Design and Analysis of Building by AKSES and Manual Method
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Abstract:
The principle objective of this paper is to analyze and design a multistoried building using AKSES and manual method. The design involves load calculations analyzing the whole structure. The design methods used are Limit State Design conforming to Indian Standard Code of Practice. AKSES features a state-of-the-art user interface, visualization tools, powerful analysis and design engines with advanced finite element and dynamic analysis capabilities. From model generation, analysis and design to visualization and result verification, AKSES is the professional’s choice. Initially we started with the analysis of simple 2 dimensional frames and manually checked the accuracy of the software with manual method. The results proved to be very accurate. In the post-processing mode, after completion of the design, we can work on the structure and study the bending moment and shear force values with the generated diagrams. We may also check the deflection of various members under the given loading combinations. The design of the building is dependent upon the minimum requirements as prescribed in the Indian Standard Codes. The minimum requirements pertaining to the structural safety of buildings are being covered by way of laying down minimum design loads which have to be assumed for dead loads, imposed loads, and other external loads, the structure would be required to bear. Strict conformity to loading standards recommended in this code, it is hoped, will ensure the structural safety of the buildings which are being designed. Structure and structural elements were normally designed by Limit State Method. Complicated and high-rise structures need very time taking and cumbersome calculations using conventional manual methods. AKSES provides us a fast, efficient, easy to use and accurate platform for analyzing and designing structures.

Key words: Reinforced Concrete Building Design, Software, Manual Method, DXF File, Modelling, Analysis, Design, Drafting.

I. INTRODUCTION

Software:
Our paper involves analysis and design of multi-storeyed [G + 4] using a very popular designing software AKSES and manual methods. We have chosen AKSES because of its following advantages:
- Easy to use interface,
- Confirmation with the Indian Standard Codes,
- Versatile nature of solving any type of problem,
- Accuracy of the solution.
AKSES features a state-of-the-art user interface, visualization tools, powerful analysis and design engines with advanced finite element and dynamic analysis capabilities. From model generation, analysis and design to visualization and result verification, AKSES is the professional’s choice for steel, concrete, timber, aluminium and cold-formed steel design of low and high-rise buildings, culverts, petrochemical plants, tunnels, bridges, piles and much more.

AKSES consists of the following:
- The AKSES Graphical User Interface: It is used to generate the model, which can then be analyzed using the AKSES engine. After analysis and design is completed, the GUI can also be used to view the results graphically.
- The AKSES analysis and design engine: It is a general-purpose calculation engine for structural analysis and integrated Steel, Concrete, Timber and Aluminum design.

II. MANUAL DESIGN:
To start with we have solved some sample problems using AKSES and checked the accuracy of the results with manual methods. The results were to satisfaction and were accurate. In the initial phase of our project we have done calculations regarding loadings on buildings and also considered seismic and wind loads. Structural analysis comprises the set of physical laws and mathematics required to study and predicts the behaviour of structures. Structural analysis can be viewed more abstractly as a method to drive the engineering design process or prove the soundness of a design without a dependence on directly testing it. To perform an accurate analysis a structural engineer must determine such information as structural loads, geometry, support conditions, and materials properties. The results of such an analysis typically include support reactions, stresses and displacements. This information is then compared to criteria that indicate the conditions of failure. Advanced structural analysis may examine dynamic response, stability and non-linear behaviour. The aim of design is the achievement of an acceptable probability that structures being designed will perform satisfactorily during their intended life. With an appropriate degree of safety, they should sustain all the loads and deformations of normal construction and use and have adequate durability and adequate resistance to the effects of seismic and wind. Structure and structural elements shall normally be designed by Limit State Method. Account should be taken of accepted theories, experiment and experience and the need to design for durability. Design, including design for
durability, construction and use in service should be considered as a whole. The realization of design objectives requires compliance with clearly defined standards for materials, production, workmanship and also maintenance and use of structure in service. The design of the building is dependent upon the minimum requirements as prescribed in the Indian Standard Codes. The minimum requirements pertaining to the structural safety of buildings are being covered by way of laying down minimum design loads which have to be assumed for dead loads, imposed loads, and other external loads, the structure would be required to bear. Strict conformity to loading standards recommended in this code, it is hoped, will not only ensure the structural safety of the buildings which are being designed.

Comparison of AKSES and Manual Design:
AKSES is conventional design software whereas manual method is time consuming. Accuracy of AKSES software is more whereas there are chances of human errors in manual methods. In the software Key Plans, Schedules are obtained in DXF format immediately whereas in manual method drafting is carried out which is time consuming and needs a draftsman.

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<tr>
<th>Slabs</th>
<th>AKSES</th>
<th>Manual</th>
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<tr>
<td>SF = 14.4 N</td>
<td>BM = 9334.06 N-mm</td>
<td>SF = 14.4 N</td>
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<td>BM = 9330 N-mm</td>
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<tr>
<th>Beams</th>
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<tr>
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<td>BM = 19.46 N-mm</td>
<td>SF = 31.6 N</td>
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III. OBJECTIVE

1. To select two different types of multistoried buildings
2. To study the software: AutoCAD, AKSES.
3. To analyze and design the proposed building using the software and manual methods.
4. To compare the results.

IV. FUTURE SCOPE

Study of design of various elements of building. Planning of various components of a building with column positioning. Modelling of the building in the AKSES giving all boundary conditions. Analysis and Design of various structural components of the modal building. Study of analysis data of the software. Detailing of beams, columns, slab with section proportioning and reinforcement.

V. CONCLUSION

The software has extremely easy graphical user interface. The work can be done or commenced in plan and isometric view. No limitations for building shape and size. Output file in ASCII format with geometry, load, joint displacement and member end forces. Output file in DXF format is obtained with Key Plans, Schedules of Slabs, Schedules of Beams, Schedules of Columns and Schedules of Footings.

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