



USN

USN identification box with 10 empty slots

10CV767

Seventh Semester B.E. Degree Examination, June/July 2019
Structural Dynamics

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting at least TWO full questions from each part.

PART - A

- 1 a. Differentiate between magnitude and intensity of an earthquake. (04 Marks)
b. Differentiate between free vibration and forced vibration. (04 Marks)
c. Derive an expression for the response of a SDOF system subjected to damped free vibration. Consider an underdamped system. (12 Marks)
2 a. A vibrating system consists of weight 300N and a spring stiffness 25N/mm is viscously damped so that the ratio of any two successive amplitude is 1:0.9. Determine:
i) Natural frequency of undamped vibration
ii) Logarithmic decrement
iii) Damping ratio
iv) Damping coefficient. (10 Marks)
b. Derive an expression for a SDOF system subjected to a rotating unbalance. (10 Marks)
3 a. Derive an expression for response of a SDOF system subjected to a constant force using Duhamel's Integral. (10 Marks)
b. Derive an expression for response of SDOF system subjected to harmonic base excitation (10 Marks)
4 a. Write equation of motion for the following systems shown in Fig.Q.4a(i) and Q.4a(ii):

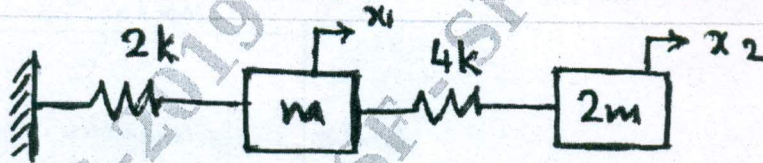


Fig.Q.4a(i)

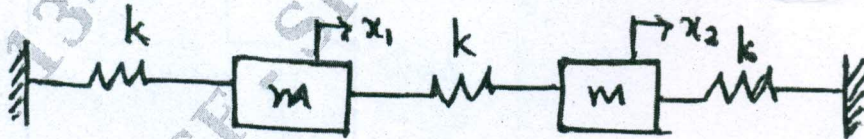


Fig.Q.4a(ii)

- b. Derive orthogonality property of normal modes with usual notations. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

**PART - B**

- 5 Determine the natural frequencies and modes of the system shown in Fig.Q.5. Also draw the mode shapes. (20 Marks)

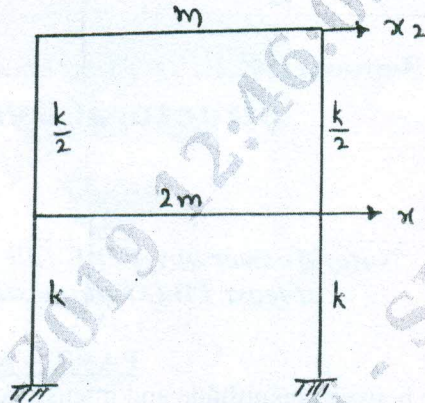


Fig.Q.5

- 6 Determine the exact response for a 2-storey shear building shown in Fig.Q.6 at time  $t = 0.15$ . Using mode superposition technique. (20 Marks)

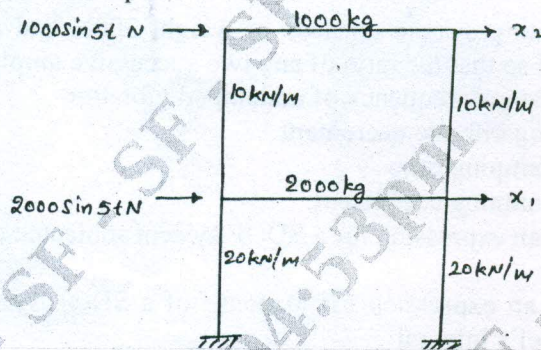


Fig.Q.6

- 7 Determine the steady state response for the 2 storey shear building shown in Fig.Q.7. (20 Marks)

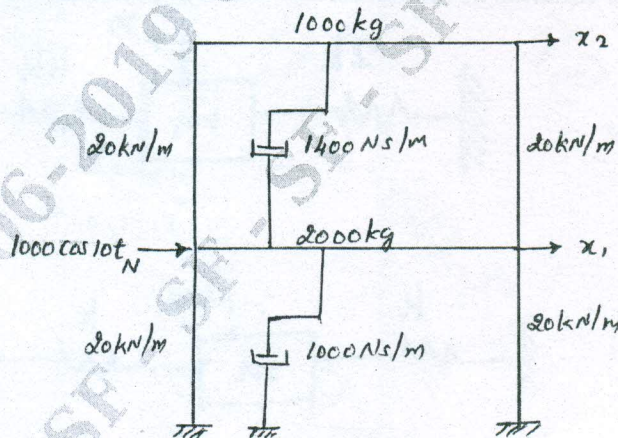


Fig.Q.7

- 8 Derive the element elastic stiffness matrix for a two noded beam element using shape functions. (20 Marks)

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