

Planning and Analyzing of IT Company By Using E-Tabs

T.Subramani¹, C.Kathirvel², P. Saravana Kumar³, R.Govindasamy⁴, P.V Yuvaraj⁵

¹Professor & Dean, Department of Civil Engineering, VMKV Engineering College, Vinayaka Missions Research Foundation (Deemed to be University), Salem, India

² Associate Professor, Department of Civil Engineering, VMKV Engineering College, Vinayaka Missions Research Foundation (Deemed to be University), Salem, India

^{3,4,5}UG Student, , Department of Civil Engineering, VMKV Engineering College, Vinayaka Missions Research Foundation (Deemed to be University), Salem, India

Abstract

Information technology (IT) is the usage of computers to keep, retrieve, transmit, and control records, or facts, regularly inside the context of a commercial enterprise or other enterprise. Depending at the corporation, these benefits may also encompass medical insurance (required to be presented by larger groups), dental coverage, imaginative and prescient care, lifestyles coverage, paid vacation go away, personal go away, sick leave, baby care, fitness, a retirement plan, and other elective benefits supplied to employees and their families. Our main objective is to get acquire knowledge in analysis and designing of IT Company. Necessary building drawing show with the Total area of 3250Sq.ft the plan, front elevation and sectional view are prepared. We prepare our project plan with AUTO CAD software. The modeling software E-Tabs used to analysis the structure by used limit state method with the IS 456:2000 code.

Keywords: Control Records, Analysis, Commercial and E-Tabs

1. INTRODUCTION

More industries are associated with data technology, consisting of computer hardware, software program, electronics, semiconductors, net, telecom device, e-trade and computer offerings. Devices had been used to resource computation for 1000's of years, likely to start with within the shape of a tally stick. By way of assessment the primary transistorized laptop, advanced at the college of Manchester and operational by way of November 1953, fed on most effective one hundred fifty. In a commercial enterprise context, the information era affiliation of the United States has described facts generation as "the examiner, layout, improvement, utility, implementation, aid or management of pc-based totally records structures".

1.1 Scope of the Project

The IT Park building consists of,

- CEO Room
- Manager Room& HR Room
- Server Room& Sweepers Room
- Security Room& Reception
- Conference hall
- Photographer Room
- Project Room
- Hardware Room

2. MANUAL DESIGN

2.1 Slab Available Data

2.1.1 Type of Slab

$$I_y / I_x = 5.3/4$$

$$= 1.3 < 2$$

Hence designed as two way slab

2.1.2 Load Calculation

Total load = 9.5 KN/m
 Design load = 9.5 x 1.5
 = 14.25 KN/M Say 15 KN/M

2.1.3 Factored Moment

$l_y / l_x = 5.48 / 4.18 = 1.3$
 Maximum moment = 17.03×10^6 N.mm

2.1.4 Check for Shear

Nominal shear force $V_u = 15 \times 4.18 / 2 = 31.35$ KN
 Nominal shear force $\tau_c = V_u / bd = 31.35 \times 10^3 / 1000 \times 180 = 0.18$ N/mm²
 $\tau_c < k\tau_c < \tau_c \text{ max} / 2$

Hence safe in the shear

$d_{avi} = \text{span} / (B_v \times MF) = 4180 / 32 \times 1.7 = 76.83$ mm

Figure 1 shows the Cross section of two way slab.

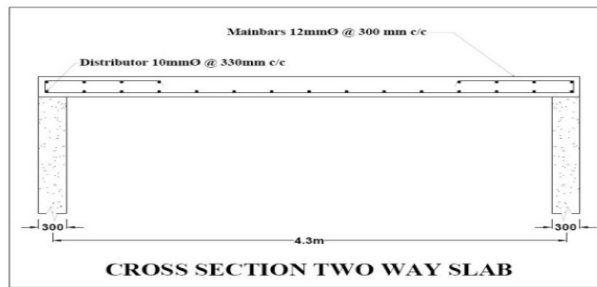


Figure 1 Cross section of two way slab

2.2 SS Beam Available Data

B = 300 mm
 d = 360 mm
 D = 400 mm (assumption)
 $F_y = 415$ N/mm²
 $f_{ck} = 25$ N/mm²

2.2.1 Load Calculation

Total load = 40.8 KN/M
 Factored load = 40.8 x 1.5
 Fd = 61.2 KN/m Say 62 KN/m

2.2.2 Factored Moment

$M_u = (F_d \times l_{eff}^2) / 8 = (62 \times 5.3^2) / 8$
 $M_u = 217.69$ KNm

2.2.3 Check For Shear Reinforcement

$V_u = F_d \times l_{eff} / 2 = 62 \times 5.3 / 2 = 164.3$ KN
 $\tau_v = V_u / bd = 164.3 \times 10^3 / (300 \times 360)$

$$\begin{aligned} \tau_v &= 1.52 \text{ N/mm}^2 \\ V_{us} &= V_u - \tau_c bd \\ &= 164.3 \times 10^3 - (0.62 \times 300 \times 360) \\ V_{us} &= 97.34 \times 10^3 \text{ N.} \\ d_{avi} &= \text{span}/(B_v \times MF) \\ d &= 5300 / 32 \times 0.9 = 184 \text{ mm} < 360 \text{ mm} \end{aligned}$$

Hence design is safe.

Figure 2 shows the Longitudinal view of beam.

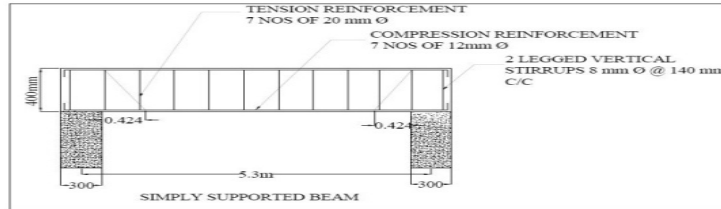


Figure 2 Longitudinal view of beam

2.3 Design Of Square Column To Support Beams

2.3.1 Available Data

$$\begin{aligned} \text{Size of column} &= 400 \times 400 \text{ mm} \\ f_{ck} &= 25 \text{ N/mm}^2 \\ f_y &= 415 \text{ N/mm}^2 \end{aligned}$$

2.3.2 Load Calculation

$$\begin{aligned} \text{Sum of all above loads} &= 316.17 \text{ KN} \\ \text{No of floor consideration} &= 388.37 \times 3 \\ &= 950 \text{ KN} \end{aligned}$$

2.3.3 Result

Figure 3 shows the cross section of column.

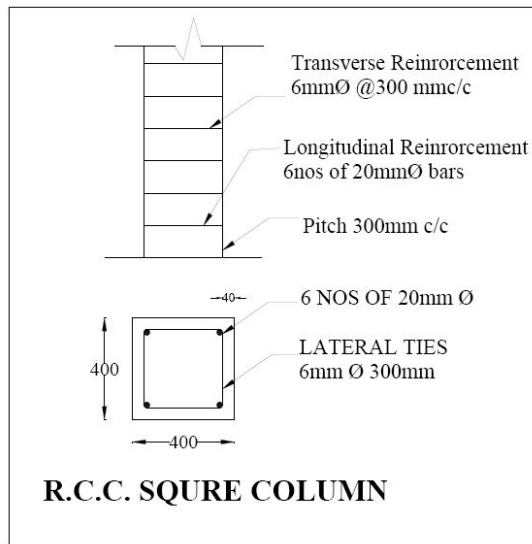


Figure 3 cross section of column

2.4 Design Of Isolated Square Footing For Square Column

2.4.1 Available Data

$$\begin{aligned} \text{Size of column} &= 400 \times 400 \text{ mm} \\ \text{Safe bearing capacity} &= 200 \text{ KN/m}^2 \end{aligned}$$

$$f_{ck} = 30 \text{ N/mm}^2$$

$$f_y = 415 \text{ N/mm}^2$$

2.4.2 Size of Footing

Axial load of footing = 316.17 KN
 Assume the self wt of footing as 10% of the column load
 $W_1 = 10/100 \times 316.17 = 31.62 \text{ KN}$
 Area of footing = $1.3 \times 1.3 = 1.7 \text{ m}^2$

2.4.3 Check for Shear

2.4.4 Transverse Shear

$$V_u = f_o \times \text{length} \times (0.45 - 0.2)$$

$$= 247.16 \times 1.3 \times 0.25 = 80.34 \text{ KN}$$

$$\tau_v = V_u/bd = 80.34 \times 10^3 / 1300 \times 200 = 0.3 \text{ N/mm}^2$$

$$\% A_{st} = 100 A_{st} / bd = 100 \times 1357.08 / (1300 \times 200) = 0.52\%$$

$$\tau_c = 0.49 \text{ N/mm}^2$$

$$K\tau_c = 1.3 \times 0.49 = 0.64 \text{ N/mm}^2$$

$\tau_v < K\tau_c$ Safe in shear

2.4.5 Check for SBC of Soil

Column load = 316.17 KN
 Weight of footing = $1.3 \times 1.3 \times 0.25 \times 25 = 10.56 \text{ KN}$
 Total load on soil = 326.73 KN
 Pressure on soil = $326.73 / (1.3 \times 1.3) = 193.3 \text{ KN/m}^2$
 $193.3 \text{ KN/m}^2 < 200 \text{ KN/m}^2$

Figure 4 shows the Reinforcement details for footing.

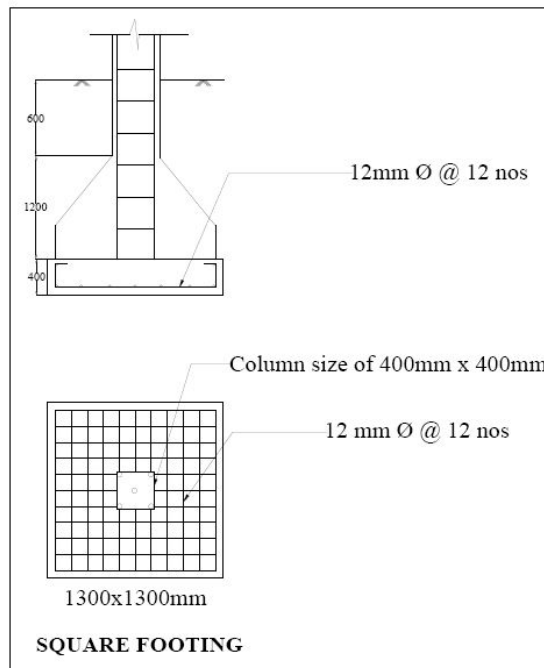


Figure 4 Reinforcement details for footing

3. ANALYSIS REPORT

Figure 5 shows the Structure of 2D View.

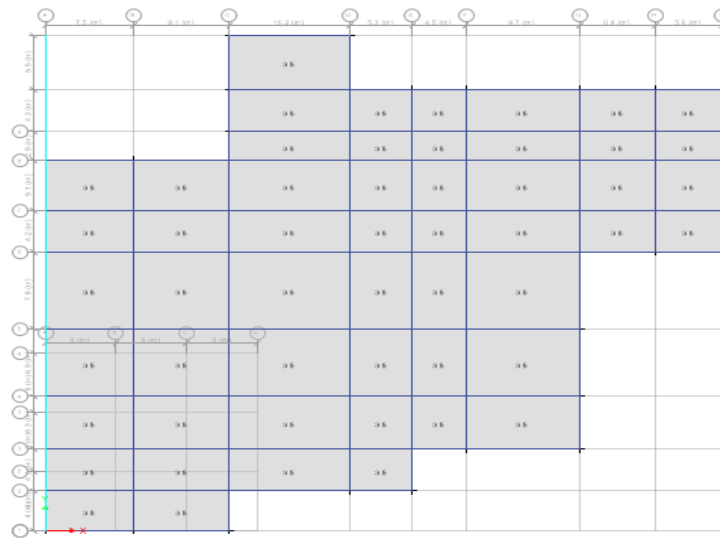


Figure 5 Structure 2D View

Figure 6 shows the Structural 3D view.

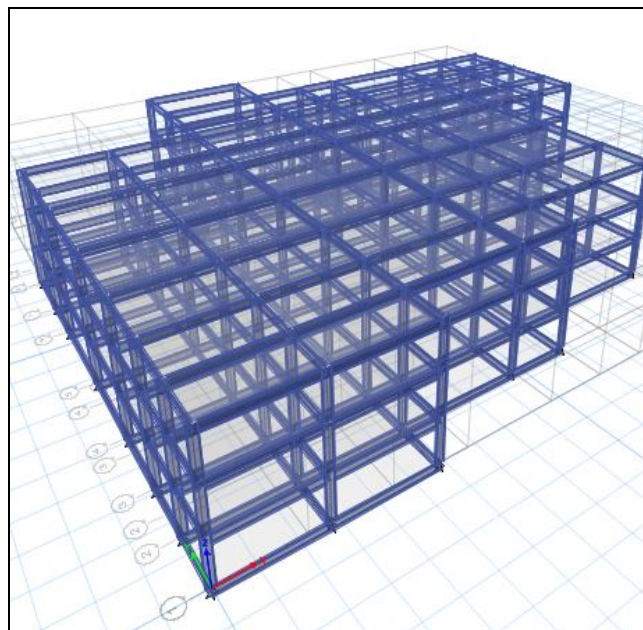


Figure 6 Structure 3 Dimensional View

Figure 7 shows the Bending Moment Diagram.

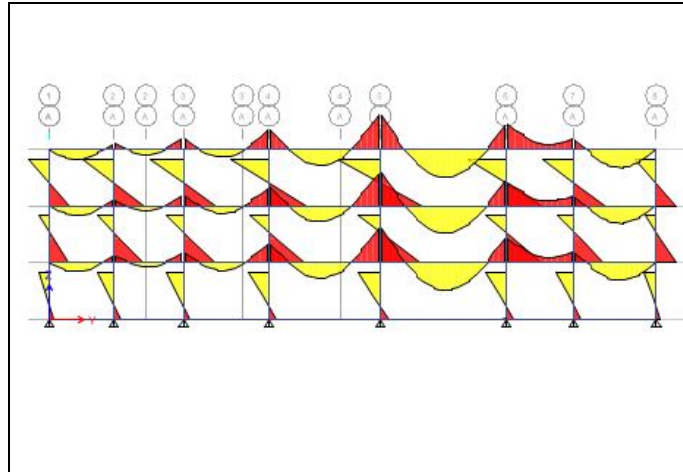


Figure 7 Bending Moment Diagram

Figure 8 shows the Shear Force Diagram.

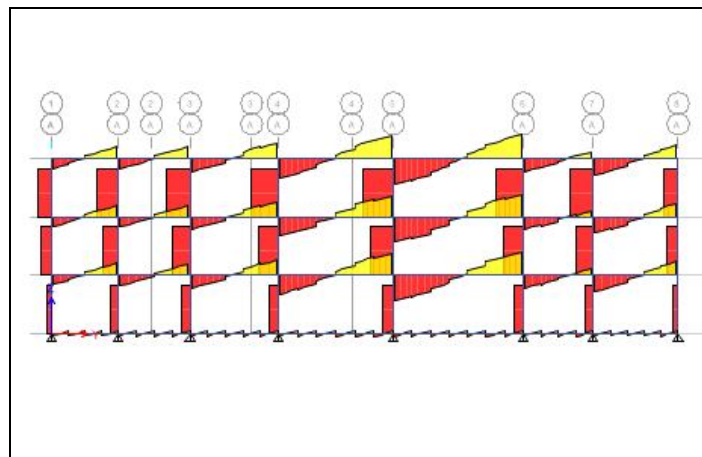


Figure 8 Shear Force Diagram

Figure 9 shows the Storey Displacement.

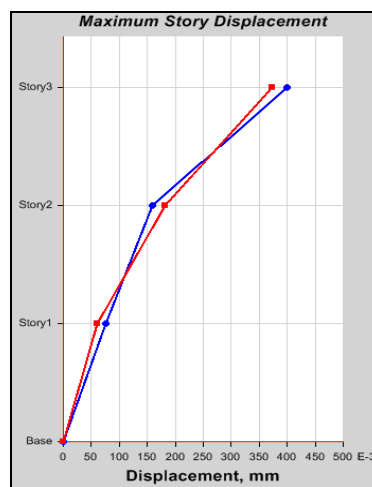


Figure 9 Storey Displacement

Figure 10 shows the Maximum Storey Drifts.

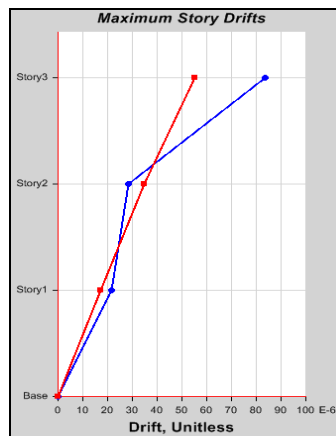


Figure 10 Maximum Storey Drifts

Figure 11 shows the Storey Overturning Moment.

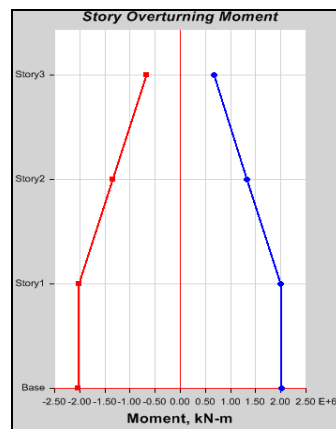


Figure 11 Story Overturning Moment

Figure 12 shows the Stress Diagram.

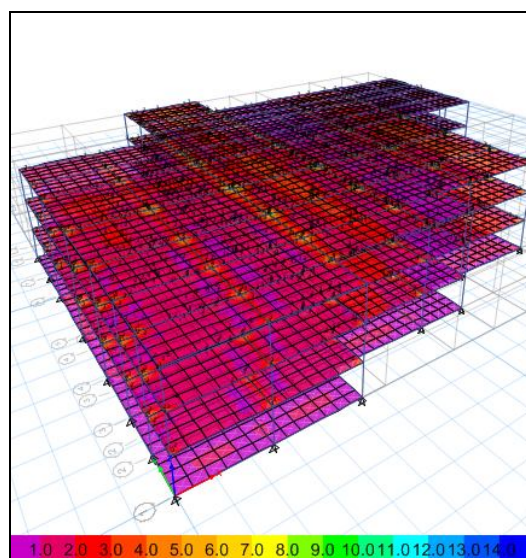


Figure 12 Stress Diagram

4. CONCLUSION

IT company are the landmark for a high-tech & well settled city, so we are tried to gave the status for our and also utilize the minimum area for our project. The IT Company consists of advanced technical equipments & facilities in our project. For the official building construction regulations should be followed in this project. Through our study we conclude that application of software in civil industry plays important role in our project.

References

- [1] T.Subramani., A.Arul, "Design And Analysis Of Hybrid Composite Lap Joint Using Fem" International Journal of Engineering Research and Applications, Volume. 4, Issue. 6 (Version 5), pp 289- 295, 2014.
- [2] T.Subramani, D.Sakthi Kumar S.Badrinarayanan "Fem Modelling And Analysis Of Reinforced Concrete Section With Light Weight Blocks Infill " International Journal of Engineering Research and Applications, Volume. 4, Issue. 6 (Version 6), pp 142 - 149, 2014.
- [3] T.Subramani, S.Poongothai, S.Priyanka , " Analytical Study Of T Beam Column Joint Using FEM Software " , International Journal of Emerging Trends & Technology in Computer Science (IJETTCS), Volume 6, Issue 3, May - June 2017 , pp. 148-156 , ISSN 2278-6856
- [4] T.Subramani, P.Babu, S.Priyanka , " Strength Study On Fibre Reinforced Concrete Using Palmyra Palm Fibre Using Fem Software " , International Journal of Emerging Trends & Technology in Computer Science (IJETTCS), Volume 6, Issue 3, May - June 2017 , pp. 198-207 , ISSN 2278-6856.
- [5] T.Subramani, S.Chitra, S.Priyanka & J.Karthick Rajan, Modeling And Analysis Of Concrete Filled Steel Tubular Beams Using Finite Element Analysis, International Journal Of Mechanical And Production Engineering Research And Development (IJMPERD), Vol. 8, Special Issue 2, Pp 429-436, Nov 2018, ISSN (P): 2249-6890; ISSN (E): 2249-8001
- [6] T.Subramani, S.Vishnupriya, "Finite Element Analysis of a Natural Fiber (Maize) Composite Beam", International Journal of Modern Engineering Research, Volume. 4, Issue. 6 (Version 1), pp 1 – 7, 2014,
- [7] T.Subramani and M.Kavitha, "Analysis Of Reliability Of Steel Frame Systems With Semi-Rigid Connections Using Numerical Method And Finite Element Analysis", International Journal of Applied Engineering Research (IJAER), Volume 10, Number 38,Special Issues, pp.28240-28246, 2015.
- [8] T.Subramani, A.Mohammed Ali, R.Karthikeyan, E.Panner Selvan , K.Periyasamy , " Analytical Study Of T-Beam Using ANSYS " , International Journal of Emerging Trends & Technology in Computer Science (IJETTCS), Volume 6, Issue 3, May - June 2017 , pp. 259-266 , ISSN 2278-6856.
- [9] T.Subramani, Periasamy, "A. Study on Behaviour of Stud Type Shear Connector in Composite Beam Using ANSYS". **International Journal of Engineering & Technology**, [S.l.], v. 7, n. 3.10, p. 54-58, july 2018. ISSN 2227-524X.
- [10] T.Subramani, V. Sukumar, "Castellated Beam with and without Stiffeners Using ANSYS". **International Journal of Engineering & Technology**, [S.l.], v. 7, n. 3.10, p. 94-97, july 2018. ISSN 2227-524X.
- [11] T.Subramani, M.Piruntha, "Behaviour of CRP- Geopolymer Concrete Columns under Axial Loading using ANSYS", International Journal of Engineering & Technology, S.l.], v. 7,n (3.10), 203-206, july 2018. ISSN 2227-524X.
- [12] T. Subramani, J. Balakrishnan, S. Priyanka & J. Karthick Rajan, Design And Analysis Of Stiffened Plate With And Without Stiffener Using ANSYS, International Journal Of Mechanical And Production Engineering Research And Development (IJMPERD), Vol. 8, Special Issue 2, Pp 461-468, Nov 2018, ISSN (P): 2249-6890; ISSN (E): 2249-8001.
- [13] T.Subramani, S.Subithabi, S.Priyanka & J.Karthick Rajan, Analysis Of Composite Shear Wall Using ANSYS, International Journal Of Mechanical And Production Engineering Research And Development (IJMPERD), Vol. 8, Special Issue 2, pp 477-484, Nov 2018, ISSN (P): 2249-6890; ISSN (E): 2249-8001.
- [14] T.Subramani and Athulya Sugathan, "Finite Element Analysis of Thin Walled- Shell Structures by ANSYS and LS-DYNA", International Journal of Modern Engineering Research, Vol.2, No.4, pp 1576-1587,2012.
- [15] T.Subramani, A.Kumaresan., " Advanced Cable Stayed Bridge Construction Process Analysis with ANSYS", International Journal of Modern Engineering Research, Volume. 4, Issue.6 (Version 1), pp 28-33, 2014,
- [16] T.Subramani, R.Senthil Kumar, "Modelling and Analysis of Hybrid Composite Joint Using Fem in ANSYS", International Journal of Modern Engineering Research, Volume 4, Issue 6 (Version 1), pp 41- 46, 2014.

- [17] T.Subramani., R.Manivannan, M.Kavitha, "Crack Identification In Reinforced Concrete Beams Using Ansys Software" ,International Journal of Engineering Research and Applications, Volume. 4, Issue. 6 (Version 6), pp 133 - 141, 2014.
- [18] T.Subramani, M.Subramani, K.Prasath,"Analysis Of Three Dimensional Horizontal Reinforced Concrete Curved Beam Using Ansys" International Journal of Engineering Research and Applications, Volume. 4, Issue. 6 (Version 6), pp 156 - 161, 2014.
- [19] T.Subramani, K.Bharathi Devi, M.S.Saravanan , Suboth Thomas⁴, Analysis Of RC Structures Subject To Vibration By Using Ansys," International Journal of Engineering Research and Applications Vol. 4, Issue 12(Version 5), pp.45-54, 2014
- [20] T.Subramani, T.Krishnan, M.S.Saravanan , Suboth Thomas, "Finite Element Modeling On Behaviour Of Reinforced Concrete Beam Column Joints Retrofitted With CFRP Sheets Using Ansys" International Journal of Engineering Research and Applications Vol. 4, Issue 12(Version 5), pp.69 -76, 2014
- [21] T.Subramani, S.Krishnan, Saravanan.M.S, Suboth Thomas "Analysis Of Retrofitting Non-Linear Finite Element Of RCC Beam And Column Using Ansys" International Journal of Engineering Research and Applications ,Vol. 4, Issue 12(Version 5), pp.77-87, 2014.
- [22] T.Subramani, J.Jayalakshmi , " Analytical Investigation Of Bonded Glass Fibre Reinforced Polymer Sheets With Reinforced Concrete Beam Using Ansys" , International Journal of Application or Innovation in Engineering & Management (IJAEM) , Volume 4, Issue 5, pp. 105-112 , 2015
- [23] T.Subramani, M.S.Saravanan, "Analysis Of Non Linear Reinforced And Post Tensioned Concrete Beams Using ANSYS", International Journal of Applied Engineering Research (IJAER) International Journal of Applied Engineering Research (IJAER), Volume 10, Number 38 Special Issues, pp.28247-28252, 2015
- [24] T.Subramani, K.Balamurugan , " Finite Element Anaylsis Of Composite Element For FRP Reinforced Concrete Slab By Using ANSYS" , International Journal of Application or Innovation in Engineering & Management (IJAEM) , Volume 5, Issue 5, pp. 076-084 , 2016 .
- [25] T.Subramani, A.Kumaravel , " Analysis Of Polymer Fibre Reinforced Concrete Pavements By Using ANSYS" , International Journal of Application or Innovation in Engineering & Management (IJAEM) , Volume 5, Issue 5, pp. 132-139 , 2016 .
- [26] T.Subramani, M.Senthilkumar , " Finite Element Anaylsis Of RC Beams With Externally Bonded Simcon Laminates By Using ANSYS" , International Journal of Application or Innovation in Engineering & Management (IJAEM) , Volume 5, Issue 5, pp. 148-155 , 2016 .
- [27] T.Subramani, A.Selvam , " Studies On Economical Configuration Of RCC And Prestressed Shell Roofs By Using ANSYS " , International Journal of Application or Innovation in Engineering & Management (IJAEM) , Volume 5, Issue 5, pp. 182-191 , 2016 .
- [28] T.Subramani, S.Sharmila, "Prediction of Deflection and Stresses of Laminated Composite Plate with Artificial Neural Network Aid", International Journal of Modern Engineering Research, Volume 4, Issue 6 (Version 1), pp 51 -58, 2014.
- [29] T.Subramani, K.Udhaya Kumar, "Damping Of Composite Material Structures with Riveted Joints", International Journal of Modern Engineering Research, Volume. 4, Issue. 6 (Version 2), pp 1 – 5, 2014.
- [30] T.Subramani, S.Sundar, M.Senthilkumar, "Investigation of the Behaviour for Reinforced Concrete Beam Using Non Linear Three Dimensional Finite Elements", International Journal of Modern Engineering Research, Volume. 4, Issue. 6 (Version 2), pp 13 -18, 2014,
- [31] T.Subramani, and P.Shanmugam, "Seismic Analysis and Design of Industrial Chimneys By Using STAAD PRO" International Journal of Engineering Research and Applications, Vol.2, Issue.4, pp 154-161, 2012.
- [32] T.Subramani and D.Ponnuvel, "Seismic and stability Analysis of Gravity Dams Using STAAD Pro" International Journal Of Engineering Research and Development, Vol.1, No.5, pp 44- 54, 2012.
- [33] T.Subramani, B.Saravanan, J.Jayalakshmi, "Dynamic Analysis Of Flanged Shear Wall Using STAAD Pro", International Journal of Engineering Research and Applications, Volume. 4, Issue. 6 (Version 6), pp 150 - 155, 2014.
- [34] T.Subramani, K.Bharathi Devi, M.S.Saravanan, Suboth Thomas, "Analysis Of Seismic Performance Of Rock Block Structures With STAAD Pro International Journal of Engineering Research and Applications Vol. 4, Issue 12(Version 5), pp.55- 68, 2014.

AUTHOR



Prof. Dr. T. Subramani Working as Professor and Dean of Civil Engineering in Vinayaka Missions Kirupananda Variyar Engineering College, Vinayaka Missions Research Foundation (Deemed to be University), Salem, Tamilnadu, India. Having more than 28 years of Teaching experience in Various Engineering Colleges. He is serving as reviewer for many International Journals and also published 250 papers in International Journals. He has presented more than 107 papers in conferences, especially 77 in International and 30 National Level. He has authored 07 books. Guided more than 259 students in PG projects. Currently he is guiding 03 Ph.D., Research Scholars. He is serving as examiner and Valuer for B.E & M.E Degree Theory and Practical Examinations for Madras University, Periyar University, Anna University, Annamalai University and Vinayaka Missions Research Foundation [Deemed to be University]. He is Question paper setter and Valuer for UG and PG Courses of Civil Engineering in number of Universities. He is serving as Chairman of Board Of Studies (Civil Engineering), Vinayaka Missions Research Foundation [Deemed to be University], also a member of Board of studies in Periyar University. He is Life Fellow in Institution of Engineers (India) and Institution of Valuers. Life member in number of Technical Societies and Educational bodies like MISTE, MIGS, MIRC, ISRMITT, UWA, Salem District Small and Tiny Association (SADISSTIA), SPC – Salem Productivity Council. He has delivered much technical talk in various field. He is a Chartered Civil Engineer and Approved Valuer for many banks. He is a Licensed Building Surveyor in Salem City Municipal Corporation-Salem, and Licensed Civil Engineer in Salem Local Planning Authority- Salem. He is the recipient of many prestigious awards.



C.Kathirvel Completed his Master of Engineering (M.E) in the Branch of Environmental Engineering at Vinayaka Mission's Research Foundation, Salem, Currently he is Working as Associate Professor of Civil Engineering in VMKV Engineering College, Vinayaka Missions Research Foundation (Deemed to be University), Salem, TamilNadu, India. Having more than 10 years of teaching experience He published 17 International Journal Publications and presented more than 15 papers in International Conferences. His work focuse specifically water divining



P.Saravana Kumar has completed his Diploma in the branch of civil engineering in Salem Polytechnic College, Salem, Tamilnadu, India and now he is persuing his B.E Degree in the branch of Civil Engineering at V.M.K.V. Engineering College, Vinayaka Missions Research Foundation, Deemed to be University, Salem, Tamilnadu, India. He has well knowledge in AUTOCAD & ARCHICAD drawing, Experienced in Heavy civil Infrastructures & Metro Projects. His hobbies are playing Carrom, Chess and Cricket.



R.Govindasamy has completed his Diploma in the branch of civil engineering in CSI Polytechnic College, Salem, Tamilnadu, India and now he is persuing his B.E Degree in the branch of Civil Engineering at V.M.K.V. Engineering College, Vinayaka Missions Research Foundation, Deemed to be University, Salem, Tamilnadu, India. He has well knowledge in AUTOCAD drawing, Experienced in Building Structures. His hobbies are playing Football, Kabadi and Cricket.



P.V Yuvaraj has completed his Diploma in the branch of civil engineering in TiruppurKalaimahal Polytechnic College, Tiruppur, Tamilnadu, India and now he is persuing his B.E Degree in the branch of Civil Engineering at V.M.K.V. Engineering College, Vinayaka Missions Research Foundation Deemed to be University, Salem, Tamilnadu, India. He has well knowledge in Drafting, Tender Finalization and Experienced in Building Structures. His hobbies are social work in Nehru Yogendra.