MOHAMED SATHAK A J COLLEGE OF ENGINEERING
Sponsored by Mohamed Sathak Trust
(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)
Siruseri IT Park, Egattur, Chennai 603 103

M.E. - STRUCTURAL ENGINEERING

S.No.	Name of the course that include experiential learning through Project work/ Internship (2017 - 2018)
1	ST7001 - Analysis and design of Tall buildings
2	ST7203 - Steel Structures
3	CN7001 - Advanced Concrete Technology
4	ST7101 - Concrete Structures
5	ST7013 - Design of Steel Concrete Composite Structures

PRINCIPAL
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3... Rajiv Gandhi Road (OMR), Siruseri, IT Park
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ST7001 **ANALYSIS AND DESIGN OF TALL BUILDINGS** **L T P C**
3 0 0 3

OBJECTIVES:

□ To study the behaviour, analysis and design of tall structures.

UNIT I LOADING AND DESIGN PRINCIPLES **9**

Loading- sequential loading, Gravity loading, Wind loading, Earthquake loading, - Equivalent lateral force, modal analysis - combination of loading, – Static and Dynamic approach - Analytical and wind tunnel experimental methods - Design philosophy - working stress method, limit state method and plastic design.

UNIT II BEHAVIOUR OF VARIOUS STRUCTURAL SYSTEMS **9**

Factors affecting growth, height and structural form. High rise behaviour, Rigid frames, braced frames, In filled frames, shear walls, coupled shear walls, wall-frames, tubulars, cores, outrigger - braced and hybrid mega systems.

UNITIII ANALYSIS AND DESIGN **9**

Modeling for approximate analysis, Accurate analysis and reduction techniques, Analysis of buildings as total structural system considering overall integrity and major subsystem interaction, Analysis for member forces, drift and twist - Computerized three dimensional analysis – Assumptions in 3D analysis – Simplified 2D analysis.

UNIT IV STRUCTURAL ELEMENTS **9**

Sectional shapes, properties and resisting capacity, design, deflection, cracking, prestressing, shear flow, Design for differential movement, creep and shrinkage effects, temperature effects and fire resistance.

UNIT V STABILITY OF TALL BUILDINGS **9**

Overall buckling analysis of frames, wall-frames, Approximate methods, second order effects of gravity of loading, P-Delta analysis, simultaneous first-order and P-Delta analysis, Translational, Torsional instability, out of plumb effects, stiffness of member in stability, effect of foundation rotation.

TOTAL: 45 PERIODS

OUTCOMES:

□ On completion of this course students will be able to know the behavior of tall buildings due to various types of loads.

□ They will be able to analyze and design such buildings by approximate, accurate and simplified methods.

REFERENCES:

1. Beedle.L.S., "Advances in Tall Buildings", CBS Publishers and Distributors, Delhi, 1986.
2. Bryan Stafford Smith and Alexcoull, "Tall Building Structures - Analysis and Design", John Wiley and Sons, Inc., 2005.
3. Gupta.Y.P.,(Editor), Proceedings of National Seminar on High Rise Structures - Design and Construction Practices for Middle Level Cities, New Age International Limited, New Delhi,1995.
4. Lin T.Y and Stotes Burry D, "Structural Concepts and systems for Architects and Engineers", John Wiley, 1988.
5. Taranath B.S., "Structural Analysis and Design of Tall Buildings", McGraw Hill, 1988.

CN7001 **ADVANCED CONCRETE TECHNOLOGY** **L T P C**
3 0 0 3

OBJECTIVES :

□ To study the properties of concrete making materials, tests, mix design, special concretes and various methods for making concrete.

UNIT I CONCRETE MAKING MATERIALS **9**

Aggregates classification, IS Specifications, Properties, Grading, Methods of combining aggregates, specified gradings, Testing of aggregates. Cement, Grade of cement, Chemical composition, Testing of concrete, Hydration of cement, Structure of hydrated cement, special cements. Water Chemical admixtures, Mineral admixture.

UNIT II TESTS ON CONCRETE **9**

Properties of fresh concrete, Hardened concrete, Strength, Elastic properties, Creep and shrinkage – Durability of concrete.

UNIT III MIX DESIGN **9**

Principles of concrete mix design, Methods of concrete mix design, IS Method, ACI Method, DOE Method – Statistical quality control – Sampling and acceptance criteria.

UNIT IV SPECIAL CONCRETE **9**

Light weight concrete, Fly ash concrete, Fibre reinforced concrete, Sulphur impregnated concrete, Polymer Concrete – High performance concrete. High performance fiber reinforced concrete, Self-Compacting-Concrete, Geo Polymer Concrete, Waste material based concrete – Ready mixed concrete.

UNIT V CONCRETING METHODS **9**

Process of manufacturing of concrete, methods of transportation, placing and curing. Extreme weather concreting, special concreting methods. Vacuum dewatering – Underwater Concrete.

TOTAL : 45 PERIODS

OUTCOME:

□ On completion of this course the students will know various tests on fresh, hardened concrete, special concrete and the methods of manufacturing of concrete.

REFERENCES:

1. Gambhir.M.L., Concrete Technology, McGraw Hill Education, 2006.
2. Gupta.B.L., Amit Gupta, "Concrete Technology, Jain Book Agency, 2010.
3. Neville, A.M., Properties of Concrete, Prentice Hall, 1995, London.
4. Santhakumar.A.R. ;"Concrete Technology",Oxford University Press,2007.
5. Shetty M.S., Concrete Technology, S.Chand and Company Ltd. Delhi, 2003.

ST7101 **CONCRETE STRUCTURES** **L T P C**
3 0 0 3

OBJECTIVES:

□ To make the students be familiar with the limit state design of RCC beams and columns

□ To design special structures such as Deep beams, Corbels, Deep beams, and Grid floors

□ The students will have confident to design the flat slab as per Indian standard, yield line theory and strip method.

□ To design the beams based on limit analysis and detail the beams, columns and joints for ductility

UNIT I DESIGN PHILOSOPHY 9

Limit state design - beams, slabs and columns according to IS Codes. Calculation of deflection and crack width according to IS Code - Design of slender columns

UNIT II DESIGN OF SPECIAL RC ELEMENTS 9

Design of RC walls - ordinary and shear walls. Strut and tie method of analysis for corbels and deep beams, Design of corbels, Deep-beams and grid floors.

UNIT III FLAT SLABS AND YIELD LINE BASED DESIGN 9

Design of flat slabs and flat plates according to IS method – Check for shear - Design of spandrel beams - Yield line theory and Hillerborg's strip method of design of slabs.

UNIT IV INELASTIC BEHAVIOUR OF CONCRETE STRUCTURES 9

Inelastic behaviour of concrete beams and frames, moment - rotation curves, moment redistribution.

UNIT V DUCTILE DETAILING 9

Concept of Ductility – Detailing for ductility – Design of beams, columns for ductility - Design of cast-in-situ joints in frames – Fire resistance of Reinforced concrete members.

TOTAL: 45 PERIODS

OUTCOME:

□ On completion of this course the students will have the confidence to design various concrete structures and structural elements by limit state design and detail the same for ductility as per codal requirements.

REFERENCES:

1. Gambhir.M.L., "Design of Reinforced Concrete Structures", Prentice Hall of India, 2012.

2. Purushothaman, P, "Reinforced Concrete Structural Elements: Behaviour Analysis and Design", Tata McGraw Hill, 1986

3. Unnikrishna Pillai and Devdas Menon "Reinforced Concrete Design', Third Edition, Tata McGraw Hill Publishers Company Ltd., New Delhi, 2007.

4. Varghese, P.C, "Advanced Reinforced Concrete Design", Prentice Hall of India, 2005.

5. Varghese, P.C., "Limit State Design of Reinforced Concrete", Prentice Hall of India, 2007.

ST7013 DESIGN OF STEEL CONCRETE COMPOSITE STRUCTURES L P C 3 0 0 3

OBJECTIVES:

□ To develop an understanding of the behaviour and design study of Steel concrete composite elements and structures.

UNIT I INTRODUCTION 9

Introduction to steel - concrete composite construction – Coes – Composite action – Serviceability and - Construction issues.

UNIT II DESIGN OF CONNECTIONS 9

Shear connectors – Types – Design of connections in composite structures – Degree of shear connection – Partial shear interaction

UNIT III DESIGN OF COMPOSITE MEMBERS 9

Design of composite beams, slabs, columns, beam – columns - design of composite trusses.

UNIT IV COMPOSITE BOX GIRDER BRIDGES 9

Introduction - behaviour of box girder bridges - design concepts.

UNIT V CASE STUDIES 9

Case studies on steel - concrete composite construction in buildings - seismic behaviour of composite structures.

TOTAL: 45 PERIODS OUTCOMES:

□ At the end of this course students will be in a position to design composite beams, columns, trusses and box-girder bridges including the related connections.

□ They will get exposure on case studies related to steel-concrete constructions of buildings.

REFERENCES:

1. Johnson R.P., "Composite Structures of Steel and Concrete Beams, Slabs, Columns and Frames for Buildings", Vol.I, Blackwell Scientific Publications, 2004.
2. Oehlers D.J. and Bradford M.A., "Composite Steel and Concrete Structural Members, Fundamental behaviour", Pergamon press, Oxford, 1995.
3. Owens.G.W and Knowles.P, "Steel Designers Manual", Steel Concrete Institute(UK), Oxford Blackwell Scientific Publications, 1992.

ST7203 **STEEL STRUCTURES** **L T P C**
3 0 0 3

OBJECTIVES:

□ To study the behaviour of members and connections, analysis and design of Industrial buildings and roofs, chimneys. Study the design of with cold formed steel and plastic analysis of structures.

UNIT I GENERAL 9

Design of members subjected to combined forces – Design of Purlins, Louver rails, Gable column and Gable wind girder – Design of simple bases, Gusseted bases and Moment Resisting Base Plates.

UNIT II DESIGN OF CONNECTIONS 9

Types of connections – Welded and Bolted – Throat and Root Stresses in Fillet Welds – Seated Connections – Unstiffened and Stiffened seated Connections – Moment Resistant Connections – Clip angle Connections – Split beam Connections – Framed Connections.

UNIT III ANALYSIS AND DESIGN OF INDUSTRIAL BUILDINGS 9

Analysis and design of different types of Live pan, Pratt and north light trusses roofs – Analysis and design of industrial buildings – Sway and non sway frames – Aseismic design of steel buildings.

UNIT IV PLASTIC ANALYSIS OF STRUCTURES 9

Introduction, Shape factor, Moment redistribution, Combined mechanisms, Analysis of portal frames, Effect of axial force - Effect of shear force on plastic moment, Connections - Requirement – Moment resisting connections. Design of Straight Corner Connections – Haunched Connections – Design of continuous beams.

UNIT V DESIGN OF LIGHT GAUGE STEEL STRUCTURES 9

Behaviour of Compression Elements - Effective width for load and deflection determination – Behaviour of Unstiffened and Stiffened Elements – Design of webs of beams – Flexural members – Lateral buckling of beams – Shear Lag – Flange Curling – Design of Compression Members – Wall Studs.

TOTAL: 45 PERIODS

OUTCOMES:

□ At the end of this course students will be in a position to design bolted and welded connections in industrial structures.

□ They also know the plastic analysis and design of light gauge steel structures.

REFERENCES:

1. Lynn S. Beedle, Plastic Design of Steel Frames, John Wiley and Sons, 1990.
2. Narayanan.R.et.al., Teaching Resource on Structural steel Design, INSDAG, Ministry of Steel Publishing, 2000.
3. Subramanian.N, Design of Steel Structures, Oxford University Press, 2008.
4. Wie Wen Yu, Design of Cold Formed Steel Structures, Mc Graw Hill Book Company, 1996.

EXPERIMENTAL AND ANALYTICAL INVESTIGATION ON COMPOSITE COLUMN

A THESIS

Submitted by

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Register No: 311816413001

In partial fulfillment for the award of the degree of

MASTER OF ENGINEERING

IN

STRUCTURAL ENGINEERING

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ANNA UNIVERSITY:CHENNAI 600 025

JUNE 2018

ANNA UNIVERSITY, CHENNAI – 600 025

BONAFIDE CERTIFICATE

Certified that this report titled **"EXPERIMENTAL AND ANALYTICAL INVESTIGATION ON COMPOSITE COLUMN"** is the bonafide work ofJ.JESVINRENSPAL(RegisterNo:311816413001) who carried out the **PHASE II PROJECT WORK** program under my supervision.Certified further that to the best of my knowledge the work reportedherein does not form part of any other thesis or dissertation on the basis of which adegree or award was conferred on an earlier occasion on this or any other candidate.

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INTERNAL EXAMINER

EXTERNAL EXAMINER

ABSTRACT

The use of composite construction has become more widespread in recent decades. Composite construction combines the advantages of both structural steel and concrete, namely the speed of construction, strength, and light weight of steel, and the inherent mass, stiffness, damping, and economy of concrete. The Composite column consists of a steel tube filled with concrete. The concrete fill adds stiffness and compressive strength to the tubular column and reduces the potential for inward local buckling. The steel tube acts as longitudinal and lateral reinforcement for the concrete core to resist tension, bending moment and shear, and to prevent the concrete from spalling.

Due to the beneficial composite action of both materials, the CFT columns provide excellent seismic resistant structural properties such as high strength, high ductility and large energy absorption capacity.

In this project, a study was carried out produce composite column and to study the properties and behavior of composite column experimentally and analytically. Concrete mix designs are prepared using the IS code method for M40 concrete grade. The specimens were produced with different shapes(square, rectangular and circular) and sizes. These tests are conducted to ensure the quality of material and to reduce the cost. Laboratory tests were carried out on the prepared cft column specimens.The compressive strength of the composite column will be

CHAPTER 5

SUMMARY AND CONCLUSIONS

5.1 GENERAL

The general objective of this project was to evaluate the compressive strength and behavior of composite column both experimentally and analytically. From the test results of the samples, as compared to the respective conventional concrete properties, the following conclusions and recommendations are drawn out.

5.2 CONCLUSIONS

The use of composite construction has become more widespread in recent decades. Composite construction combines the advantages of both structural steel and concrete, namely the speed of construction, strength, and light weight of steel, and the inherent mass, stiffness, damping, and economy of concrete.The concrete fill adds stiffness and compressive strength to the tubular column and reduces the potential for inward local buckling. The steel tube acts as longitudinal and lateral reinforcement for the concrete core to resist tension, bending moment and shear, and to prevent the concrete from spalling.

The compressive strength of composite columns of different sections are determined by testing in laboratory using UTM. Then, the composite columns are modelled using software called abaqus to find the behavior and maximum load capacity. The results obtained from analysis and testing are get compared.

By this, the analytical result that obtained from abaqus software is more or less equal to the experimental results obtained from testing. The results obtained from the tests on six concrete filled steel tube columns are presented and are compared with abaqus results in this paper. The results obtained by the abaqus software agree very well with the experimental results. So, instead of making real experimental, we can use the Abaqus software analysis to determine the strength of structural components.

INVESTIGATION ON THE BEHAVIOUR OF COLD-FORMED STEEL BEAM - COLUMN CONNECTIONS

A THESIS

Submitted by

RAMYA D

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In partial fulfillment for the award of the degree
of

MASTER OF ENGINEERING
IN
STRUCTURAL ENGINEERING

MOHAMED SATHAK A J COLLEGE OF ENGINEERING

ANNA UNIVERSITY :CHENNAI 600 025

JUNE 2017

ANNA UNIVERSITY, CHENNAI - 600 025

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INTERNAL EXAMINER

29/06/17

EXTERNAL EXAMINER

ABSTRACT

Thin sheet steel products are extensively used in building industry, andrange from purlins to roofsheeting and floor decking. Generally these are available for useas basic building elements for assembly at site or as prefabricated frames or panels. These thinsteel sections are cold-formed, i.e. their manufacturing process involves forming steel sections in a cold state (i.e. without application of heat) from steel sheets of uniform thickness. These are given the generic title Cold Formed Steel Sections. Sometimes they are also called Light Gauge Steel Sections or Cold Rolled Steel Sections. The thickness of steel sheet used in cold formed construction is usually 1 to 3 mm. Much thicker material up to 8 mm can be formed if pre-galvanised material is not required for the particular application. The method of manufacturing is important as it differentiates these products from hot rolled steel sections. Normally, the yield strength of steel sheets used in cold-formed sections is at least 280 N/mm², although there is a trend to use steels of higher strengths, and sometimes as low as 230 N/mm². Manufacturers of cold formed steel sections purchase steel coils of 1.0 to 1.25 m width, slit them longitudinally to the correct width appropriate to the section required and then feed them into a series of roll forms. These rolls, containing male and female dies, are arranged in pairs, moving in opposite direction so that as the sheet is fed through them its shape is gradually altered to the required profile. The number of pairs of rolls (called stages) depends on the complexity of the cross sectional shape and varies from 5 to 15. At the end of the rolling stage a flying shearing machine cutsthe member into desired lengths. Cold formed steel can be manufactured in two processes, such as brake pressing and rolled formed. Roll forming consist of feeding a continuous steel strip through a series of opposing rolls to progressively deform the steel plastically to form the desire shape. Roll forming is usually used to produce sections where very large quantities of a given

shape are required. The initial tooling costs are high but the subsequent labour content is low. Brake pressing normally involves producing one complete fold at a time along the full length of the section using brake press dies. For section with several folds, it is normally necessary to move the steel plate in press and to repeat the pressing operation several times. Brake pressing is normally used for low volume production where a variety of shapes are required and the roll forming tooling costs can't be justified. The first standard was developed by American Iron and Steel Institute (AISI) in 1946 and was based largely on researched work done under the direction of Prof George Winter at Cornell University. Since the development of building codes and specification in various countries, the application of cold formed steel is increasing rapidly for constructing .

CHAPTER 9

CONCLUSION

This paper has described a detailed investigation of the behaviour of cold formed steel beam column connections by self tapered screws with two types of connections. Both experimental and theoretical analysis was conducted for better understanding of the behaviour of the beam column connections. They were validated by comparing their result with the corresponding experimental results.

Table 9.1:Comparison of results

Analytical ultimate Load(kN)	31.55
Theoretical ultimate Load(kN)	37
Experimental ultimate Load(kN) for Linear arrangement of Bolts	31.7
Experimental ultimate Load(kN) for staggered arrangement of Bolts	33.84

Compare to the Theoretical ultimate Load, The Experimental ultimate Load is low, Because to find the Theoretical ultimate used the factor of safety values are high as per code book specifications. So that the experimental values are low.

The following conclusions are made from the above Study:

- Self tapered screws are a simple design and it achieving necessary moment capacities.
- Numerical validation has been carried out to verify the appropriateness of the experimental results and find that they are quite closer to the corresponding test result.

- The staggered arrangement of bolts have took more loads and less deflections compared to the linear arrangements of bolts.
- The results obtained based on the various codes are conservative.
- The strength and stiffness of the joints are increased by to increase the depth of beam and the thickness of column.
- The finite element analysis software ABAQUS include local and overall geometric imperfections and residual stresses.
- It is concluded that the connections are carried over the 85% of load carrying capacity of beams. So that these connections are efficient.

EXPERIMENTAL STUDY ON THE BEHAVIOUR OF CORRUGATED WEB STEEL BEAM

PROJECT REPORT

Submitted by

R. PALANISAMY

Register No: 311816413004

In partial fulfillment for the award of the degree of

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IN

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MAY-JUNE 2018

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Certified that this thesis titled "EXPERIMENTAL STUDY ON THE BEHAVIOUR OF CORRUGATED WEB STEEL BEAM" is the bonafide work of R. PALANISAMY (REG NO. 311816413004) who carried out the work under my supervision. Certified further that to best my knowledge the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any candidate.

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INTERNAL EXAMINER

12/06/18

EXTERNAL EXAMINER

ABSTRACT

In the built-up beams of girders thickness of web plate required is more and also intermediate stiffener plates are to be used in case of heavy loads. So the dead weight of the structure increases. To reduce this and to improve the structural efficiency, corrugated web may be used.

The use of corrugated webs is a potential method to achieve adequate out-of-plate stiffness and shear buckling resistance without using stiffeners. Therefore, it considerably reduces the cost of beam fabrication and the weight of superstructures.

In this work, the capacity of normal and corrugated web steel girder under flexure buckling and a combination of shear and flexural buckling have been studied using two point loading and mid-point loading by numerical and experimental analysis. The load carrying capacity of normal girder is studied and compared with the capacity of 30°, 45° and 60° corrugations of trapezoidally corrugated web girder by analytical and experimental investigations.

The simply supported built-up beam of 0.9 m span with plain web plate and trapezoidally corrugated web plate of 2mm thickness, 150mm web depth with 30°, 45° and 60° corrugations have been analysed using ANSYS software. The maximum load carrying capacity for the critical stress have been found for all the girder specimens for mid-point loading and two point

CHAPTER 7

SUMMARY AND CONCLUSIONS

7.1 SUMMARY

The analysis of normal and trapezoidally corrugated web steel beams have been carried out both theoretically and experimentally.

The simply supported built-up beam of 0.9m span with plain web plate and trapezoidally corrugated web plate of 2mm thickness, 150mm web depth 30^0,45^0 and 60^0 corrugations has analysed by experimental investigations. The maximum load carrying capacity has found for all the types of girders for mid-point loading setup for its combined shear flexure behaviour and two point loading setup for its pure flexure behaviour.

7.2 CONCLUSIONS

From the limited experimental investigation the following conclusion are drawn,

Two-point loading

- Under pure flexure, the load carrying capacity of 30^0 trapezoidally corrugated web girder is 12%, 45^0 trapezoidally corrugated web is 25.2% and that of 60^0 trapezoidally corrugated web is 27% more compared to normal plain web girder.

EXPERIMENTAL INVESTIGATION ON BEHAVIOR OF CORRODED CHST COLUMN RETROFITTED USING FRP

A THESIS

Submitted by

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In partial fulfilment for the award of the degree of

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Certificated that this report titled " **EXPERIMENTAL INVESTIGATION ON BEHAVIOR OF CORRODED CHST COLUMN RETROFITTED USING FRP** " is the bonafide work of **NABAJYOTI MODAK** (Resister No: 311816413003) who carried out the **PHASE II PROJECT WORK** program under my supervision.

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12/6/18 12/06/18

INTERNAL EXAMINER **EXTERNAL EXAMINER**

ABSTRACT

Steel is the most used building material on earth. Many steel structures are built with an expected life time of approximately 60 to 70 years. But steel structures undergo following damage due to age, chemical attack, fire and impact or corrosion. Various techniques are available for strengthening steel structures, to increase the load carrying capacity or else to improve the in-service performance.

Many research work have been carried out on the strengthening of steel structures using various techniques. It is possible to increase the strength of structural members even after they have been severely damaged due to loading conditions as well as environmental effects. Here, for retrofitting the steel column external FRP wrapping system was used. The use of FRP sheets or plates bonded to the steel column has been studied by several researchers. Because the FRP materials are non-corrosive, non-magnetic and resistant to various types of chemicals, they are increasingly being used for external reinforcement of existing structural members.

Two hollow steel columns of 88.9 mm external diameters and a thickness of 4 mm were tested as control structures, then they were retrofitted with Aramid fibre sheet with different wrapping schemes and the result were compared using graph. The main experimental parameters include arrangement of Aramid fibre sheet and numbers of layers of Aramid fibre. From the result it is observed that the load carrying capacity is very much increased even after loading the sample up to ultimate level because of the effectiveness of Aramid fibre wrapping.

CHAPTER 6

CONCLUSION

Retrofitting of Steel Tubular column for axial compression using external bonded FRP sheets have been studied by several investigators. However, study on the retrofitting of structural columns using Aramid FRP in spiral wrapping and their comparison has received least attention.

In the present work, the axial compression behavior with respect to the strength of short Circular Hollow Steel Tubular (CHST) columns retrofitted for compression by Aramid sheets has been studied. This study is carried out through a series of experiments. From the detailed study of the experimental results and the data obtained from that of the FRP retrofitted columns, the major conclusions drawn are summarized bellow.

- The results of this study shows that the use of Aramid sheet is feasible and effective for retrofitting of steel structures without causing catastrophic brittle failure.
- As can be seen, loads and deflections are increased almost proportionally up to the failure mode.
- The stress-strain behavior is also gives a quite satisfaction with the increase of stress. Comparing all those results it is observed that the use of wrapping can able to withstand more stress.
- In the controlled sample, the ultimate load carrying capacity was 319 kN. It has been observed that in the controlled sample the column failed by local buckling. The support ends i.e., at the top and bottom it undergoes uniform buckling through the cross-section and in the middle portion it buckles laterally in to some extent.
- In CHST-HS-1-L, the ultimate load was 325 kN. Here, it was observed that a little minor crack was there in the Aramid wrapping and the column

EXPERIMENTAL AND NUMERICAL ANALYSIS OF SLIP BLOCK TEST FOR DIFFERENT NIBS ON COMPOSITE SLAB

A PROJECT REPORT

Submitted by

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In partial fulfillment for the award of the degree of

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STRUCTURAL ENGINEERING

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Certified that this report titled **"EXPERIMENTAL AND NUMERICAL ANALYSIS OF SLIP BLOCK TEST FOR DIFFERENT NIBS ON COMPOSITE SLAB"** is the bonafide work of **KASTHURI.R** (Register No:311816413002) who carried out the **PHASE I PROJECT WORK** program under my supervision.

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ABSTRACT

Composite slabs are widely used in the building industry for last decades. In the composite slabs, shear resistance is achieved by the mechanical interlocking in the form of embossments or shear connectors which is used to transfer the shear between cold-form steel sheet and concrete core. The various small-scale tests are used to determine the shear resistance of composite slab subjected to various combinations of loads in vertical and horizontal direction. The numerical study is going to be analysed by the Finite element model of ABAQUS Software and finally it is compared with experimental results by using small scale Slip block test for the three different types of embossments with different spacing's on Re-Entrant profile deck sheet.

CHAPTER 6

SUMMARY & CONCLUSION

Review of literature has been carried out on experimental and numerical studies on profiled composite slabs. From the literature reviews it is inferred that the performance of composite slabs is highly influenced by load transfer between the steel and concrete. Previous studies revealed that adequate load transfer devices in the form of different location of mechanical interlocks between sheeting and concrete are necessary to effectively utilize the composite action and improve the slab performance.

The experimental investigation is included with reentrant profiled sheet with three different shapes of embossments with different spacing's of 18 slip block test specimens are taken to determine the horizontal slip resistance between the steel concrete composite slabs.The maximum load carrying capacity is achieved on chevron 90° (D_3) specimen with 14.9kN under the slip of 1.4mm and chevron 0° (C_3)has achieved for the strength of 14.2kN with 1.6mm. next to that the rectangular 90°(F_3) shaped embossments has obtained maximum strength of 13.1kN with 2.5mm slip between the steel and concrete.

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