B.Tech. (Sem. - 7th / 8th)
EARTHQUAKE RESISTANT STRUCTURES
SUBJECT CODE : CE - 404
Paper ID : [A0625]

[Note : Please fill subject code and paper ID on OMR]

Time : 03 Hours   Maximum Marks : 60

Instruction to Candidates:

1) Section - A is **Compulsory**.

2) Attempt any **Four** questions from Section - B.

3) Attempt any **Two** questions from Section - C.

Section - A

**Q1)**   **(10 x 2 = 20)**

a) Differentiate between magnitude & intensity of an earthquake.

b) What is under-damped system?

c) What is Impulse load?

d) Define Iso-Seismals.

e) What is Fourier Spectrum?

f) Shear walls are employed for increasing stiffness and are uniformly distributed in both principal directions. Comment.

g) What are coupled shear walls?

h) What is the permissible value of Drift in buildings from earthquake point of view?

i) List any 2 typical features of damages due to earthquake in masonry buildings.

j) What is Interaction Ratio?

Q2) Define Seismology. Show a typical Seismograph system and explain its working.

Q3) A portal frame having weight of its beam and superimposed load W deforms horizontally by Y_0 when acted upon by a horizontal load P. Derive a relationship between P & Y_0 taking into account the individual stiffness of members & rotations at joints B & C.

Figure 1
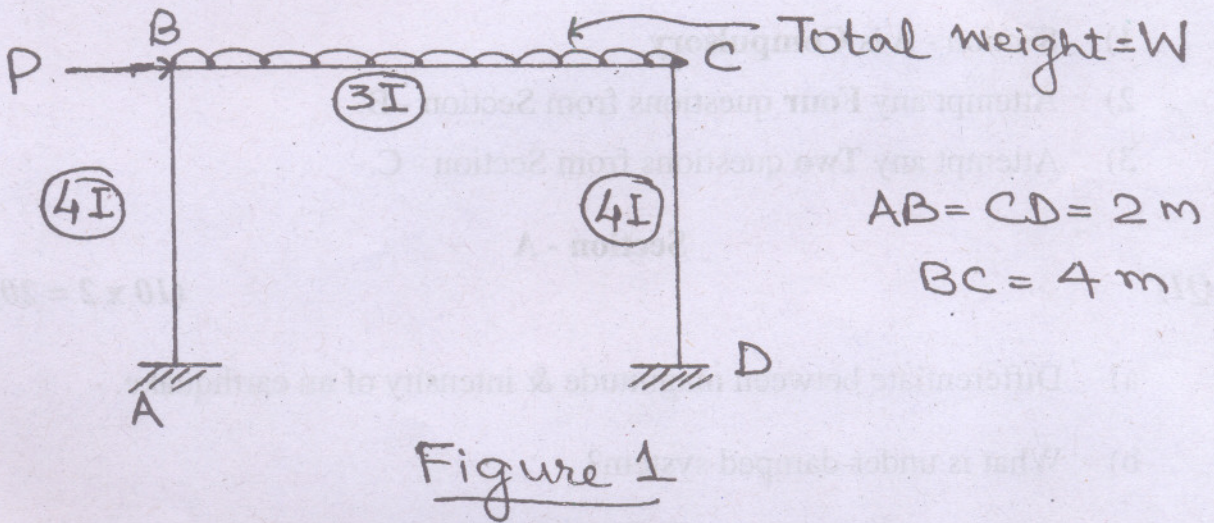
Q4) Assuming that system is excited by a periodic force sinusoidal in form, derive equations for forced vibration of a damped system.

Q5) Write the procedure for lateral load analysis of masonry buildings. Distinguish between Rigid & Flexible Diaphragms.

Q6) With the aid of an example, discuss the seismic design procedure of a shear wall. Show the reinforcement details in reinforced concrete shear wall designed by you.

(2 x 10 = 20)

Q7) A system is modeled by two vibrating masses m_1 and m_2 interconnected by a spring K and damper element C. For harmonic force $F = F_0 \sin \bar{\omega} t$ acting on mass m_2, determine (a) equation of motion in terms of relative motion of two masses, $u = y_2 - y_1$ (b) the steady state solution of relative motion. Refer Fig. 2.
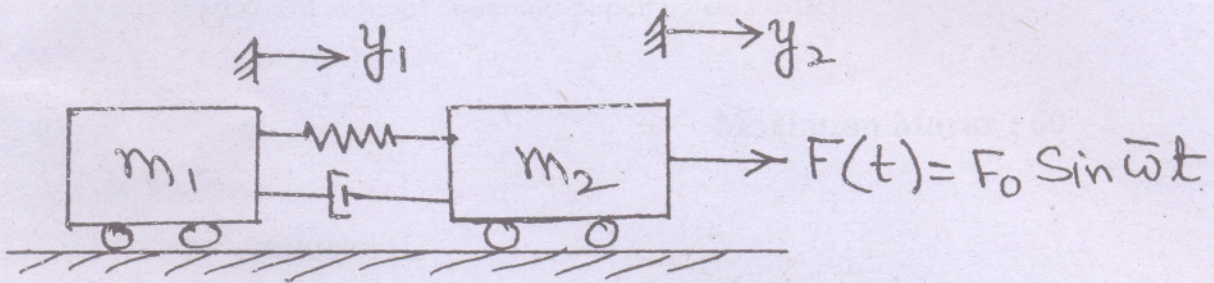

Fig 2

Q8) Discuss the case of square pulse of Finite Duration, derive relationship between Magnification factor and τ/T. Refer Fig. 3.
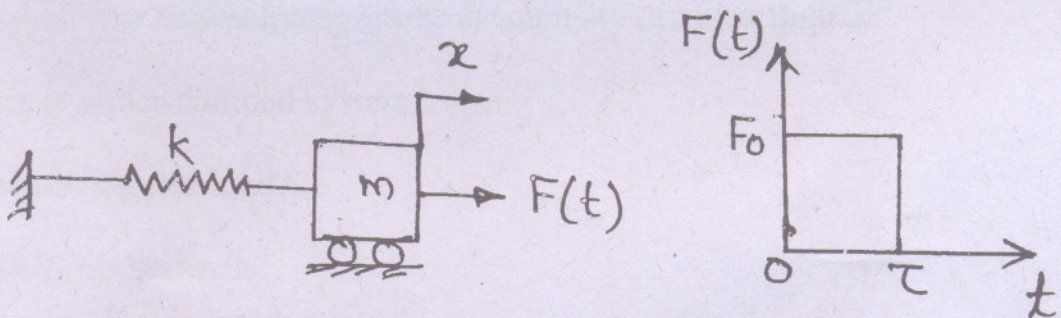

Fig. 3

The above system is subjected to Transient Forces.

Q9) Write short notes on (any TWO):

   (a)   Past earthquakes & Lessons learnt.

   (b)   Ductility.

   (c)   Classification of Shear Walls.