

Roll No.

Total No. of Pages : 03

Total No. of Questions : 08

M.Tech.(Civil Engg.) (Sem.-1)

DYNAMICS OF STRUCTURES

Subject Code : CE-501

M.Code : 35202

Time : 3 Hrs.

Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWENTY marks.
3. Missing data if any can be suitably assumed, clearly stating the same.
4. Use of relevant IS codes (IS 1893 etc.) is allowed.
5. Wherever possible support the answer with suitable sketches.

1. Write short answer for the following :

- a) Write a short note on Amplitude.
 - b) What is meant by theory of vibration?
 - c) What do you mean by Dynamic Response?
 - d) What is meant by Forced vibrations?
 - e) Define Resonance.
 - f) Define static force.
 - g) What is the response for impulsive load or Shocks?
 - h) Define Cycle.
 - i) Write the mathematical equation for springs in parallel and springs in series.
 - j) Define Magnification factor. (2 × 10)
2. a) Derive the equation of motion and its solution for forced undamped vibration system. (14)
- b) Write short note on “Logarithmic Decrement”. (6)

3. a) A vibrating system consists of a mass of 5kg, spring of stiffness 120 N/m and a damper with a damping co-efficient of 5 N/s/m. determine (10)
- Damping factor
 - Natural frequency of the system
 - Logarithmic decrement
 - The ratio of two successive amplitude
 - The number of cycles after which the initial amplitude reduces to 25%
- b) Derive “DUHAMEL INTEGRAL”, use this (or otherwise) to derive Dynamic Load Factor for an impulsive load. (10)
4. Find the natural frequency and mode of the system. (20)

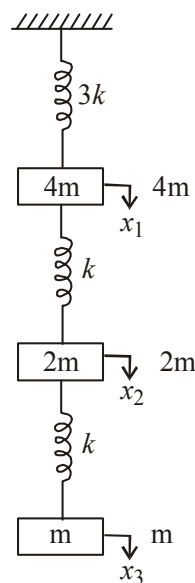


Fig.1

5. a) Derive the differential equation of motion for the flexural vibration of a beam of uniform cross section and derive the frequency equation for a fixed beam along with mode shapes for this beam. (14)
- b) Describe in detail the working of vibration absorber. (6)

6. a) Write short answer for the following : (2 × 5)
- What is intensity of earthquake?
 - Define magnitude of earthquake.
 - Explain Degree of freedom.
 - What is fault?
 - What are the causes of earthquake?
- b) Explain elastic rebound theory. (5)
- c) Explain in detail about seismic waves. (5)
7. a) A four storied square RC framed building shown in Fig. 2 with live load 4 kN/m^2 is to be constructed in Delhi. Work out seismic forces on the structure by seismic coefficient method using IS 1893. All beams and columns size $300\text{mm} \times 400 \text{ mm}$. Thickness of roof and floor slab 120 mm thick. Wall is of 150 mm thick all around. Height of each floor 3m . Density of concrete 25 kN/m^3 . (15)

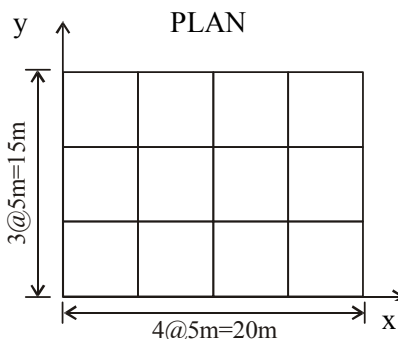


Fig.2

- b) Explain in short “Rigid Diaphragm Effect”. (5)
8. What is standard eigen value problem? List the various methods used for the solution of Eigen value Problem. Determine the eigen value for the following problem. (20)

$$10x_1 + 4x_2 - x_3 = 0$$

$$4x_1 + 2x_2 + 3x_3 = 0$$

$$-x_1 + 3x_2 + x_3 = 0$$

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.