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"COMPARATIVE STUDY OF BEHAVIOR OF RCC AND STEEL FRAMED STRUCTURE DURING EARTHQUAKE"

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ABSTRACT

In recent era it is required to make the structure strengthen and stable to all adverse circumstances. The most dangerous and disastrous one is earthquake is one of the most dangerous and disastrous cause of that there will be need to evaluate and improve the seismic performance of multistoried buildings. The height of structural is now increasing for the pursuit of the economy, rationalization of structures and efficiency of construction now.

In this paper we are dealing with comparative study of seismic analysis of RCC framed structure and steel framed structure. The equivalent static analysis is carried out in the study using the software and the comparison of these models are presented. The work will present elaborated view about the nature and performance of RCC and steel framed structure seismically.

Keywords- *Seismic analysis, RCC, steel.*

I. INTRODUCTION

The Reinforced Concrete (RC) has been the most popular construction material used Worldwide from the past century. It's a wonderful construction material that possesses almost all of the desirable properties such as excellent insulation from environment, durability, low cost, strengthen and also it is able to mold in any given shape and size. Even from structural aspects, reinforced concrete construction serves its intended purpose extremely well, if properly designed and constructed. However, the performance of reinforced concrete structures during past earthquakes has forced researchers to evaluate the suitability of the material to resist seismic excitations. As compared to the Reinforced concrete structure (RCC) the steel has got some important physical properties like high strength and ductility. The high yield and ultimate strength results in slender sections. These properties of steel are of very much vital in case of the seismic resistant design. Thus a comparative study is necessary to be done from the point of view of seismic performance.

II. SIGNIFICANCE OF STUDY

From design point of view, the choice for design of a structure as per the requirement was normally load bearing structure and framed structure whether it is RCC or Steel but failure of these structure are mainly due to impact of earthquake on the structure. So, it is necessary to study the actual performance of the RCC structure and steel structure during earthquake.

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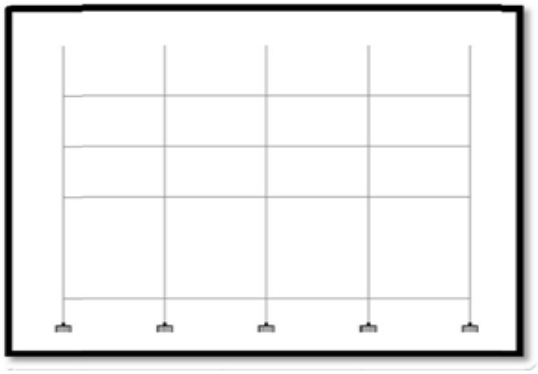

Fig.2.1 Framed structure

III. SCOPE OF STUDY

Three dimensional s pace frame a nalysis is c rried out for two different framed structures suh as;
[1] RCC framed Building
[2] Steel framed Building

Equivalent static analysis of these buildings, in terms of lateral displacement, storey drift & shear force is presented & compared within the considered configuration. At the end, a suitable configuration of building to be used is suggested.

IV. BUILDING CONFIGURATION

Two different frames are considered,
[8] RCC framed structure
[9] Steel framed structure
The building plan is as shown in figure:

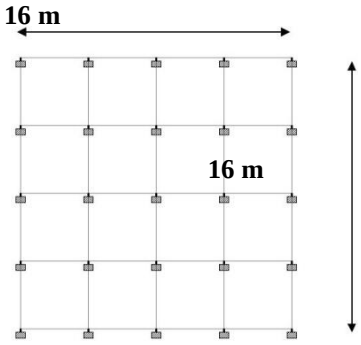

Fig.4.1 Framed structure

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Table 4.1 Properties of members of different configurations of building

Parameters	RCC Framed Structure	Steel Framed Structure
Plan dimensions	16m X 16m	16m X 16m
Total height of building	17m	17m
Beam sections	230mm X 400mm	ISHB 300
Column sections	300mm X 300mm	ISHB 350

V. METHOD OF ANALYSIS

The seismic analysis of all buildings are carried out by Seismic coefficient method by using IS 1893(part I) - 2002. The other parameters used in seismic analysis

[9] Moderate seismic zone-III
[10] Zone Factor = 0.16.
[11] Importance Factor = 1
[12] Response Reduction Factor = 5

Analyses of results In all, two buildings have been analyzed for seismic load. The seismic force was applied in X & Z direction independently.

Table 5.1 Lateral Displacements

SR. NO.	STOREY LEVEL	RCC framed structure		Steel Framed structure	
		X- dir	Z - dir	X- dir	Z - dir
1	I	0.010	0.010	0.014	0.022
2	II	0.076	0.075	0.091	0.185
3	III	0.145	0.141	0.176	0.345
4	IV	0.203	0.199	0.249	0.484
5	V	0.248	0.240	0.303	0.585
6	VI	0.267	0.258	0.331	0.626

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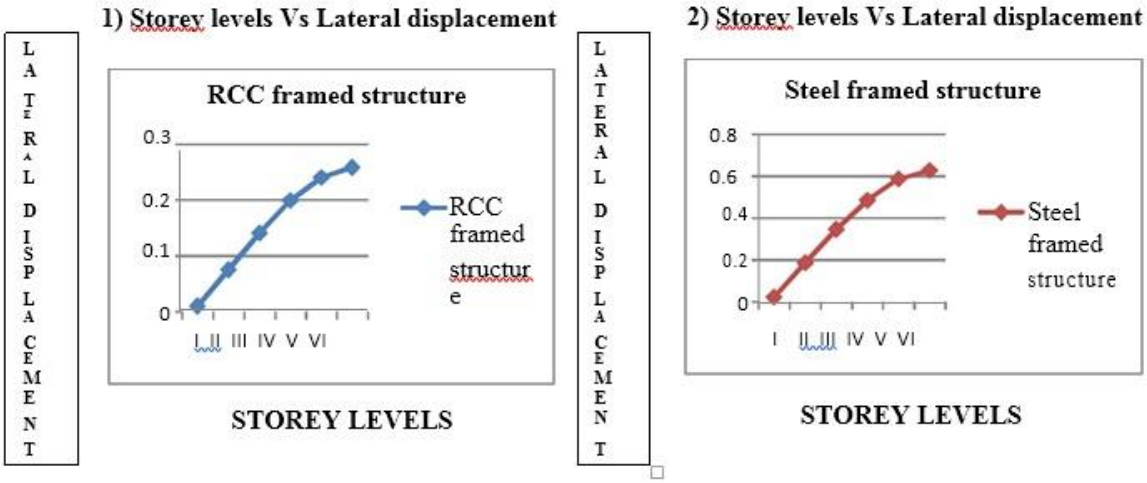
Table 5.2 Storey Drift

SR. NO.	STOREY LEVEL	RCC framed structure		Steel Framed structure	
		X- dir	Z - dir	X- dir	Z - dir
1	I	0.010	0.010	0.014	0.022
2	II	0.066	0.065	0.077	0.163
3	III	0.069	0.067	0.084	0.161
4	IV	0.058	0.057	0.074	0.139
5	V	0.045	0.041	0.054	0.101
6	VI	0.020	0.018	0.027	0.040

Table 5.3 Maximum shear force

SR. NO.	STOREY LEVEL	RCC framed structure		Steel Framed structure	
		Max Fz (kN)	Max Fy (kN)	Max Fz (kN)	Max Fy (kN)
1	I	0.005	8.259	0.042	6.553
2	II	0.165	63.392	0.241	60.322
3	III	0.347	66.049	0.521	59.387
4	IV	0.529	62.247	0.768	56.873
5	V	0.665	59.598	0.902	56.892
6	VI	0.696	25.999	0.865	24.647



VI. CONCLUSIONS

From the results obtained i.e. seismic analysis of RCC framed structure and Steel framed structures, it can be concluded as

1) Lateral displacements in longitudinal and transverse direction in RCC framed structuresare less as compared to the Lateral displacement in Steel framed structures.
2) Steel framed structure will resist more lateral forces and will undergo deformation due tothe property of ductility but at the same condition RCC framed structure will undergoes cracks.
3) Storey drift in longitudinal transverse direction in RCC framed structures are less ascompared to the Lateral displacement in Steel framed structures.
4) Shear forces in RCC framed structures are relatively less as compared to that in Steelframed structures.

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