

Chapter (1)

Introduction

1.1 Introduction:

A structure refers to a system of connected parts used to support a load. When designing a structure to serve a specified function for public use, the engineer must account for its safety, esthetics, and serviceability, while taking into consideration economic and environmental constraints. Often this requires several independent studies of different solutions before a final judgment can be made as to which structural form is most appropriate. This design process is both creative and technical and requires a fundamental knowledge of material properties and the laws of mechanics which govern material response. Once a preliminary design of a structure is proposed, the structure must then be analyzed to ensure that it has its required stiffness and strength.

To analyze a structure properly, certain idealizations must be made as to how the members are supported and connected together. The loadings are determined from codes and local specifications and the forces in the members and their displacements are found using the theory of structural analysis. The results of this analysis then can be used to redesign the structure, accounting for a more accurate determination of the weight of the members and their size. Structural design, therefore, follows a series of successive approximations in which every cycle requires a structural analysis. The structural analysis is applied to civil engineering structures; however, the method of analysis described can also be used for structures related to other fields of engineering.

1.2 RESEARCH OBJECTIVES :

1.2.1 General objectives:

- i) Learn about flat slab analysis methods (moment distribution).
- ii) Learn about flat slab design methods using various codes “ACI-318,B.S8110, and EC 2”.
- iii) Learn about different computer software’s “PROKON and EXCEL”

1.2.2 Special objectives:

- i) Developing excel spread sheets to analyze and design flat slabs using B.S 8110 1:1997.
- ii) Compare between the results of the spread sheets with “ PROKON” program.
- iii) Compare flat slab design between various codes “ACI-318, B.S8110, and EC 2”.

1.3 METHODOLOGY :

To achieve the above objectives of the research uses the following methodology:

1. literature review collected from the following:-
 - Internet web sites.
 - Theses and journals of flat slabs.
 - Flat slab books by various codes.

2. Structural analysis methods were discussed.
3. Excel spread sheets developed to analyze and design flat slab.
4. Finally the comparison between spread sheets and PROKON program was done.

1.4 RESEARCH OUTLINES :

The outlines of this report are as follows:

- Chapter one includes a general introduction , the objectives , the `methodology and this research outlines.
- Chapter two includes classification of structures ,loads , structures analysis , analysis methods , design methods and flat slab by various codes .
- Chapter three include tools and equipment and examples by various codes .
- Chapter four includes the results and discussion .
- Chapter five includes conclusion and recommendations .