

FACULTY OF ENGINEERING & TECHNOLOGY  
M.E.(Structural Engg)Year Examination-June-2015  
Structural Dynamic & Earthquake Engineering  
(Revised)

Time: Three Hours

Maximum Marks: 80

“Please check whether you have got the right question paper.”

- i) Solve any two questions from each section.
- ii) IS: 1893 is permitted.

SECTION-A

Q.1 a) For a lumped mass MDOF system explain 15  
 a)how the response is obtained using modal superposition method. 05  
 b)Prove  $w = \sqrt{\frac{k}{m}}$

Q.2 a) Define orthogonality condition and derive the same for MDOF system. 10  
 b) Discuss in detail about damping. 10

Q.3 Size of structural element as follows. 20  
 Inner column = 0.23m×0.45m  
 Outer column = 0.30m×0.60m  
 Slab thickness = 0.15m  
 Floor beams = 0.23m×0.45m  
 Roof beams = 0.30m ×0.90m  
 Frame material is of RCC.  
 Find the natural frequencies and corresponding mode shapes for Fig.1

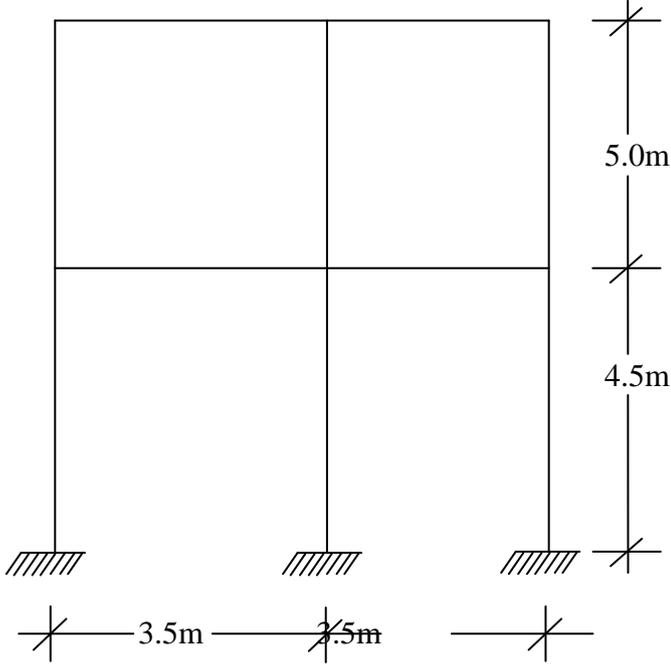


Fig.1

## SECTION-B

- Q.4 a) What is response spectrum? How it is different from response history. 05  
b) Explain time history method. 05  
c) Explain the effect of vertical earthquake acceleration. 10
- Q.5 a) For a typical application, a moment resisting steel frame and moment resisting RC frame is examined. Which one will have more damping and what will be the consequences? 10  
b) Describe the equation of motion of beam element with distributed properties. 10
- Q.6 A twelve storied RCC frame with shear wall with  $I = 1.5$ , height of each storey is 3.5m, the floor area is 570 sq. m. with a dead load of  $2.75 \text{ kN/m}^2$ . The L.L. on each floor is  $3 \text{ kN/m}^2$  and on roof it is  $1.5 \text{ kN/m}^2$ . The structure is on hard strata. The damping in the structure is estimated to be 8%. Determine the design seismic forces on the structure by equivalent static force method, if the building is situated in Tiruchirapalli city. 20