RESPONSE SPECTRUM ANALYSIS OF MULTI STOREY BUILDING USING ETABS

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Abstract:

One of the most frightening and destructive phenomena of a nature is a severe earth quake and it's terrible after effects. Earthquake strike suddenly, violently and without warning at any time of the day or night. If an earthquake occurs in a populated area, it may cause many deaths and injuries and extensive property damage. Although there are no guarantees of safety during an earthquake, identifying potential hazards ahead of time and advance planning to save lives and significantly reduce injuries and property damage. Hence it is mandatory to do the seismic analysis and design to structural against collapse. It is highly impossible to prevent an earthquake from occurring, but the damage to the buildings can be controlled through proper design and detailing. Designing a structure in such a way that reducing damage during an earthquake makes the structure quite uneconomical, as the earth quake might or might not occur in its life time and is a rare phenomenon. In order to compete in the ever-growing competent market, it is very important for a structural engineer to save time. As a sequel to this an attempt is made to analyze and design a multistoried building by using a software package E-Tabs. For analyzing a multi storied building one has to consider all the possible loadings and see that the structure is safe against all possible loading conditions.There are several methods for analysis of different frames like kani's method, cantilever method, portal method, and Matrix method. The present project deals with the seismic analysis and design of a multi storyed residential building of G+13 RCC Residential Building. The dead load &live loads are applied and the design for beams, columns, footing is obtained E-Tabs with its new features surpassed its predecessors, and compotators with its data sharing capabilities with other major software like AutoCAD, and MS Excel.We conclude that E-Tabs is a very powerful tool which can save much time and is very accurate in Designs.Thus it is concluded that E-Tabs package is suitable for the design of a multistoried building. Keywords:RCC structure, E-Tabs, Seismic Analysis, Response spectrum analysis, Shear wall etc.

INTRODUCTION:

General

Seismic Analysis is a subset of structural analysis and is the calculation of the response of a building structure to earthquakes. It is part of the process of structural design or structural assessment and retrofit in regions where earthquakes are prevalent. Nonlinear dynamic analysis utilizes the combination of ground motion records with a detailed structural model, therefore is capable of producing results with relatively low uncertainty. In nonlinear dynamic analysis, the detailed structural model subjected to a ground motion record produces estimated of component deformations for each degree of freedom in the model and the modal responses are combined using schemes such as the square root sum of squares. In non linear dynamic analysis, the non linear properties of the structure are considered as part of a time domain analysis. This approach is the most rigorous, and is required by some building codes for buildings of unusual configuration or of special importance. However, the calculated response can be very sensitive to the characteristics of the individual ground motion used as seismic input. Therefore, several analyses are required using different ground motion records to achieve a reliable estimation of the probabilistic distribution of structural response. Since the properties of the seismic response depend on the intensity, or severity, of the seismic shaking, a comprehensive assessment calls for numerous nonlinear dynamic analyses at various levels of intensity to represent different possible earthquake scenarios. This has let to the emergence of methods like the incremental dynamic analysis. Earthquakes Vibrations of the earth's surface caused by waves coming from a source of disturbances inside the earth are described as earthquake. By far the most important earthquake from an engineering standpoint is of tectonic origin, that is, those associated with large scale strains in the crust of the earth. One of the theories describing this phenomenon is termed elastic rebound theory. It explains that the strain energy 8 that accumulates due to deformation in earth mass, gets released through rupture when it exceed the resilience of the storing materials. The energy thus released is propagated in the form of wave which impact energy to the media through which they pass and vibrate the structure standing on the earth's surface. A major tectonic earthquake is generally preceded by small 'foreshocks' caused either by small rupture or plastic deformation and followed by 'aftershocks 'due to the fresh rupture or the readjustments of the fractured mass. A major shock may result from a rapture of

the rock over a length of 100 to 400 km and several kilo meters wide and thick. Epicentre: The place on the earth's surface directly above the point on the fault where the earthquake ruptures began. Once fault slippage begins, it expands along the fault during the earthquake and can extend hundreds of miles before stopping. Seismic wave: Vibrations that travel out ward from the earthquake fault at speeds of several miles per second. Although fault slippage directly under a structure can cause considerable damage, the vibrations of seismic waves caused most of the destruction during earthquake

OBJECTIVE:

Following specific objectives has been made for the present study

1) To develop, planning and analysis model of the High rise structure in E-Tabs.

2) Study of seismic loads applied to the structure for the response spectrum analysis as per IS 1893-2002.

3) Comparison of analytical results of seismic load applied on the structure by E-Tabs.

4) To verify deflection, Drift, story shear, story stiffness, overturning moment of the building structure.

5) To study the performance of lateral displacement at all zones (II, III, IV, V)zones

METHODOLOGY:

In an advancement of building two essential issue considered are security and economy. If the piles are adjusted and taken higher then economy is affected. In case economy is considered and stacks are taken lesser then the security is bartered. So the estimation of various weights acting is to figured unequivocally. Indian Standard code IS: 875 ASCE 7: Minimum Design Loads for Buildings and Other Structures decides di loads for structures. Sorts of weights falling up on the structure are:

- Dead loads
- Livloads
- Wind loads
- Wall loads
- Seismic loads

Plan The general plotting represents the plan of a G+13, the single column building. 30x25 m. Methodology Types of Loads Acting on the Structure In an advancement of building two essential issue considered are security and economy. If the piles are adjusted and taken higher then economy is affected. In case economy is considered and are taken lesser then the security is bartered. So the estimation of various weights acting is to figured unequivocally. Indian Standard code IS: 875-1987 and American Standard Code ASCE 7: Minimum Design Loads for Buildings and Other Structures decides di

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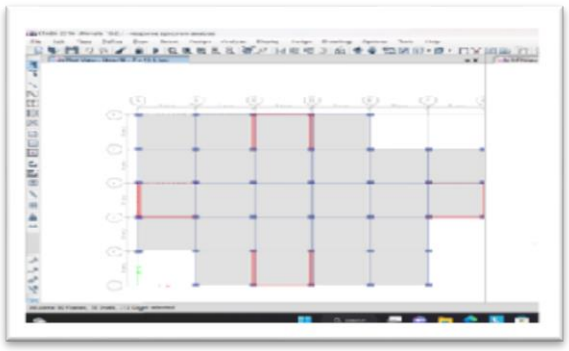

FIG:-1

3 Elevation

Figures represent the proposed elevation of building. representing the front view which gives the overview of a building block. Each floor consists of height 3.7 column buildings 14 Figures represent the proposed elevation of building. It shows the elevation of a G+13 representing the front view which gives the overview of a building block. Each floor consists of height 3.7 m which is taken as per municipal corporation rules for single It shows the elevation of a G+13 building

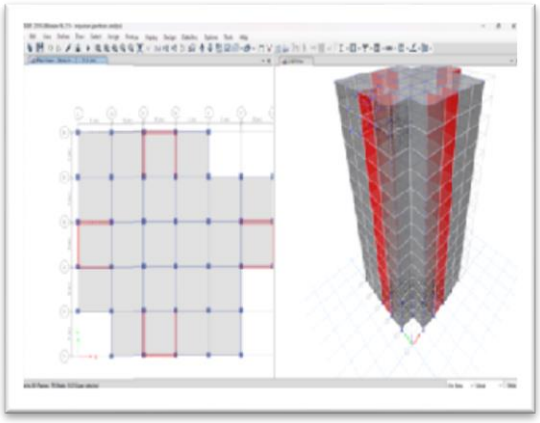

FIG:-2

RESULT:

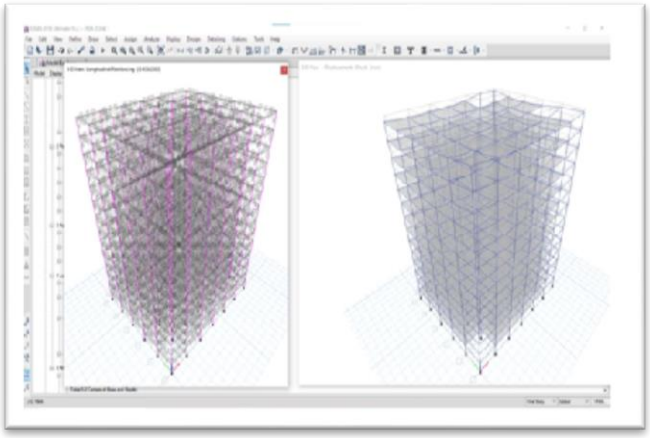

FIG:-3

CONCLUSION:

Seismic Analysis is a subset of structural analysis and is the calculation of the response of a building structure to earthquakes. It is part of the process of structural design or structural assessment and retrofit in regions where earthquakes are prevalent. Nonlinear dynamic analysis utilizes the combination of ground motion records with a detailed structural model, therefore is capable of producing results

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