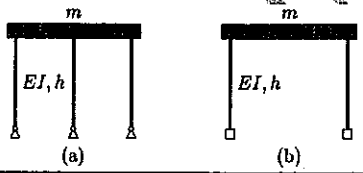
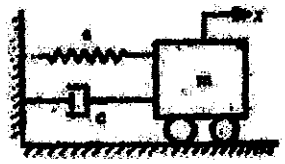
COURSE NAME: Structural Dynamics

COURSE INSTRUCTOR: Dr. Tanmay Gupta MAX. TIME: 1 Hour

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

(c) Use of calculator is allowed

Q.No	Question	CO	Marks
Q1	Differentiate between static and dynamic loading? Explain in detail how a dynamic problem can be classified?	1	4
Q2	Determine the natural frequency of vibration using simple structural concepts. Consider the frames below. Compute the stiffness and natural frequencies. 	1	3
Q3	Find the equation of motion for the spring mass dashpot system shown in figure when damping ratio $\xi = 2$. The mass m is displaced by a distance of 30mm and released. 	2	3
Q4	Define Logarithmic Decrement and state its simplified relationship with the damping ratio for lightly damped structures.	2	2
Q5	A free vibration "pluck test" is conducted on an elevated water tank model of effective mass $m = 2{,}500$ kg to determine its dynamic parameters. The tank is pulled laterally and released from rest. An accelerometer records the following displacement-time data: Peak displacement at cycle 1: $u_1 = 40.0$ mm occurring at $t_1 = 0.20$ s. Peak displacement at cycle 6: $u_6 = 8.0$ mm occurring at $t_6 = 2.20$ s. Determine the damped natural frequency (ω_d), undamped natural frequency (ω_n), and lateral effective stiffness (k).	2	3

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