QP Code: RO20MTECH215 Reg. No | | | | | | | | | | | AR 19

GIET UNIVERSITY, GUNUPUR – 765022

M. Tech (Second Semester Examinations) – October' 2021

MPCSE2020 – STRUCTURAL DYNAMICS

(Structural Engineering)

Time: 2 hrs Maximum: 50 Marks

(The figures in the right hand margin indicate marks)

PART – A

Q.1. Answer ***ALL*** questions (2 x 10 = 20)

a. Differentiate free and forced vibration.

b. What is meant by prescribed dynamic loading?

c. What are the different types of damping encountered in a vibrating structural system?

d. List out the assumptions made in shear building.

e. What is stiffness matrix and damping matrix?

f. "Dynamics problems are of Eigen value type." Is this statement true? Justify.

g. Define modal participation factor.

h. State the modal orthogonal conditions with reference to mass and stiffness

i. Discuss about the natural frequency and mode shapes for both ends free.

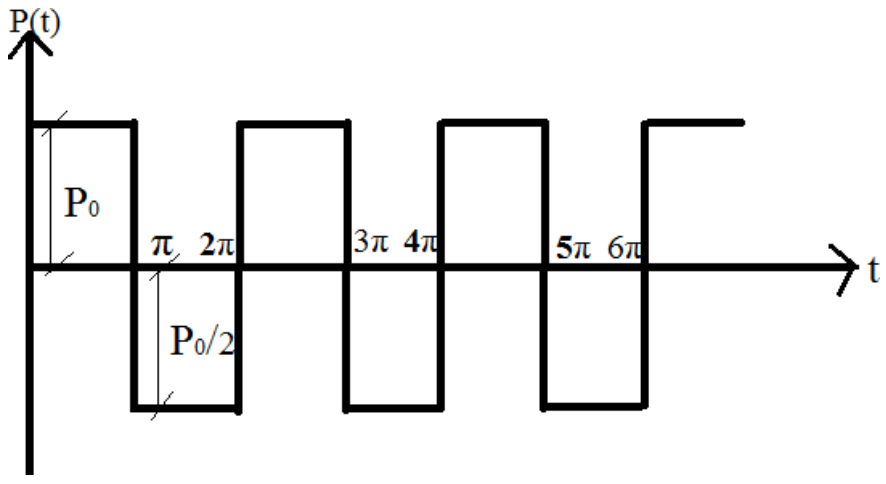
j. Recommend how Rayleigh's method be adopted to find the fundamental frequency of a cantilever beam.

PART – B **(6 x 5 = 30 Marks)**

Answer ***ANY FIVE*** questions Marks

2. A block of weight 900 N (moving between vertical guides) is supported by a spring of stiffness 106 N/m. the block is given an initial displacement of 50 mm with a velocity of 300 mm/sec, determine the period of vibration, natural frequency, amplitude of motion, maximum velocity and maximum acceleration of the block. Assuming a damping of 20% and show the logarithmic decrement and the damping coefficient of the system. (6)

3. Solve and derive the Fourier series expression for the given periodic loading function and write the expression for the steady state response of an SDOF system (6)

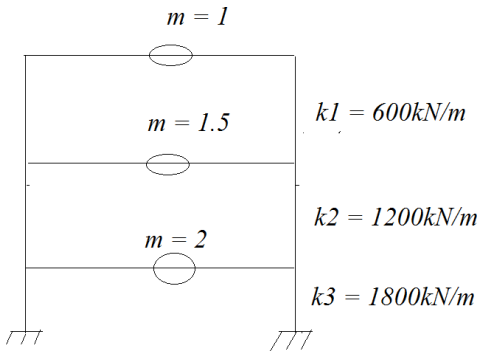


4. What are the normal modes for the following system and show that the modes are orthogonal? (6)

$$\begin{bmatrix} 2m & 0 \\ 0 & m \end{bmatrix} \begin{bmatrix} \ddot{x}_1 \\ \ddot{x}_2 \end{bmatrix} + \begin{bmatrix} 3k & -k \\ -k & k \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

5. Explain in detail about the free and forced vibration of two degree of freedom systems. (6)

6. Determine the natural frequencies and mode shape for the shear building as shown in figure. (6)



7. Determine from first principles, the first three natural frequencies and mode shapes of a simply supported beam subjected to free flexural vibrations (6)

8. Explain how the conservation of energy method is used to analyse beams for dynamics. (6)

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