iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 **Issue:** XI **Month of publication:** November 2018

DOI: http://doi.org/10.22214/ijraset.2018.11095

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue XI, Nov 2018- Available at www.ijraset.com

Automated Excel Sheets for Various RC Elements

Nitin Tiwari[1], Rashmi Sakalle[2], Aman Katare [3], Manjeet Kumar Sharma[4], Mayank Shrivastava[5], Mohd Shoab Khan[6] , Mohd Altamish Khan[7], Prajjwal Gholap[8]
[1, 2] *Assistant Professor,* [3, 4, 5, 6,7, 8] *UG Student, Department of Civil Engineering, Truba Institute of Engineering and Information Technology, Bhopal M.P, India*

***Abstract:** In this paper EXCEL spreadsheet software has used in analyzing and calculating rebar's of different RC elements like beams, columns and slabs. Five different types of EXCEL spreadsheet like simply supported beam, cantilever beam, short column and long column, one way and two-way slab has calculated in this project work. Different characteristics conditions like effective span, nominal cover, and effective length of compression members has applied in our study. Apart from the inclusion of various characteristics properties, different checks have assigned to the RC elements. Reference has been taken from RCC code IS 456:2000.*

***Keywords:** MS Excel, IS 456:2000, Analysis, Design, Beam, Column, Slab.*

I. INTRODUCTION

This study shows that, with the help of MICROSOFT excel we can create a program or a software, which can calculated reinforcement bars and distribution, bars only by given dimensions and assigning properties of the reinforced elements. For the study, a huge amount of documented data is required.

It will recorded by going through different papers and extracting the values from the same. Reinforced concrete (RC) (known as reinforced cement concrete or RCC) is a composite material in which concrete's relatively low tensile strength and ductility are counteracted by the inclusion of reinforcement having higher tensile strength or ductility.Excel sheets are are design sheets with in-built cell-based structure and the simple boundary that is easy to use, for the first time users also. It helps in analysis as well as design of civil engineering structures, which effectively utilizes MS EXCEL environment.

It has mainly used in teaching civil engineering concepts and providing useful applications. It focuses on concepts related to construction management and structural engineering varying from a simple cost estimating problem, structural design and analysis to advanced applications.

Typical civil engineering problems has used to present the programming concepts. Excel has used to enhance the concept and efficiency of structural analysis and design when design sheet is used.

II. OBJECTIVE

A. To develop a computerized programme to reduce paper work and time.
B. This increases the efficiency and reduction in workload.
C. To use structural engineering concepts in design sheets.
D. To enhance the concept and efficiency of structural analysis and design when design sheet is used.

III. CODING

MICROSOFT EXCEL is a spreadsheet developed for Windows, Android and IOS. It features calculation, tabular forms, pivot tables. It is a very widely applied spreadsheet for these type of functions, especially since 1993.

There are three activities must be performed to achieve that goal.

A. Coding of the RC elements using MICROSOFT EXCEL..
B. The calculations to decide the explanatory.
C. Result has checked in the OUTPUT.

IS 456:2000 RCC code is used in this paper as reference to various characteristic properties of reinforced elements like effective span, nominal cover, effective length of compression members, exposure conditions, etc.

©IJRASET: All Rights are Reserved

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue XI, Nov 2018- Available at www.ijraset.com

IV. METHODOLOGY

For the study, a large amount of documented data is required and RCC code IS 456:2000 is taken as a reference for different characteristic properties like effective cover, effective span, effective length of compression members, nominal cover and exposure conditions, etc.

The study shows automated calculation of rebar for following RC elements:

MS EXCEL is extensively used in calculating the rebars of the above mentioned RC elements.

A. Beams

The procedure of the method for calculation of rebars of both simply supported as well as cantilever beam can be precised as follows: 1.)given span of beam, grade of concrete, live load, grade of steel, width of support, cover need and size of main rebars 2.) to check if the simply supported beam is singly or doubly using Mu< Mu_{lim} then it is singly else doubly reinforced beam 3.) determine area of steel by using clause G.1.1-b (annex G) for singly reinforced bean and clause G.1.2 for doubly reinforced beam 4.) calculation of rebars using formula ($AST_{calculated}/ast_{one\ bar}$).

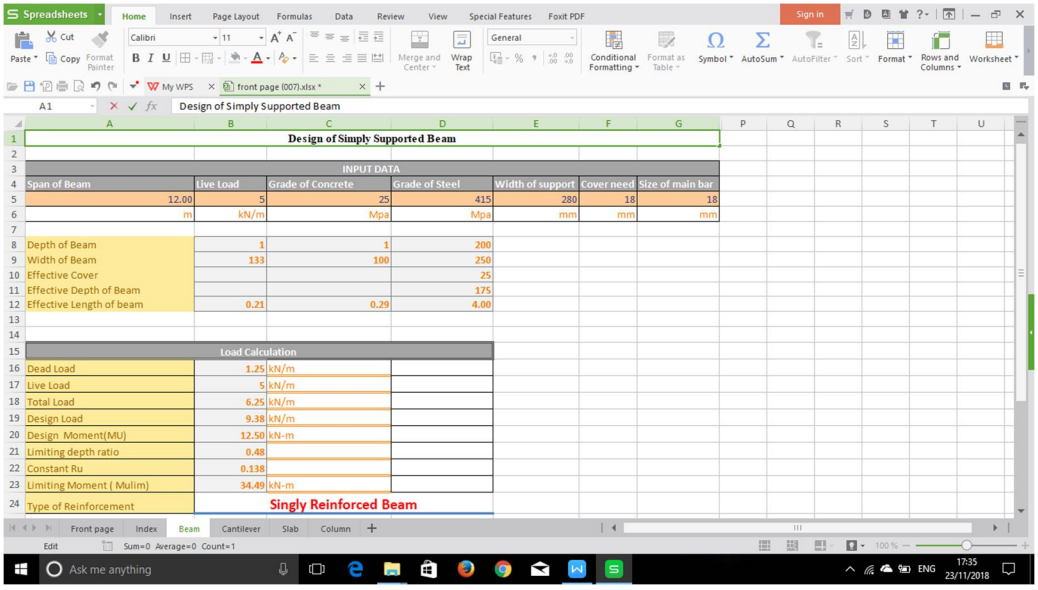


Fig1.1 input data

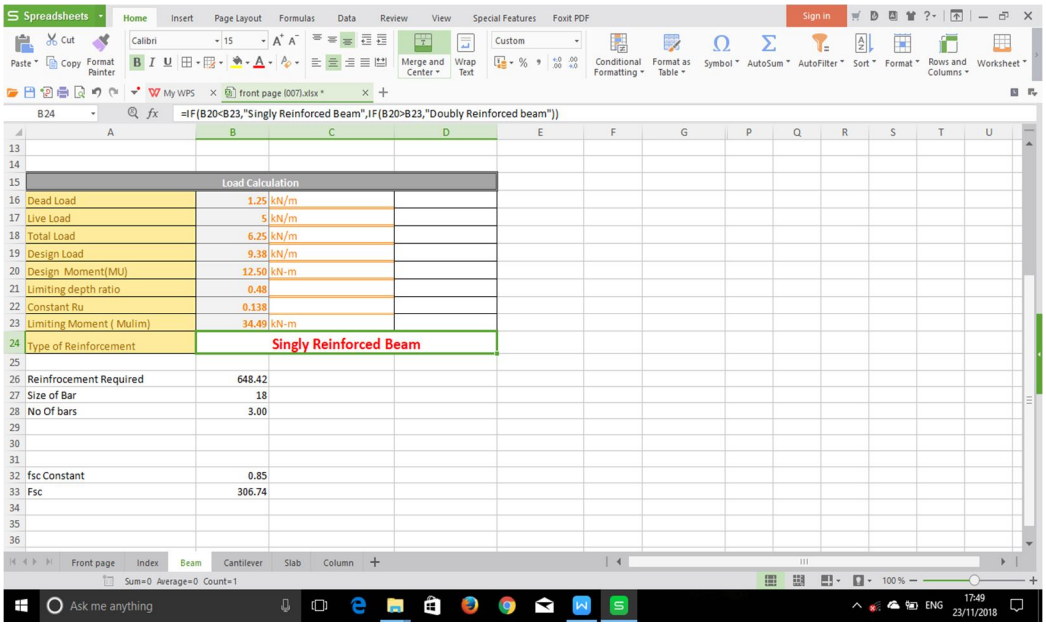


Fig1.2 checks for singly and doubly reinforced

©IJRASET: All Rights are Reserved

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue XI, Nov 2018- Available at www.ijraset.com

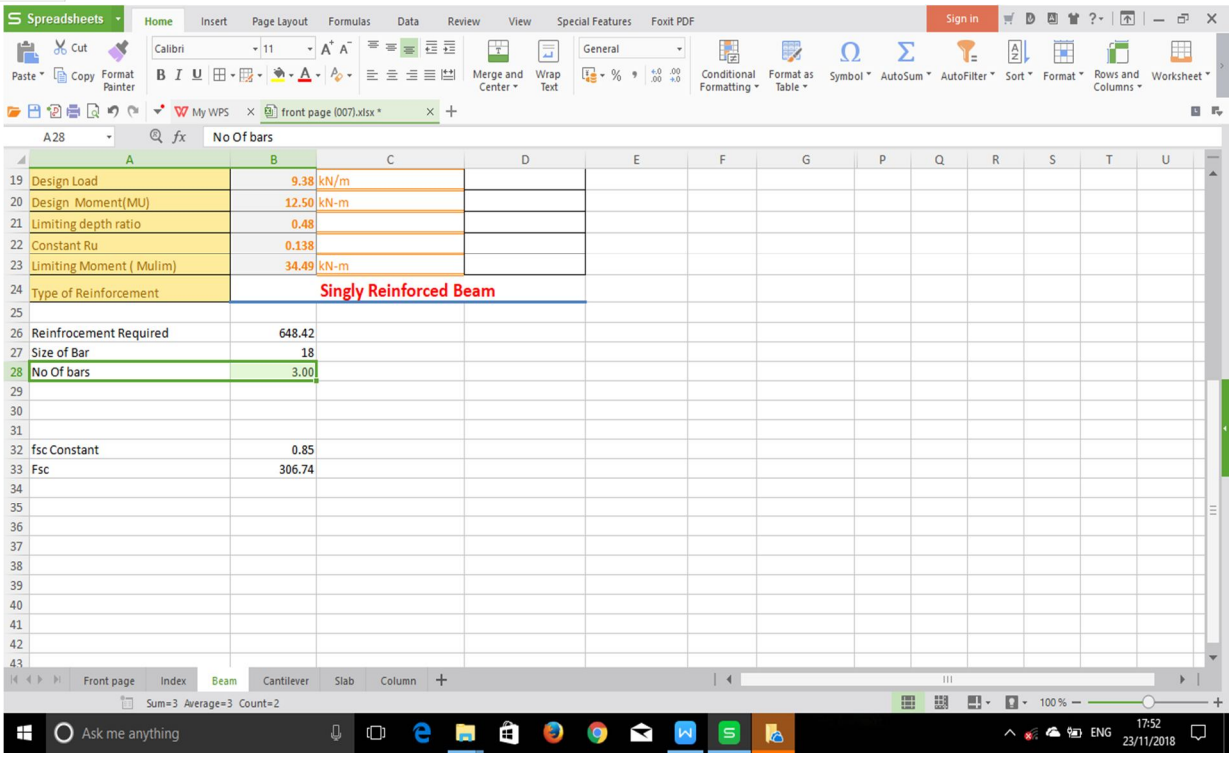


Fig1.3 no. Of rebars

B. Columns

The procedure of the method for calculation of rebar's of column for both shorter and longer span is précised as follows: 1.)given data axial load(P), length of column(L), grade of concrete(fck), grade of steel(fy), dia of rebar's 2.) check effective length of compression members using table 28 of IS 456:2000. 3.)determine whether short column or long column using clause 25, 3.)verify that the eccentricities are not less than the corresponding minimum eccentricities as per clause clause 39.2, 4.) calculation of reinforcement bars and distribution bars.

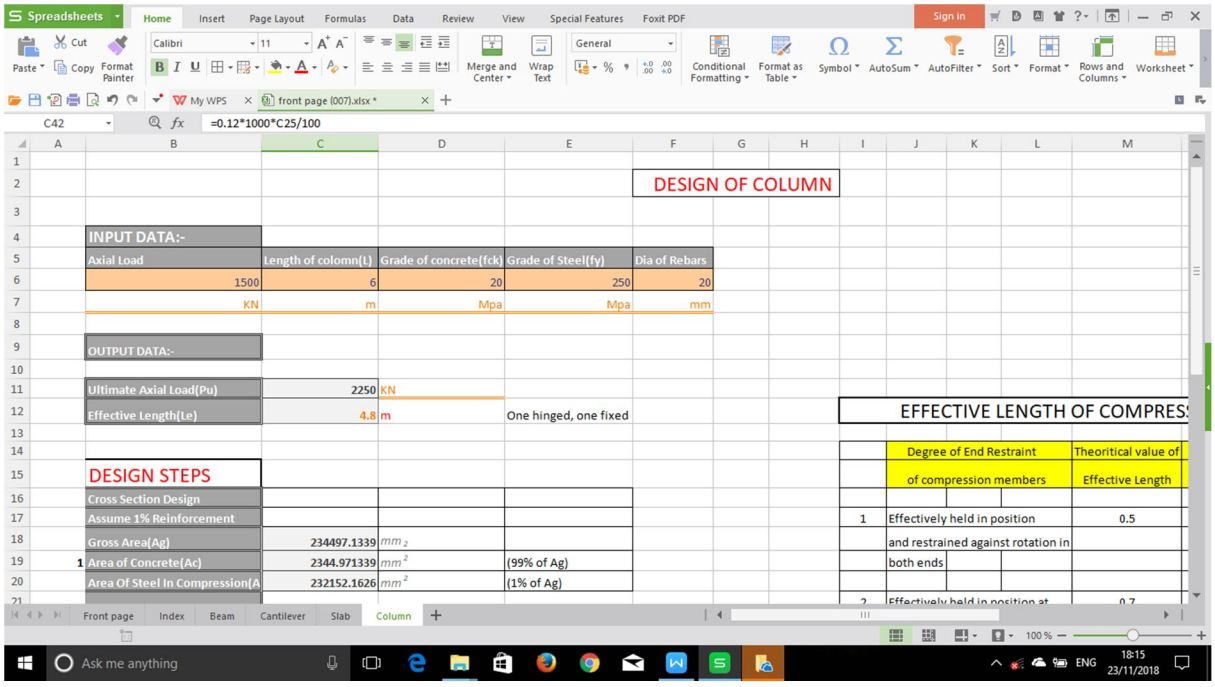


Fig2.1input data

©IJRASET: All Rights are Reserved

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue XI, Nov 2018- Available at www.ijraset.com

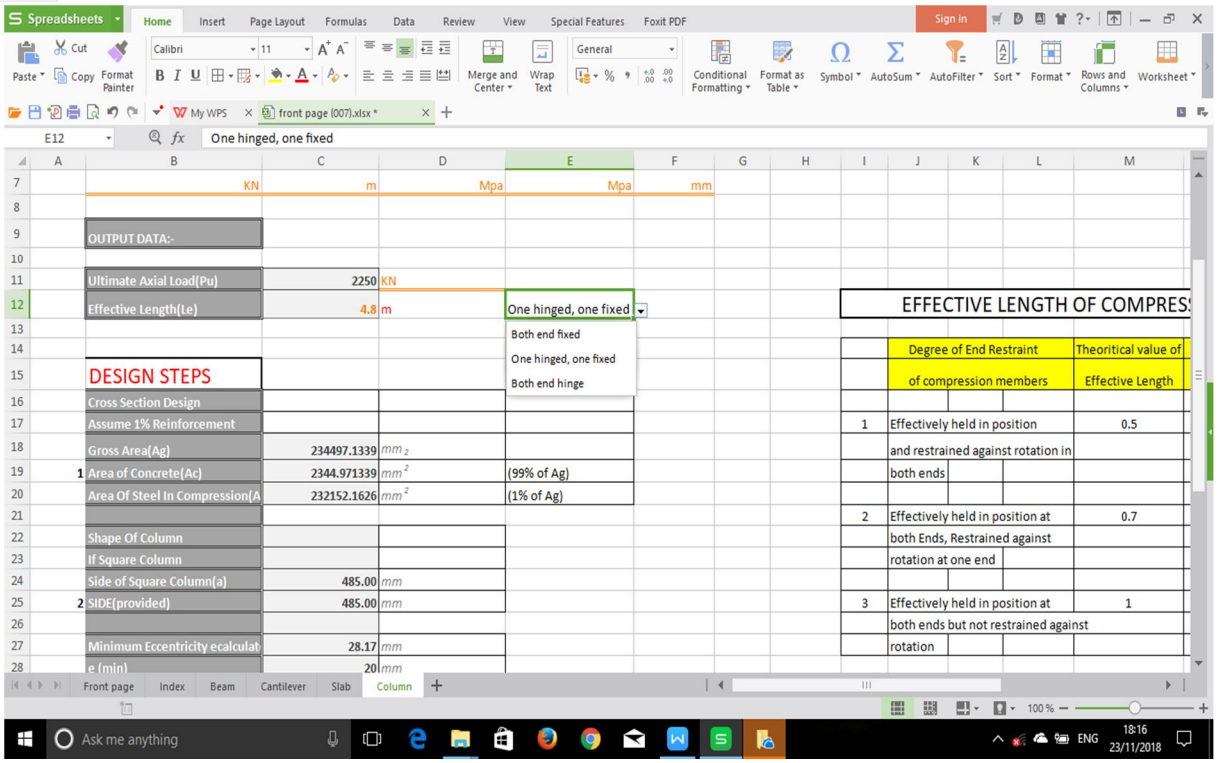


Fig2.2 different end conditions

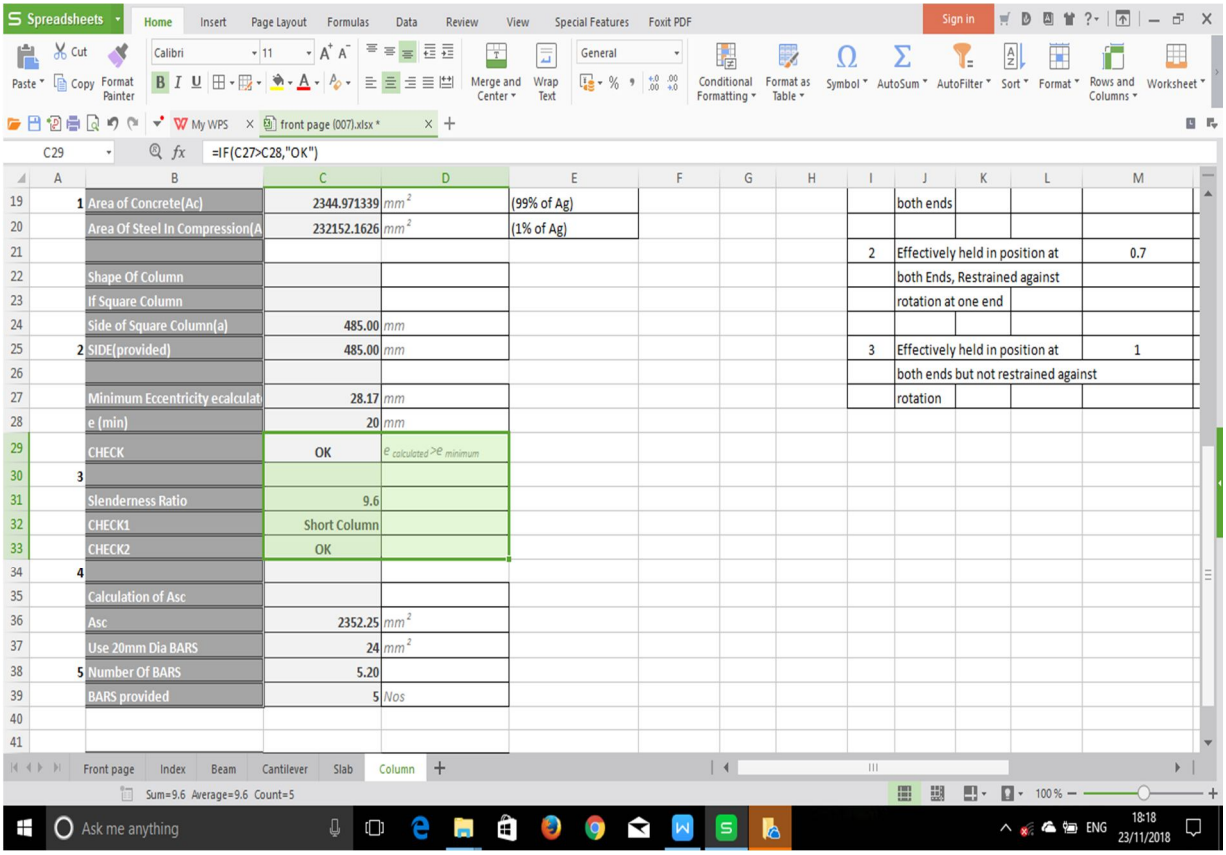


Fig 2.3 checks for short and long column

©IJRASET: All Rights are Reserved

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue XI, Nov 2018- Available at www.ijraset.com

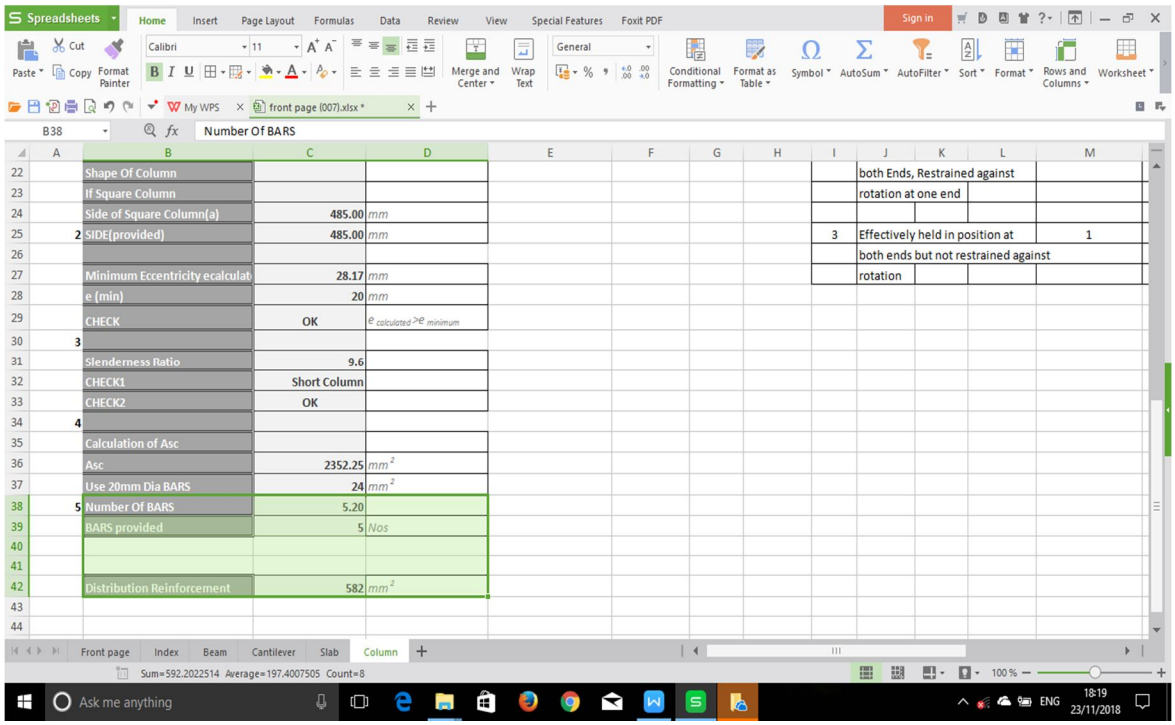


Fig 2.4 calculation of rebars and distribution reinforcement

C. Slabs

The third case demonstrates the automated calculation of rebars of two-way slab using designsheets. The design steps mainly includes: 1) given data like shorter span, longer span, live load, grade of concrete and steel, cover condition, width of support, size of primary and secondary rebars, floor finishing(=1KN/m2). 2) finding thickness of slab 3)finding effective span 4) check for one way and two way slab using clause as per IS 456:2000 5) calculation of shorter and longer span reinforcements.

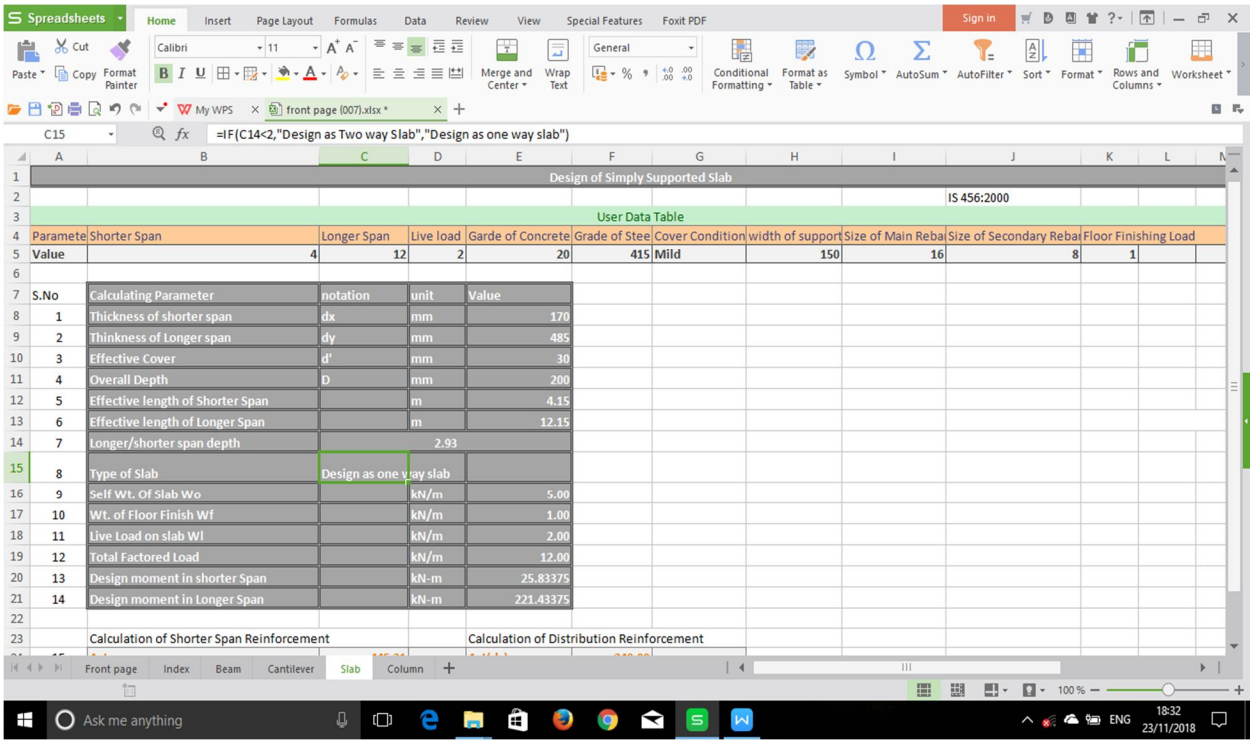


Fig 3.1 input data in user data table

©IJRASET: All Rights are Reserved

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue XI, Nov 2018- Available at www.ijraset.com

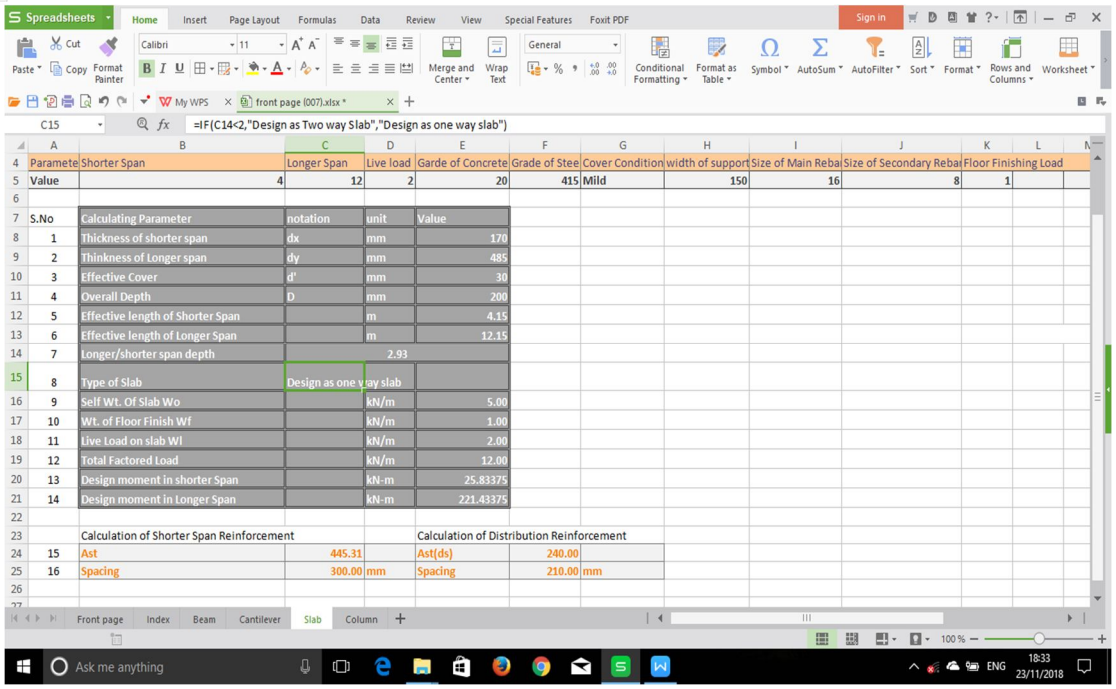


Fig 3.2 check for type of slab

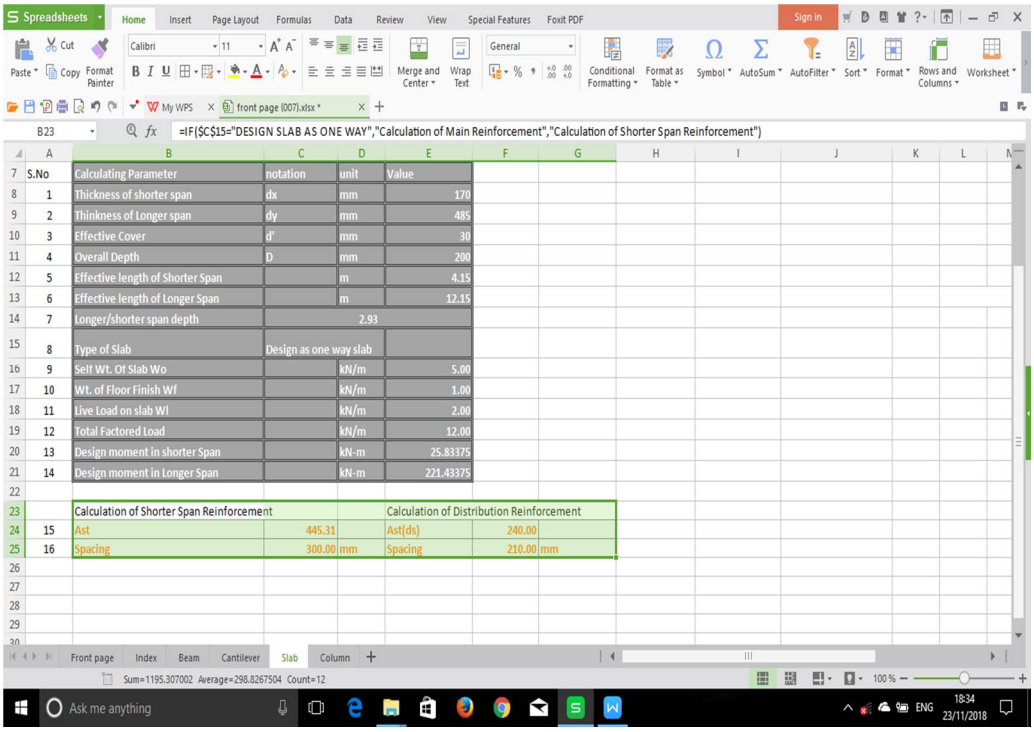


Fig 3.3 calculation of shorter and longer span reinforcements

V. CONCLUSION

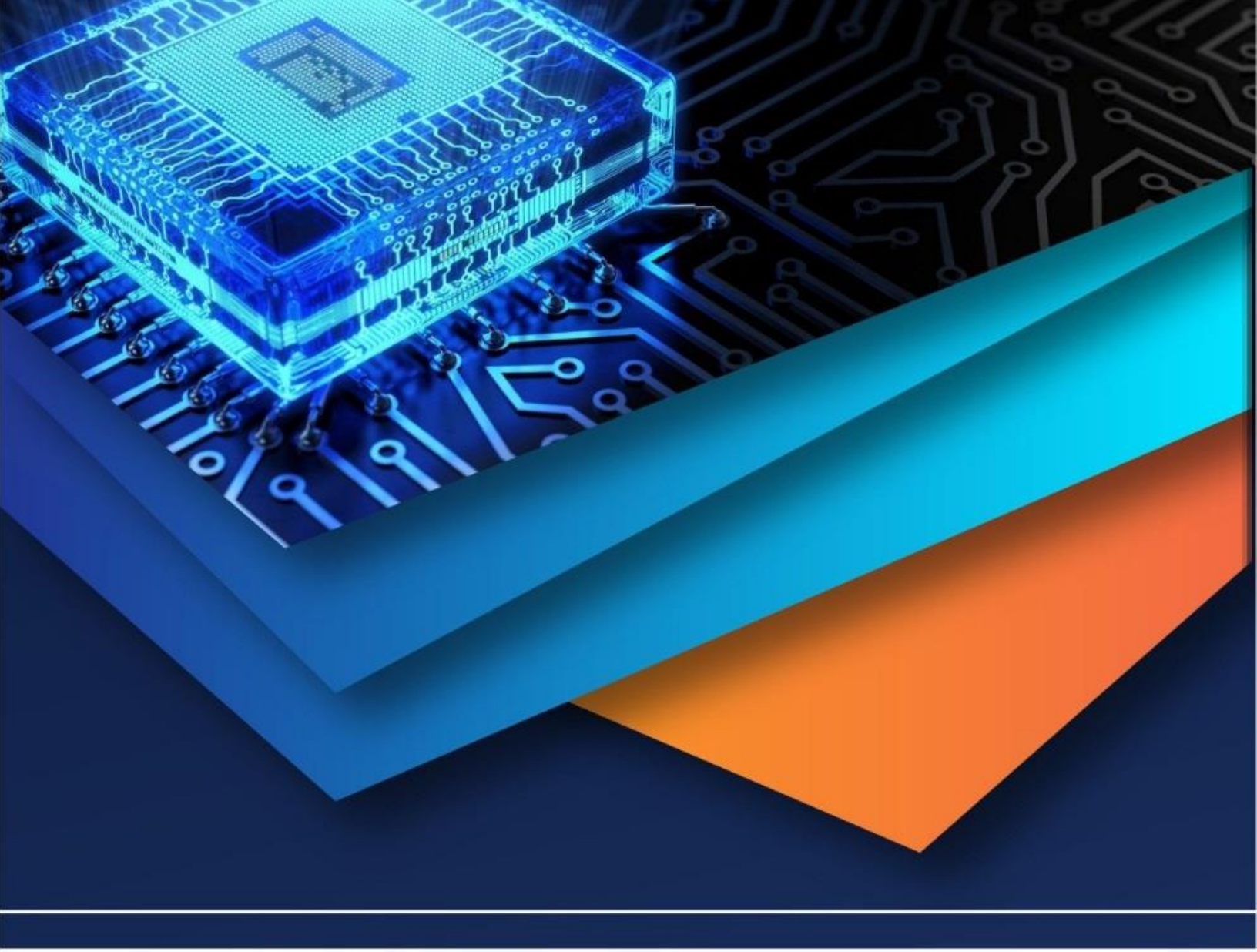
MS-EXCEL sheet is a very helpful tool for calculation of rebars of various RC elements such as beams, columns, slabs. These excel sheets can be used in conjunction with the analytical softwares like STAAD and ETABS for the design of reinforced concrete elements. These are efficient and help in quick design of buildings and other structures on various projects. While standard software like STAADPRO were used in the frame analysis but self created excel sheets for design of columns, beams and slabs.

©IJRASET: All Rights are Reserved

REFERENCE

[1] Santosh Kumar P.T. (2014) "Trends and recent advances in civil engineering (TRACE-24th-25th january 2014), International Journal of Engineering Research and Applications (IJERA) ISSN:2248-9622
[2] Varsha S Danavandi, Shaik Kabeer Ahmed (2017) "Developing civil engineering design software using MS EXCEL" ISSN:2349-0697,VOLUME-4, ISSUE-5,2017
[3] Mahesh Kumar (2015) "quick design of buildings and other projects on MS EXCEL"
[4] Suryam Tiwari, Vijay Shrivastav (2018) "Microsoft Excel Spreadsheet using VBA programming packages"-IJIRST-International Journal for Innovative Research in Science and Technology, Volume 4, Issue 11,April 2018, ISSN-(2349-6010).
[5] Ima Rahamanian, Yves Lucet, Solomon Tesfamariam(2014)"Optimal design of reinforced concrete beams", Computers and concrete, Volume 13, No.4(457-482).
[6] Fernandes R. J, Javeli F. M, Patil S. B (2017) "Analysis and Design of Reinforced Concrete Beams and Columns using open STAAD", International Journal of Soft Computing and Engineering(IJSCE) ISSN:2231-2307, Volume-7 Issue-3.
[7] Richard Lawrene Emberley(2013)" behaviour of RC columns under fire exposures using a spreadsheet-based numerical model" Worcester Polytechnic Institute, may 2013
[8] Poonam Gare, Dr. S.S. Angalekar(2016) "Design of Structural Element Employing Optimization Approach" International Journal of Innovative Research in Science, Engineering and Technology, Volume-5, Issue-7 july 2016

©IJRASET: All Rights are Reserved



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)