Quiz/Assignment

Describe the types of the configurations depicted in Figure 1, 2 & 3. How they can effect seismic performance of a structure and what are their possible solutions.

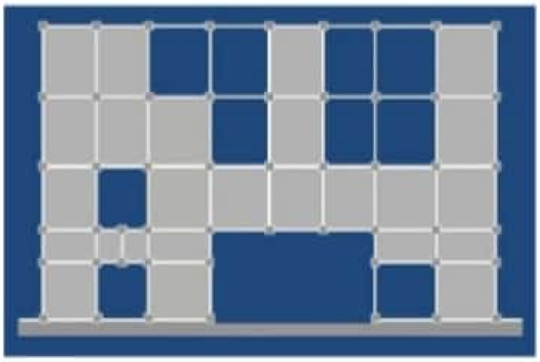

Figure 1

Figure 2

Figure 3

Develop the equation of motion of the frame shown in figure 4 under the action of a lateral dynamic force p(t). Consider a uniformly Distributed gravity load of (registration number) lb/ft acting on the beam. Neglect damping effect

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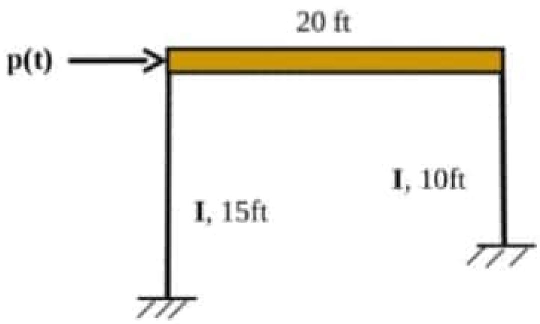

Figure 4

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Figure # 01

Describe the type of the configuration depicted in figure # 01. How they effect Seismic Performance of structure & what are there Possible Solution.

Ans:- The figure # 01 is said to be "moment frame"

The "moment Frame" is a fondarmential Structure in engineering - the frame -is a two-dimensional Series of interconnected members joined togeather. The member are not necessary straight & may be free jointed anywhere along their Length. In real structures, moment fream in two orthogonal directions are often connected togeather to form a three-dimensional frame are designed to Carry vertical & horizontial loads in the Same plane but may also be drawn on to provide resistance to horizontial Loads out of the Plane of the frame. They can be found in many different materials & buildings applications.

A moment frame is a special type of frame that uses rigid connection b/w each of its constituent members. This configuration is able to resist laterial & overturning forces because of the bending moment & shear strength ~~of the moment frame~~ that is inherent in its members & the connecting joints. There fore, the

Stiffness & Strength of the moment frame in Seismic design depends on the Stiffness & Strength of its members.

Because moment frames can be move flexiable then other options, such as shear wall, thay allow larger movements during an earthquick. Non-flexible elements attached to the frame, such as the cladding must be designed to accomodate the additional movement to avoid damage.

Figure # Q2

Describe the types of the Configuration depicted in the figure. Q2. How thay can effect Seimsics Performance of a Structure & what are their Possible Solutions.

Ans:- The diagram of figure Q2 Show us that, it is "Avoid discontinuous Shear Walls."

Solution:-

The Solution to the Problem of the discontinous Shear Wall is to eliminate the Shear walls.

If the decision is made to use Shear walls, then their presence must be recognized from the beginning of Schematic design, & their Size & location made the Subject of careful architectural & engineering Coordination early.

Effect Seimic Performance:-

This Problem may occure in buildings whose configuration is geometrically regular & Symmetrical but nonetheless irregular for Seismic design Purpose.

A building's Seismic behaviour is Strongly influenced by the nature of the Perimeter design. If there is wide Variation in Strength & Stiffness around the Perimeter, the Center of mass will not coincide with the Center of resistance, & torsional forces will tend to cause the building to rotate around the Center of resistance.

Figure # 03.

Describe the type of the configuration depicted in figure #03. How thay effect Seismic Performation of Strutuve & what are there Possible Solution.

Ans:- The figure # 03 is said to be "Stronge - Beam & weak Column".

During earthquick, building failure occure due to the failure of column under laterial load. To avoid this, seismic design of building reqvires the formation of plastic hingers in beams before plastic higners form in columns. This mechanism of often referred to as Strong column - weak Beam mechanism. This Paper deal with the analysis of Strong ~~Beam~~ Column & Weak Beam mechanism in reinforced Concrete buildings by analysing the effect of "area moment of Inertia". Reinforcement & lengths of members of the buildings. The conditions for Stronge column & weak beam given in IS-13920:2016 i.e ratio of Summation of moments of columns to that of a beams at a joint Should be greater then or eqval to 1.4 is also verified.

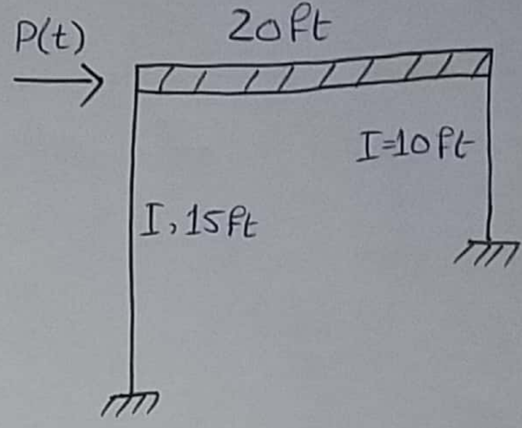
~~Keywords Stronge column weak~~

An experimential evaluation of the Seismic Performance of moment - resisting Steel frames Using weak-column Strong-Beam joint is described. A simulated seismic response is imposed on five half-scale specimens using a substructure technique of the pseudodynamic test method. Results suggest that weak-column strong-Beam frames have sufficient ductility capacity to sustain the inelastic demand induced by a major seismic event, but only if the base shear strength is larger then the minimum required by the 1988 Uniform Building Code. A frame tested with the minimum base shear strength failed during the earthquick. Othe cherasteristics, such as slenderness of the column cross-section & axial load ratio affect hysterestic behaviour, but the over-strength in base shear capacity has the largest influence on the satisfactory performance of weak-column Stronge-Beam frames.

Problem :- (Figure # 04)

Develope the equation of motion of the frame Show in the figure 4. ....

Solution:- ID # 7209



$$m = \frac{w}{g}$$

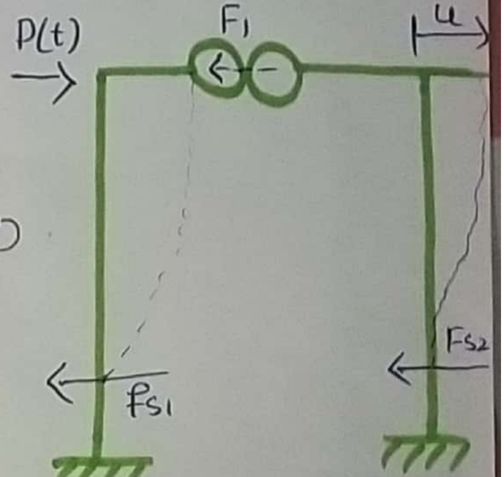
$$= \frac{7209 \times 20K}{32.2\ ft/sec^2}$$

$$m = 4477.639 \text{ slug}$$

OR

$$m = 4477639.75 \text{ lb} \cdot \text{sec/ft}.$$

Using D-Altembert's Principle of dynamic equilibrium;



$$P(t) - f_1 - f_{s_1} - f_{s_2} = 0$$

$$P(t) - m\ddot{u} - (f_{s_1} + f_{s_2}) = 0$$

$$P(t) = m\ddot{u} + (f_{s_1} + f_{s_2})$$

$$p(t) = m\ddot{u} + (k_1 u + k_2 u)$$

$$p(t) = m\ddot{u} + (ku)$$

As, $K = 3759\ K/ft$.

$$p(t) = (4477639.75)\ddot{u} + Ku$$

$$P(t) = 4477639.75\,\ddot{u} + 3759 \times 10^6 u$$

(Where u & P(t) are in ft & lb)