REVIEW PAPER ON SEISMIC ANALYSIS OF G+7 RC BUILDING USING NON-CONVENTIONAL SIZE OF COLUMN AND BEAM TO REDUCE THE DEFLECTION BY STAAD.Pro

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Abstract: Structural engineering field is facing lot of challenges off late in Civil Engineering domain in development required infrastructure for the needs of mankind. Gravity loads, Wind loads as per IS 875 and Earthquake loads as per IS1893 PART 1 (2002) are considered acting on the structure and the design is carried out in accordance with IS456-2000. Various load combinations as per IS 1893-2016 have been considered to obtain the worst condition. Various seismic data are necessary to carry out the seismic analysis of the structures in this study the seismic response of the structures is investigated under earthquake excitation expressed in the form of member forces, joint displacement, support reaction. The design of foundations will be done using SAFE software and detailing of reinforcement is carried out in accordance with STAAD.PRO. Manual design calculations will be done for representative structural elements slab, beam, column and footing to validate software results. Behaviour of the structure when acted upon by static and dynamic loads is presented with the help of stress resultants namely axial forces, bending moments and shear force in all structural elements for safety in accordance with IS456-2000.

Keywords: STAAD.PRO, Seismic analysis, Gravity load, Static load, Dynamic

I.   INTRODUCTION

Structural Engineering is a Sub-Discipline of Civil Engineering that involves the application of the laws of Physics, Mathematics to safely design the load bearing elements of Man Made Structures. Usually, the base of a structure is fixed which leads to inertia forces causing certain distributions that occur in moving based system. The horizontal and vertical structural elements resist lateral forces produced by seismic waves. Hence seismic analysis is done to understand the resistance of structures to dynamic motions and consists determination of bending moments, shear forces and deflections.

However, in zones where the probability of occurrence of the earthquake is very low, static analysis of structure is sufficient to cater to safe design needs. Static analysis is used for the design of ordinary moment resisting frame but the design of special moment resisting frames requires complete seismic analysis of the structure. STAAD.PRO is a leading software for performing the analysis and design of structures. Structural design is important in Civil Engineering because it helps to check that the structure is safe. Structural design gives all the vital information regards foundations, floors, walls, beams, roof and the quality of material to ensure that any of the structure built meet all the safety requirements.

II. METHODOLOGY

Owais Bhat, Manish Kaushal 2022 - In this Project the, author says that The Fundamental principles of earthquake-Resistant design applicable to RCC members are outlines. Beams are designed for flexure,shear and torsion.
While Analyzing the results we get suitable design elements for building a concrete structure without any error or corrections such as Beam design output of a beam containing flexure and shear Reinforcement are provided along the length of the beam. Analysis and design carried in
STADD.Pro and post processing in STADD.Pro gives the load at various supports.

B. Girish Babu 2017 - In this Project, Author Analyses and study of the G+7 building, seismic load dominates the wind load under the seismic zone –II. Basically, the wind pressure is high for high rise building based on weather conditions such as coastal areas, hilly stations. The Storey drift condition for considered G+7 building, the base drift=0.0 at every story. This says that the structure is safe under drift condition.

Rajat Srivastava, Sitesh Kumar Singh 2018 - In this Project, Author Analyses and design a G+9 Residential building is located at Delhi (Zone 2) region, we have given more emphasis on earthquake load rather than others. Author concludes that the results of the computerized and manual analysis are identical, & STAAD.PRO is an excellent software for high-rise buildings. . After Analysis and Design author concludes that Design and detailing of all require element of building were calculated manually and values were kept in required field in the software.

Taruna Kamble, Dr. G. D. Awchat 2018 - Author and team analyzed high rise G+20 storey building (3-D Frame) a is carried out by Seismic Analysis and design results it is conclude that STAAD.PRO and ETABS both the software's gives almost similar results, so both the software can be used for high rise modelling. And After analysis and design author concludes that Changing the shear wall will affect the attraction of forces, so that wall must be in proper position.

Prof. Y. R. Deshmukh, S. P. Jadhav, S. M. Shirsat, A. S. Bankar, D. G. Rupanawar 2018 - In this Project the, a seismic analysis of multistory building with floating column using STAAD.PRO V8i. Author & team Analyses that comparative seismic analysis of multistoried building with and without floating column analytical study is carried out on floating column and other columns affected due to floating column. In the model floating columns and struts are provided at the specified locations in different cases. The 3- D analysis of building is carried out for Seismic Analysis of Multi storey Building With Floating Column all three cases i.e. normal framed building without floating columns, with floating columns and with struts supporting floating columns and comparative study is done.

Brajesh Kumar Tondon, Dr. S. Needhidasan 2018 - Author and team considering high rise G+8 storey building, analysis is carried out by static method and spectrum analysis and design is done as per IS 456:2000. Design & Analysis is done by both manually and using AUTO CAD & STAAD.PRO. seismic response of a residential G+8 RC frame building is analyzed by the linear analysis approaches of Equivalent static lateral force and Response spectrum methods using Staad Pro 2016 software as per the IS- 1893-2002-Part-1. After Analysis and Design author concludes that the results from of seismic analysis in both zones is compared on the basis of story drift, modal frequency, base shear and nodal displacement.

III. OBJECTIVE

1.   The Main Objective of this study is to Analyse and Design a reinforced concrete Building using STAAD.PRO.
2.   To Draw and give Reinforcement details of Structural components by using AutoCAD.
3.   Comparison of Results obtained from STAAD.PRO software with a manual method.
4.   To perform seismic analysis on building in different zones.
5.   Carrying out a complete design of the main structural elements of a multi – storied building including slabs, beams, columns and footing.

IV. CONCLUSION

The Analysis and design done both manually and in STAAD.PRO, Results were almost same / identical, results are verified and are within the permissible limit and according to Indian Standard Code. Reinforced concrete is the most widely used Construction material in the building industry, orthodox criteria for design of RCC Members are almost exclusively concerned with strength while ductility and energy absorption receive little consideration. seismic analysis of reinforced concrete(RC) buildings has provided a comprehensive overview of the state of knowledge in this critical area of structural engineering. The analysis of RC buildings in the context of seismic loads is a multifaceted field that continually evolves with advancements in research, technology, and engineering practices.

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