

1. Evaluate the expression for response of a damped SDOF system subjected to unit impulse load. (5)
2. Evaluate the response of a SDOF system subjected to a load as shown in Figure 1 using Convolution Theorem. (Unlamped) (15)
3. Develop Lagrange's equation of motion for a multi degree of freedom system from the Principle of Virtual Work. (15)
4. In finite difference technique of obtaining response of a SDOF system under dynamical loading, explain how a zero initial condition with load being zero at initial time is solved. (5)
5. Using Runge - Kutta method find the response of a SDOF system defined by the expression

$$m\ddot{x} + kx = F(t) \text{ with } m = 5 \text{ kg and } k = 3000 \text{ N/m}$$

The description of the load function $F(t)$ is shown in Figure 2. (15)

6. An 82-kg machine is mounted on an elastic foundation. An experiment is run to determine the stiffness and damping properties of the foundation. When the tool is excited with a harmonic force of magnitude 8000 N at a variety of frequency the maximum amplitude obtained is 4.1 mm at a frequency of 40 Hz. Calculate the stiffness and damping properties of the foundation. (5)

Or

Develop the expression for transmissibility for a base excited system (5)

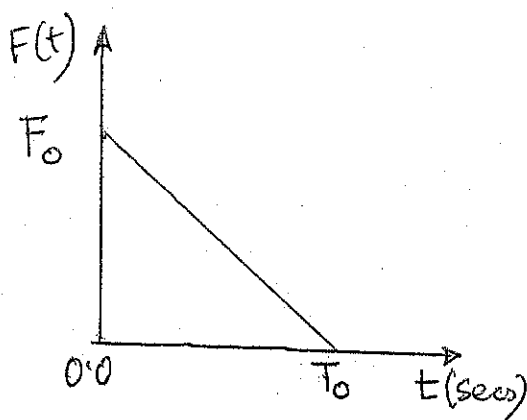


Figure - 1

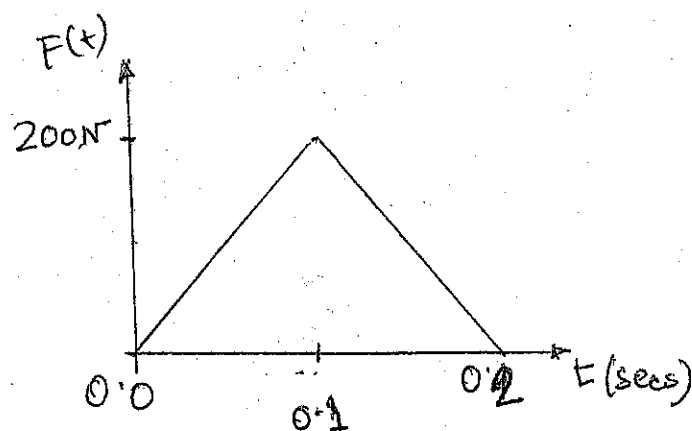


Figure - 2


B.E. Civil Engineering - Fourth Year - Second Semester-19**Structural Dynamics****PART-II**

Time: Three Hours

Full Marks 100

Use a separate Answer-Script for each part

[IS1893 is allowed]

No. of questions	Part II (Answer All Questions)	Marks (2X20=40)
1(a) (b)	Derive the equation of motion in free vibration of a flexural uniform beam. Determine the natural frequencies and mode shape the following beam (Ends-fixed, simply supported). 	10 10
2	Consider a five bay two storey R.C. framed building. The floor is rigid. The mass at the first floor and at roof are 15 ton/m ² and 7.5 ton/m ² respectively. Area of floor is 40 m ² . The column size at ground floor is 500X500 and at first floor is 450X450. Floor to floor height is 4m in each floor. The building is located at Kolkata (zone III). Determine the storey stiffness, frequencies and mode shapes and storey shear. Assume M30 grade of concrete.	20