

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES
Department of Civil Engineering



2019-2023
Certificate

This is to certify that

T RADHIKA	20T85A0121
N RAKESH	20T85A0122
A YASHWANTH KUMAR	20T85A0134
CH NARESH	20T85A0111

Have satisfactorily completed the major project work entitled

**“ANALYSIS AND DESIGN OF HOSPITAL BUILDING BY
USING E-TABS”**

In partial fulfillment of the requirement for the award of Bachelor of Technology in Civil Engineering, prescribed by Jawaharlal Nehru Technological University for the year 2019-2023.

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ABSTRACT


It is envisaged that no single standard can meet the requirements of different regions in our country representing plains, islands and hilly terrains with diverse geo-climatic variations. However, attempt has been made in this standard to cover basic needs of 100 bedded hospitals which could be suitably adjusted to meet specific needs and priorities of a particular region or a community. Especially in towns due to rapid industrialization, the demand is very high. Adapting the construction of Multi-Specialty Hospital.


Hence an Engineer to be knowledgeable about the planning and designing of such a Multi-Specialty Hospital. Advancements of computer packages have given many tools to the designer towards achieving the best and accuracy in their work an attempt is made in this project to utilize the computer packages and comparing the results with manual procedures.

In our project, a Multi-Specialty Hospital is analyzed and designed for live loads, dead loads and seismic loads. The process of modeling analysis and design of Beams and Columns is carried by using ETABS package and Slabs, Footings and Staircase is done manually. One column is Designed Manually and compared with ETABS Design.

Used Key Skills:

1. IS: 12433 (PART-2)-2001 Basic Requirements for Hospital Planning
2. IS: 456-2000 RCC Design
3. IS: 875-1987(PARTS) Load Combinations
4. ETABS
5. Auto Cad 2D/3D


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DEPARTMENT OF CIVIL ENGINEERING
ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES

2019-2023S



CERTIFICATE

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D. PAVAN	20T85A0115
B.NAGARANI	20T85A0110

Have satisfactorily completed the major project work entitled
**PLANNING ANALYSIS AND DESIGN OF G+5 MULTY STORY
BUILDING USING SAP-2000**

In partial fulfillment of the requirement for the award of Bachelor of Technology in Civil Engineering, prescribed by Jawaharlal Nehru Technological University for theyear 2019-2023.


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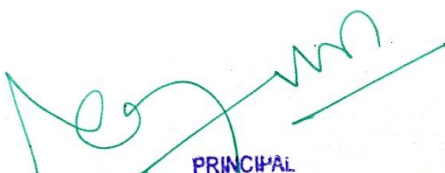
ABSTRACT

The structures with a setback are very susceptible during earthquakes because of their vertical geometry and mass irregularity; however, the risk increases if the structures also feature stiffness irregularity in elevation. The threat factor of such a construction may grow if it is built on sloping terrain. This research attempts to examine the seismic performance of setback constructions standing on flat ground as well as on a hill's slope, with different plan configuration. This research was carried out using three separate methods: the equivalent static force method, the response spectrum method, and the time history method. the buildings were considered

All structures were developed in accordance with IS 875:1987 part 1, part 2, and IS 1893:2016 (equivalent to dead, live, and seismic loads) and in accordance with IS 456:2000 and IS 13920 (1993, Reaffirmed 2008). Details of the reactions obtained from the various buildings under various seismic excitations were provided. Maximum top story displacement, maximum story drift, and maximum base shear are the characteristics employed in the comparison of analysis of all configurations.

Structures on sloped land are found to be more vulnerable than those on flat ground, and their level of vulnerability rises as the slope angle increases. On a sloping surface, movement has been seen in the structure under directional force. These sloped constructions show differential movement on both sides, with the taller side moving higher than the shorter side in the force's direction this occurrence shows that the stiffness is concentrated on the structure's shorter side on higher slopes. Due to the asymmetrical in plan the C and L-shaped models got high base shear compare to the regular and +- shaped model.

Keywords: *Soil-structure interaction, variation in plan configuration, Sloping ground, Linear Time history analysis, SAP-2000 software.*


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M PAVAN KALYAN	20T85A0117
M MACHENDAR	19T81A0102

Have satisfactorily completed the major project work entitled

**“ANALYSIS AND DESIGN OF SCHOOL BUILDING G+5
BY USING STAAD PRO”**

In partial fulfillment of the requirement for the award of Bachelor of Technology in Civil Engineering, prescribed by Jawaharlal Nehru Technological University for the year 2019-2023.

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ABSTRACT

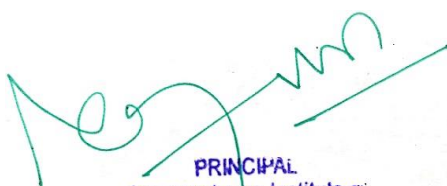
Every building has got its form, function and aesthetic. School is very challenging to plan; they are important for preparing the future human resources and directly contribute to social and economic development of a place. We consider that the architecture will take of these and the structural engineer will be responsible for strength and safety of structure. A building or structure should be constructed according to Indian standard specified by the concerned department. Generally, these are different types of buildings such as Residential, Commercial, offices and Institutional buildings, Government offices, etc...


STAAD Pro allows structural engineers to analyzed and design virtually any type of structure through its flexible modelling environment, advanced features and parent data collaboration. By referring to various research papers it is concluded that software-based analysis and design is accurate and also it can save as compared to manual.

In this project we have designed a school building (RCC) G+5 using staad pro V8i which includes design of elements such as beams, columns, and footings. Study of loads acting on building and RCC design with reference to IS:875 and IS:875 and IS:456-20.

Structural planning and design is an art and science of designing with economy and elegance, serviceable and durable structure. The entire process of structural planning and designing requires not only imagination and conceptual thinking but also sound knowledge of science of structural engineering besides knowledge of practical aspects, such as relevant design codes and byelaws.

Hence in this project, an attempt is made on planning, analysis and design of residential building with four floors and each floor consists of 8 flats each individual flat consists of master bedroom, bedroom, kitchen, toilet, dining hall and veranda. The structural analysis is analyzed by using STAAD PRO software for analyzing and design of frames. AUTOCAD is also used for draw the plans, columns and beam framing, stair case and etc. IN this project the designs of slabs, columns, footing, staircase, sunshades, lintel, septic tank, elevated tank by "Limit State Method" Using IS:456-2000 code book.


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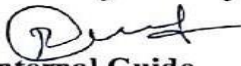
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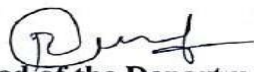
K. BHEEMASENA KUMAR	19T81A0101
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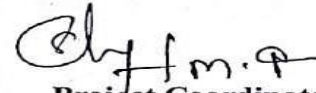
Have satisfactorily completed the major project work entitled

**“Design and analysis of G+20 RC building in different
zones by using STAAD Pro”**

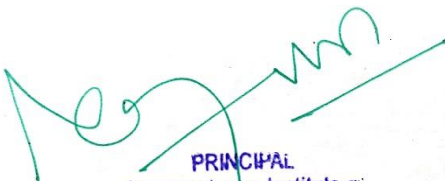
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ABSTRACT

As per IS-1893-2002 entire country is divided in 4 zones based on the intensity of earthquake. Because of non-availability of land mass in the urbanized areas like towns and cities a multiey storied RC buildings need to design to satisfy the requirements.

Design of multiey storied building is critical task for a structural engineer by considering the horizontal loads. In this dissertation a multiey storied RC building with G+20 storied subjected to dead loads, live loads and earthquake loads are considered to design.

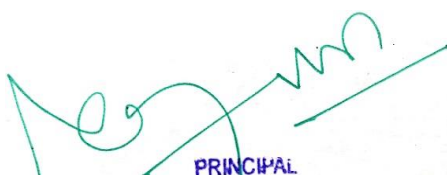
The parameters are load displacements, shear force, bending moments and the masses participation capacities are considered to decide the behaviour of structure.


In this we are going to develop a RC building in the different zones. The main object of the project is developed to analysis of a G+20 RC building behaviour in different zones by using the STAAD pro. The project aims to give a proper awareness to right designing and detailing of the building.

In this first of all, the planning is done by using auto CAD and the design involves load calculations manually and the structure is analyzed by using STAAD pro.

Rc building is nothing but the Reinforced concrete building. The objectives of the present work are to study the behaviour of a RC building regular in plan which is subjected to different zones by using STAAD Pro.

The analysis is carried out by the help of STAAD Pro v8i structural software. Different values of SEISMIC ZONE FACTORS(Z) are taken from their respective properties and their corresponding effects are interpreted in the results.


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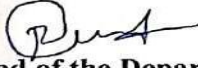
**“PLANNING ANALYSIS AND DESIGN OF
SHOPPING MALL BY USING ETABS”**

In partial fulfillment of the requirement for the award of Bachelor of Technology in Civil Engineering, prescribed by Jawaharlal Nehru Technological University for the year 2019-2023.


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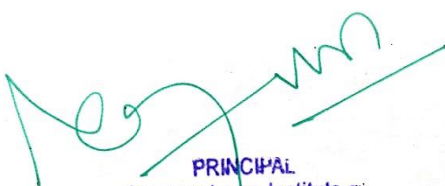

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ABSTRACT:

Population density is more in the cities like Hyderabad also the cost of construction and cost of land is very much high. Because of scarcity of lands there is a necessity of design of multi storied commercial buildings. Basically, the shopping malls are stiffness-unsymmetrical structures along the vertical direction.

In this study a G+3 shopping mall with mass symmetric is being consider to analyse and design with a plot size of 106ft X106ft. The shopping mall buildings are more vulnerable due to gravity loads. The live loads are considered as per Indian standard. The materials and sections are designed based on performance-based design as per ductile detailing in ETABS software.

Various parameters are considered to study the behaviour of shopping mall in terms of load displacements, Bending Moments and shear force, story drifts and story shears subjected to Live loads, wind load and seismic loads. Design of structural member was done as per IS:456-2000 limit state method. The grade of concrete and steel was considered as M40 and Fe500. Design and detailing of drawings are incorporated wherever required.


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**“ANALYSIS & DESIGN OF BUILDING IN DIFFERENT
WIND AND SEISMIC ZONE USING ETABS”**

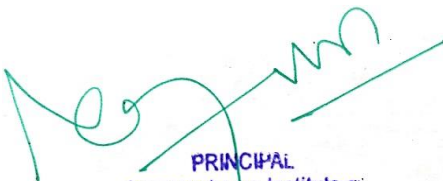
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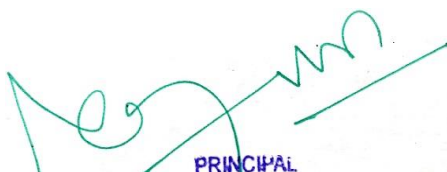
ABSTRACT


As a structure is subjected to the earthquake, it results vibrating. The earthquake force subjected to structure will be resolved into three mutually perpendicular direction the two horizontal directions (x and y) and therefore the vertical direction (z). Here the most essential thing is to consider the results of lateral loads induced from wind and earthquakes within the analysis of reinforced concrete structures, especially for high-rise buildings. Here the basic intent of analysis for the earthquake resistant structures is that buildings should be able to resist minor earthquakes without damage. To avoid the collapse during a major earthquake, the members are must have to be ductile enough to absorb and dissipate energy by post-elastic deformation.

So redundancy within the structural system which permits redistribution of internal forces within the failure of key elements. The objectives of the current work is to study the behavior of a multi storied building subjected to earth quake load by adopting Response spectrum analysis. The current investigation is restricted to strengthened cement (RC) multicelebrated business working with unique zone I,II,III,IV,V. The examination is administered the assistance of FEM programming's E-Tabs. The structure model within the examination has four stories' with consistent story stature of 2.95m. Models are utilized to dissect with various cove lengths and also the quantity of Bays and also the straight width along two flat bearings are kept steady in each model for accommodation. Various estimations of SEISMIC ZONE FACTOR are taken and their comparing impacts are deciphered within the outcomes.

Skills Used:

- IS1893-2002
- IS456-2000
- Etabs 2015


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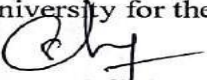
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**“ANALYSIS AND DESIGN OF RESIDENTIAL BUILDING
G+5 BY USING STAAD PRO”**

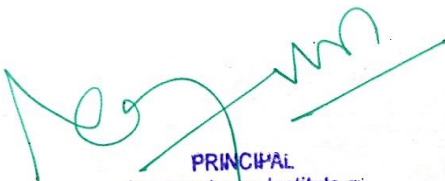
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ABSTRACT

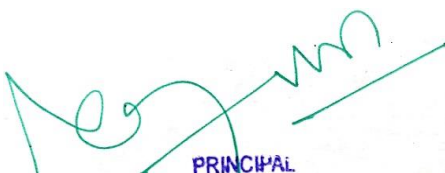
With the increase in population and development civilization, the demand for house is increased at peak rate. Especially in towns due to rapid industrialization, the demand is very high. Adapting the Construction of Multistoried Building not only matches with demand but also decreases the price of single house.

Hence an Engineer to be knowledgeable about the planning and designing of such multistoried Buildings. Advancement of computer package have given many tools to the designer towards achieving the best and accuracy in their work An attempt is made in this project to utilize the computer package and comparing the result with manual procedures.

In our project, a Multistoried Building is analyzed and designed for live loads, dead loads and seismic loads. The process of modeling analysis and design of Beams and Column is Designed Manually and compared with STAAD Design.

STAAD Pro allows structural engineers to analyzed and design virtually any type of structure through its flexible modeling environment, advanced features and parent data collaboration. By referring to various research papers it is concluded that software based analysis and design is accurate and also it can save as compared to manual.

In this project we have designed a Residential building (RCC) G+5 using staad pro V8i which includes design of elements such as beams, columns, and footings. Study of loads acting on building and RCC design with reference to IS:875 and IS:875 and IS:456-20.


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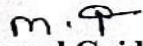
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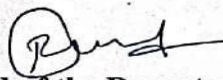
E. ANITHA	20T85A0101
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D.VENU	20T85A0129
B. VIKRANTH GUPTA	20T85A0130

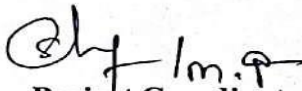
Have satisfactorily completed the major project work entitled


**“ PLANNING, ANALYSIS & DESIGN OF A G+4 RESIDENTIAL BUILDING
WITH SHEAR WALLS BY USING E-TABS ”**

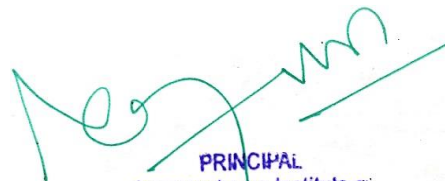
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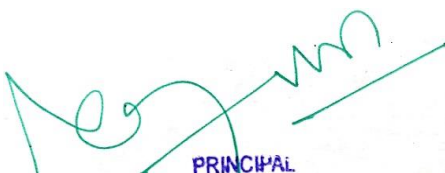
ABSTRACT

Multi storied RC framed buildings are subjected to not only gravity and horizontal loads. Many buildings are failed due to horizontal loads. To resist horizontal loads the Shear walls are very effective in resisting the horizontal displacements in the multi storied buildings.

In the present study the critical horizontal displacements are identified to design the shear wall locations. This study is carried by considering a RCC Building frame of G+4 residential building.

As per Indian Standard code provisions the static earthquakes are being considered in the zone III. The critical parameters are identified displacements are identified based on by calculating the horizontal story displacements, story shears, story drifts and base shear of the structure.

Keywords: Shear wall, Earthquake, E-TABS


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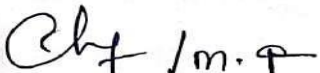
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2. N. NAVANEETH CHARY	20T85A0113
3. N. NARESH	20T85A0112
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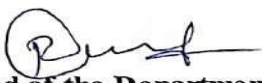
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**“ANALYSIS AND DESIGN OF AN INDUSTRIAL BUILDING
BY USING SAP2000”**

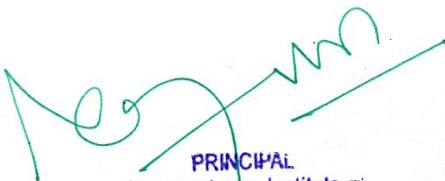
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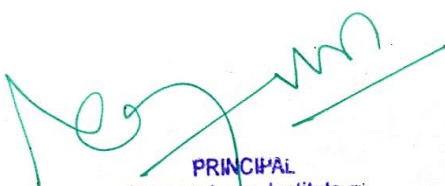

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ABSTRACT

Analysis and design was carried out for three different type of roof trusses namely fink truss, pratt truss and howe truss for two different type of steel sections i.e. Angle section and I section on SAP2000 software. The analysis for optimum section were carried out for combination of three trusses with two sections each making six different combinations of truss and sections and the best optimized section with truss was found on SAP2000 software. Comparative study was made and it was found that Fink truss with angle section to be optimum and economical. In order to design a fire-resistant steel structure, the change in the physical and mechanical properties of the steel at high temperatures must be known. As the temperature of steel structural elements increases during fire, their strength decreases considerably. After a certain temperature, these strength drops reach critical levels. Therefore, collapses and various deformations (buckling, arching, etc.) occur. To prevent these collapses during the fire, various fire protection materials must be applied to the structural members such as column and beam. Columns are the most critical structural elements in a steel bearing system. While the possible collapse of the columns may cause the collapse of the whole structure, the beams alone may not cause the collapse of the structure, and the column-beam junctions directly affect the spread of fire. Since there will be many openings and gaps in industrial buildings, the spread and growth of a possible fire becomes very serious.


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**“STUDY ON THE EFFECTS OF USING ALCCOFINE AND
RECYCLED CONCRETE AGGREGATE IN COHRESIONAL
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In partial fulfillment of the requirement for the award of Bachelor of Technology in Civil Engineering, prescribed by Jawaharlal Nehru Technological University for the year 2019-2023.

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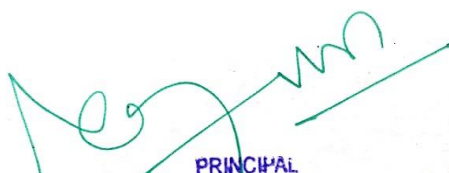
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ABSTRACT

Recycling of concrete has gaining importance from the past decades in view of the environmental considerations. Aggregate obtained by recycling of concrete is termed as the recycled concrete aggregate which has inferior properties compared to the natural aggregates. In view of environmental considerations, OPC is replaced with PSC which is a *blended cement* and natural river sand is replaced with manufactured sand for savings in economy of the project.

Alccofine C 1203 is a ultra-fine GGBS which possesses supplementary cementitious properties added as a partial replacement to the cement. Based on the trial studies, the optimum replacement percentage of Alccofine is identified and natural coarse aggregate is replaced with recycled concrete aggregate by 75 % & 100 % respectively. Hardened properties of the concrete comprising of Alccofine and recycled concrete aggregate are compared with the natural aggregate concrete at 28 days of curing.

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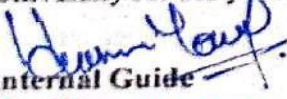
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“STABILIZATION OF SOIL USING COCONUT COIR”

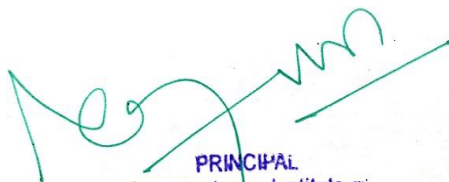
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ABSTRACT

This research focused on the compaction characteristics (MDD, OMC) and strength properties (CBR Values) of expansive soils such as clayey soil. Compaction characteristics and bearing capacity can be improved by stabilization process of soil. These properties can be improved by controlled compaction using mechanical equipment or by addition of suitable admixture or reinforcing the soil with crumb rubber, plastic waste, fiber etc. here we used natural fiber like coconut coir fiber. Reinforcement of soil with coir fiber is low-cost approach for improving the soil properties such as (MDD value, CBR value). It includes effects of coir fiber on clayey soil based on the results of Standard Proctor tests, Atterberg limit test, and California Bearing Ratio (CBR) tests. Coir Fiber was added in different proportions of 1%, 2.5%, and 5% respectively. It is found that with addition of coconut coir fiber at 2.5%, with clayey soil M.D.D changes from 1.63gm/cc to 1.67gm/cc. C.B.R ratio from 4.59% to 6.13% at O.M.C of 14.28%.

Soil stabilization has become a major issue in Construction engineering and the researches regarding the Effectiveness of using natural wastes are rapidly increasing. The use of natural fibers to reinforce soil is an old and ancient Idea. Consequently, randomly distributed fiber reinforced soils Have recently attracted increasing attention in geotechnical Engineering. The main aim of this paper, therefore, is to review The, benefits, properties and applications of coir fiber in soil Reinforcement through reference to published scientific data. Keywords: California Bearing Ratio (CBR), Optimum Moisture Content (OMC), Maximum Dry Density (MDD), Safe Bearing Capacity (SBC).


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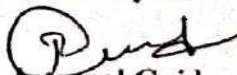
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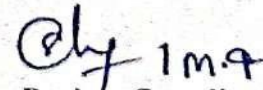
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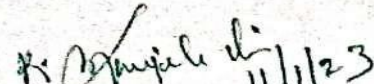
**“EXPERIMENTAL STUDY OF HIGH-DENSITY
CONCRETE ”**


In partial fulfillment of the requirement for the award of Bachelor of
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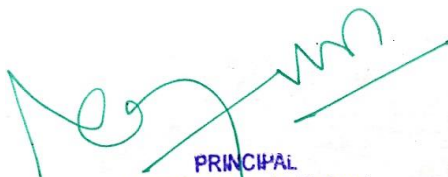

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ABSTRACT

Concrete has an extensive role to play both in construction and improvement of our civil engineering and infrastructure. It's great strength, durability and versatility are properties that are utilized in the construction of roads, bridges, airport, railways, tunnels, ports and harbours and many other major infrastructure projects. To call the concrete, as high-density concrete, it must have unit weight at 100% replacement of haematite ranging from 3400 kg/m^3 to 3600 kg/m^3 . They can, however be produced with the densities up to about 5280 kg/m^3 High density concrete offers reliable, cost-efficient radiation shielding and can be used alongside other shielding materials to maximize protection in the available space. High density aggregates are the key ingredient in High density concrete.

The more common aggregates used to achieve the required densities are Hematite, Ilmenite, Magnetite and Steel aggregate. The concrete was studied using Hematite (iron ore) having a density varies from $3400\text{-}3600 \text{ Kg/m}^3$. Several properties of concretes with design mix of M60 grade were also studied that include the compression, The high density concrete was also compared with normal weight concrete of the same strength grade with respect to the above parameters. Based on the experimental investigations carried on the conventional concrete, high density Concrete has more Compressive strength, Split tensile strength, values are found out.


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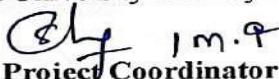
Have satisfactorily completed the mini project work entitled


“STUDY ON STRENGTH AND DURABILTY OF HIGH-
PERFORMANCE CONCRETE BASED ON FLY ASH AND MICRO
SILICA”

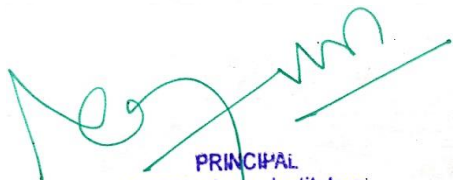
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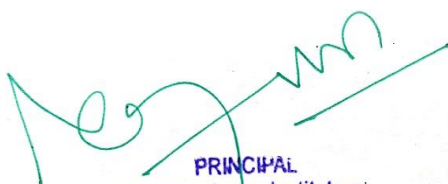

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ABSTRACT

This project work presents the strength characteristics of micro silica concrete. The micro silica concrete is an innovative and eco-friendly construction material and an alternative to Portland cement concrete. Use of micro silica concrete reduces the demand of Portland cement which is responsible for high CO₂ emission. Concrete is the most versatile used material which requires the large quantity of Portland cement. But the production of Portland Pozzolana cement (PPC) generates large amount of carbon-di-oxide which is polluting the atmosphere. Hence it is inevitable to find an alternative material Micro silica concrete is an innovative construction material which shall be produced by the chemical action of inorganic molecules. This depends upon thermally activated natural materials like fly ash, micro silica. Fly ash is a by-product of coal obtained from thermal power plants. This is rich in silica. Micro silica is the by-product of the silicon and ferro silicon alloy production. The river is the most popular choice for the fine aggregate component of concrete.

The present work involves to investigate the mechanical properties of concrete like compressive strength of micro silica concrete. Comparing with the test results of M₄₀ grade to reduce the usage of cement. On replacement of cement with fly ash and micro silica at 10%, 20% by weight of cement. conventional curing is adopted.


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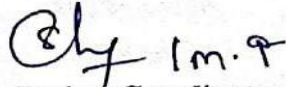
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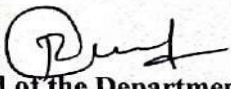
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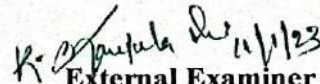
“EXPERIMENTAL INVESTING OF COMPARISION OF THE
MECHANICAL PROPERTIES OF THE NATURAL AGGREGATE
CONCRETE AND RECYCLED AGGREGATE CONCRETE”

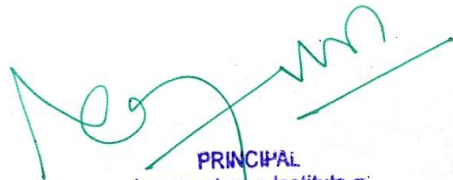
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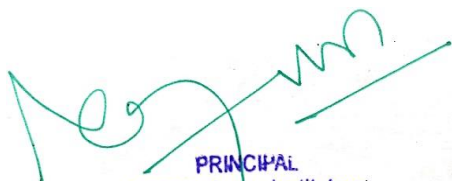

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ABSTRACT

Increase in demand and decrease in supply of aggregates for the production of concrete, result in the need to identify new sources of aggregates. Construction materials are increasingly judged by their ecological characteristics. Recycling of concrete gains importance because it protects natural resources and eliminates the need for disposal by using the readily available concrete as an aggregate source for new concrete. Several investigations made to study the effects of recycled aggregate on the engineering properties of concrete. As a part of the research in the present work, the natural coarse aggregate is replaced with recycled concrete aggregate completely to compare the behavior of the engineering properties of Natural aggregate concrete and recycled aggregate concrete at 28 days of curing.

Keywords: recycled concrete aggregate, water absorption, residual mortar, aggregate properties, concrete material properties, structural performance.



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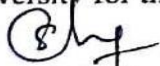
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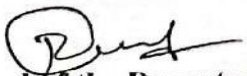
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**“EFFECTS OF RECYCLED AGGREGATE ON
ENGINEERING PROPERTIES OF CONCRETE”**

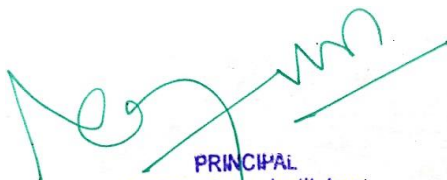
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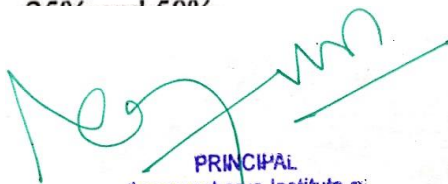

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ABSTRACT

Worldwide, cities generate about 1.3 billion Tons of solid waste per year. Building materials account for about half of all materials used and about half the solid waste generated worldwide. The waste generated in the construction, maintenance, repair and disposal phases of a building, is called Construction and Demolition (C&D) Waste. Management of C&D waste is a problem faced not only in India but by the global community and quantum of waste produced occupies a huge fraction of the total solid waste generation by mass.

The demand for construction is ever increasing due to the rapid infrastructure developments taking place all around the globe. This has created a need of using alternative construction materials in place of the conventional ones which are expensive and scarce. Whenever any construction/ demolition activity takes place construction and demolition (C&D) waste is generated. The disposal of the construction waste is a major problem as it remains for years as a solid municipal waste and it causes severe blockage of sewerage systems, pollution of river streams, unwanted accumulation on lands, etc.

Recycling aggregates from construction waste is a possible way of saving the environment from pollution and eradicating the above mentioned problems. Many researches have shown that recycled coarse aggregates can be used as a reliable alternative to normal coarse aggregate in construction, particularly for structural application. In the present work, the behaviour of the mechanical properties of the concrete made with natural aggregate concrete and recycled aggregate concrete is compared at 28 days of curing in which the natural coarse aggregate is replaced with recycled concrete aggregate by



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“EFFECTS OF ALCCOFINE AND RECYCLED CONCRETE AGGREGATE
ON HARDEND PROPERTIES OF CONCRETE”

In partial fulfillment of the requirement for the award of Bachelor of Technology in
Civil Engineering, prescribed by Jawaharlal Nehru Technological University for the year 2019-
2023.

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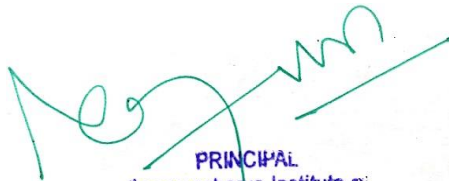
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ABSTRACT

Recycling of concrete has gained importance in the past decades in view of environmental considerations. Aggregate obtained by recycling concrete is termed recycled concrete aggregate which has inferior properties compared to natural aggregates. In view of environmental considerations, OPC is replaced with PSC which is a Blended Cement and natural river sand is replaced with manufactured sand for savings in the economy of the project.

Alccofine C 1203 is an ultra-fine GGBS that possesses supplementary cementitious properties added as a partial replacement to the cement. Based on the trial studies, the optimum replacement percentage of Alccofine is identified as 10% and natural coarse aggregate is replaced with recycled concrete aggregate by 25 % & 50 % respectively. Hardened properties of the concrete comprising Alccofine and recycled concrete aggregate are compared with the natural aggregate concrete at 28 days of curing. The alccofine -1203 has ultra-fine particles with a unique chemical composition that improves the hydration process and pozzolanic reaction. Therefore, its incorporation in concrete has resulted in good workability, reduction in heat of hydration and reduction in permeability to concrete and increased the rate of hydration process and improved the pozzolanic reaction to achieve high strength to concrete at the early curing stage . The presence of calcium (CaO) and silica (SiO₂) in alccofine -1203 improved the mechanical and durability properties of concrete better than the other SCMs .



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2019-2023

Certificate

This is to certify that

K. PRANEETH KUMAR	20T85A0119
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M. MACHENDHAR	19T81A0102

Have satisfactorily completed the minor project work entitled

**“MECHANICAL PROPERTIES ON GLASS FIBRE REINFORCED
RECYCLED CONCRETE AGGREGATE”**

In partial fulfillment of the requirement for the award of Bachelor of Technology in Civil Engineering, prescribed by Jawaharlal Nehru Technological University for the year 2019-2023.



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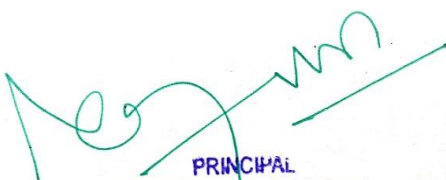
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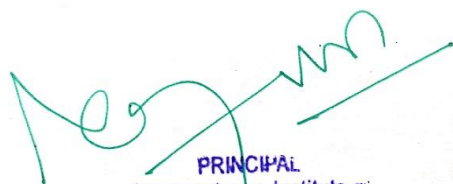

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ABSTRACT

Plain cement concrete has inferior performance in tension and a very high carbon footprint. These issues can be minimized by simultaneous incorporation of fibers and recycled aggregates in concrete. This research paper investigates the influence of glass fiber (GF) reinforcement on mechanical and durability performance of concrete made with recycled coarse aggregate (RCA).

In this study, two types of concrete mixes are produced using 100% RCA, and in each of these two mixes, 0.1%, 0.2% and 0.3% volume fractions of GF are used. Mechanical performance of concrete mixtures is evaluated based on compressive strength and flexure strength.

The use of Recycled Concrete Aggregate is gaining importance throughout the globe due to the depleting source of natural aggregate and disposal problem of demolished waste. Concrete is a versatile material with numerous applications thus by using recycled aggregate in it we can achieve economy and sustainability, but the only problem is its brittleness. Thus this brittleness in concrete can be overcome by dispersing fibers discretely in the concrete. The aim of this research work is to determine the suitability of glass fibers for use in structural recycled aggregate concrete of high strength. In this research work we have partially replaced recycled aggregate concrete (0%, 20%, 40%, 60%) with varying percentages of glass fibers (0.02%, 0.04%, 0.06%) and have compared it with the corresponding conventional aggregate concrete. Thus the mechanical properties of M20 grade concrete with various replacements levels of coarse aggregate were studied and it was found that Recycled Aggregate Concrete (RAC) had lower strength compared to Natural Aggregate Concrete (NAC) and showed an increase in strength with the addition of fiber.



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CERTIFICATE

This is to certify that the project report entitled
“CONSTRUCTION OF FLEXIBLE PAVEMENT”
being submitted by

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2. S. DRUVATEJA	19T85A0111
3. CH. KRISHNA VAMSHI	20T85A0107
4. S. VISHAL	20T85A0132

In a partial fulfillment of the requirements for the award of Degree in **CIVIL ENGINEERING**, is a record of the Bonafide work carried out by them during the academic year **2019-2023** under our guidance and supervision.

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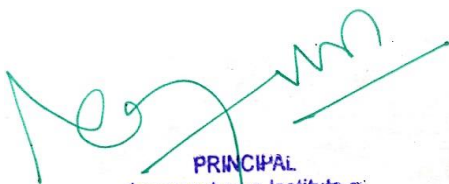
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ABSTRACT

The satisfactory performance of the pavement will result in higher savings in terms of vehicle operating costs and travel time, which has a bearing on the overall economic feasibility of the project. Flexible pavements are those, which on the entire have low or immaterial flexural quality and are somewhat flexible in their basic activity under the loads. The Flexible pavements layer reflects the distortion of the lower layer on to the surface of the layer.

Accordingly, if the lower layer of the pavements or soil sub-grade is undulated the adaptable parts: soil sub-grade, sub-base course, base course furthermore, surface course. The total work includes collection of data analysis of various flexible and rigid pavement designs and their estimation procedure are very much useful to the engineer who deals with highways and road construction techniques.



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