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RISK ANALYSIS IN CONSTRUCTION INDUSTRY USING REGRESSION ANALYSIS AND FUZZY LOGIC

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ABSTRACT

Construction projects are initiated in complex and dynamic environments resulting in environments of high uncertainty and risk, which are compounded by demanding time constraints. It is exposed to the numerous technical & business risks that often represent greater exposures than those that are traditional. Therefore risk assessment need arises. Risk assessment is a tool to classify those risks in a project and manage it accordingly with proper treatment. Risk assessment is defined in this study as a method that aims to recognize and estimate risks to personnel and property impacted upon by the project. The purpose of this thesis work is to develop a new methodology to determine risk analysis problems. The algorithm created in this thesis was developed using regression analysis and fuzzy logic. This research designed to predict the risks in construction projects by applying multiple logistic regressions. This statistical integration was intended to found the risk factors, which can occur during processes of construction. The logistic regression analyses can grade and help to point out the risk factors, which was important problems in construction. These analytical results can lead to create and development of strategies and highlighted problems, which are important issues to control, manage, and reduce the risks. Fuzzy logic was used since it is a tool capable of modeling complex and uncertain or imprecise data using simple terminology such as IF-Then statements. This logic is perfect to deal with the uncertainty risk plays in a projects development. The result of this work is the development of a new line in the area of risk analysis in construction. Yet, this approach can also be generalized and therefore have the capability of being used in the project risk evaluation in many different kinds of construction industries.

Keyword: Fuzzy logic, Construction project, risk analysis, Regression analysis

EXPERIMENTAL INVESTIGATION ON CONCRETE USING M SAND AS A PARTIAL REPLACEMENT OF RIVER SAND

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The general river sand was the cheapest asset of sand. In later a long time, the utilization of waterway sand has been expanded quickly which leads to the gigantic request within the development industry. In arrange to meet this request a number of options have come up, and one of those options is fabricated sand or M Sand. Utilization of M-Sand can radically diminish the fetched since like waterway sand, it does not contain debasements and wastages is nil since it is made with cutting edge innovation and apparatus. M-sand that's accessible is evaluated, sieved and washed. The particles are more adjusted and granular and don't have sharp edges. Utilization of M-Sand can overcome the absconds happening in concrete such as nectar combing, isolation, voids, capillary, etc. The purpose of this research is to experimentally investigate the effect of M Sand in structural concrete by fully replacing river sand to M-Sand with nano silica 1% replacement of cement and adding glass fiber admixture (0.5%, 1%,2%) total volume of the concrete. The investigations to be carried out using several test which include compressive test, tensile test and flexural test .The aim of this experiment is to maintain the economy and environmental effect.

Keyword: M-Sand, tensile test, risk analysis, M Sand

EXPERIMENTAL INVESTIGATION ON STRENGTH OF CONCRETE BY USING TITANIUM DIOXIDE SLUDGE AS A PARTIAL REPLACEMENT FOR CEMENT

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This study shows the results of a concrete containing titanium dioxide experimental investigation. The main aim of this study is to increase concrete structures' strength and durability. The favourable results are given by a small percentage of titanium dioxide (TiO₂) addition. The concrete is mixed with different percentages of titanium dioxide (0%, 0.5%, 1%, 1.5% and 2%) of powder content. According to IS 10262:2009 and IS 415:2000, the M35-grade concrete mix proportions were obtained.

In the laboratory, the concrete was developed and the characteristics of both fresh and hardened concrete were examined using appropriate testing. There have been fresh concrete tests like slump flow testing. The specimens such as cubes, cylinders and beam were casted and cured. After 28 days of curing, hardened concrete tests such as split tensile strength test, compressive strength test and flexural strength tests were experimentally done. At 1.5% replacement of titanium dioxide (TiO₂) by weight of cement, the maximum strength was achieved.

Keywords: Cement, Coarse aggregate, Fine aggregate, TiO₂

EXPERIMENTAL INVESTIGATION OF CONCRETE BY USING TYPE WASTE AS A PARTIAL REPLACEMENT OF COARSE AGGREGATE

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The work was conducted by leading tests on the crude materials to decide their properties and reasonableness for the test result analysis. Mixed proportion of concrete plans are readied utilizing IS code book technique for M30 evaluation of cement concrete. The sample specimen are casted with different rate substitutions of the coarse aggregate with shredded rubber as aggregate in the replacement by 5 %, 10%, 15% and 20%. In addition, a control concrete mix has made without adding of shredded rubber as aggregate in the grade of M30. But conducting the fresh concrete property and harden property of the concrete with control concrete and adding of differed percentage of shredded rubber as aggregate.

EXPERIMENTAL INVESTIGATION OF FIBROCEMENT DOOR PANEL

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The main objective of this investigation is to study the performance of ferrocement panels in various different casting conditions such as normal and saline casting. These casting conditions are created by using potable and saline water for casting. Fly ash which is a waste material is also used in this investigation as partial replacement of cement. The ferrocement slab panels are casted by using both normal and saline water with partial replacement of cement by fly ash and tested. The load carrying

capacity of these panels under flexure with and without fly ash at different casting conditions is investigated. The basic physical properties test for the materials has been conducted. The following percentages ferrocement panels are made by partially replacing cement by fly ash as 0%, 10% & 20% respectively. The flexural strength of control panels are compared with the flexural strength of partially replaced cement with fly ash panels at corresponding casting conditions. The addition of fly ash in different casting condition affects the flexural strength of panel with hexagonal wire fabric. In addition, the acid test was conducted to find out the acid resistance of ferrocement samples in acid circumferences. The samples for acid test are prepared in that manner such that, after the completion of 28 days normal curing period, the core portion of the ferrocement slab panels were cut out and fully immersed in acid solution for 28 days. The variation of percentage of weight loss is calculated by using each weight of the samples after 7 days, 14 days, 21 days, and 28 days respectively. The final outcome of this study is to bring out the performance of ferrocement panels against different casting conditions.

EXPERIMENTAL STUDY ON CONCRETE WITH PARTIAL REPLACEMENT OF ORDINARY COURSE AGGREGATE BY RECYCLED COURSE AGGREGATE

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Now a days increase in population increases the demand of concrete for construction purpose and Aggregates are the important constituents in concrete. Re-use of demolition waste avoids the problem of waste disposal and is also helpful in reducing the gap between demand and supply of fresh aggregates. This research deals with partial replacement of natural coarse aggregates (NCA) with recycled coarse aggregates (RCA) of age group 30 years and 35 years in different proportions like 20%, 30%, 40% . For this, M20 grade of concrete is adopted. Curing of specimens were done for 7 days and 28 days to attain the maximum strengths. Partial replacement of fine aggregate with Granite powder at 5%, 10%, 15% were done to reduce the waste percentage as well to gain more strength. After casting the specimens of RCA with Granite powder replacement, curing was done and the specimens were tested for compressive and tensile strengths. Obtained results of compressive and tensile strengths of RCA concrete mix were compared with conventional concrete. In this direction, an experimental investigation of compressive and tensile strength was undertaken to use RCA as a partial replacement in concrete. It was observed that the concrete with recycled aggregates of 30 years and 35 years age group achieved maximum compressive strength of 29.03 N/mm² , 28.96 N/mm² and tensile strength

of 11.91 N/mm² , 10.34 N/mm² were obtained at 40% replacement of RCA respectively. It is found that the compressive strength and Split tensile strength of RAC with copper slag was increased 8.20% and 2.90% when compared with the RAC.

Key words : compressive strength, granite powder, recycled coarse aggregate

EXPERIMENT INVESTIGATION ON GREEN CONCRETE USING DEMOLITION WASTE AS A REPLACEMENT OF COURSE AGGREGATE

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There is a large amount of demolished waste are generated every year in India and other developing countries. But very small amount of waste are recycled and reused. So, it have a serious problem to create environmental pollution and also required large amount of space. So, our project deals about reusing of Demolished Concrete Aggregate (DCA) & introduction of Steel Fiber (SF) from the lath wastages are replacing as coarse aggregate in concrete of different percentages 40, 50, 60 DCA& 1% of steel fiber (lathe waste) to minimize the generation of demolished building wastes. The replacement of Demolished Concrete Aggregate(DCA)& Steel fiber(lathe waste) in special concrete of 7, 14, 28 days curing & The various tests to be conducted on concrete such as compressive strength, split tensile strength and flexural strength. The tests values are computed and compared with the conventional concrete.

KEYWORDS: Demolished Concrete Aggregate (DCA), steel fiber (SF), Lathe waste, coarse aggregate.

EXPERIMENTAL AND RESEARCH ON PAPER CONCRETE

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Usual construction materials are ahead of the reach of majority of the world population due to their poor affordability. This is mainly due to the escalation of cost of building materials. Due to increasingly stringent-environmental regulations, and by considering potential long term environmental liabilities, the utilization of waste paper (news paper etc) masses by incorporating in concrete mix will be experimented. In this paper an attempt is made to utilize waste papers in concrete in proportions of 0%, 5%, 10%, 15% and 20% replacement of weight of cement and the characterization study such as cube compressive strength, splitting tensile strength, Flexural Strength, water absorption and dry density has carried out, In addition, Glass fiber reinforcement had been added to all the different percentage paper residue mix, and the compressive strength, split tensile strength and flexural strength has been analyzed. To check the feasibility to use paper concrete as a roofing element, a reinforced concrete slab of size 1200mmX1400mm had been cast and the load–deformation characteristics had been investigated for conventional and paper concrete slab of 5% replacement of paper mass and ultimate load carrying capacity has been compared. Casting has done in the laboratory and table vibrator had been used for compacting the specimens.

EXPERIMENT INVESTIGATION ON CONCRETE WITH PARTIAL REPLACED FINE AGGREGATE BY SAW DUST

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With increase in industrialization in a developing country like India cost is an important area of concern for the modern day construction. The recent study has shown us that amount of saw dust waste produced in our country is around 30000-33000 tons annually. This study focuses on the experimental investigation of using saw-dust as a partial replacement of sand in the properties of concrete mix. Saw dust also known as wood dust is a by-product or waste product of wood working operations such as sawing, milling, planing, routing, drilling and sanding. Natural sand was partially replaced with saw dust in (10%, 20%, 30% and 40%). The mixed fine aggregate was pursued through sieve size analysis along with specific gravity test. After this chemical analysis of saw dust by automated spectrometer was done. This newly formed blended fine aggregate was used in mortar and concrete to compare with natural concrete mixture. The compressive

strength, tensile strength and flexural strength up to 28 days of concrete made with natural fine aggregates were (31.56mpa, 3.29mpa, 8.56mpa) which is lower than the values of concrete using 10% of replaced sand by saw-dust (35.23mpa, 3.7mpa, 8.87mpa).

LOW COST ROOFING TILES USING AGRICULTURAL WASTE

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The scenario of living in huts in slum areas is becoming very difficult day by day due to vast change in climate. Replacing the ordinary huts and conventional poor class roofs with much efficient alternate roof cover is being the most required. On the other side, proper and efficient disposal of agricultural wastes is being the key factor in solid waste management in most of the Indian States. Having both the problems in a single line, in this project we have prepared and evaluated the performance of low cost roofing tiles using agricultural wastes as raw material. Based on the results, it is suggested that we can efficiently replace significant quantity of river sand in making roofing tiles with the corn cob powder and rice husk powder in appropriate proportions which gave compressive strength as similar as before replacement. By replacing the river sand in making roofing tiles would reduce its manufacturing cost as well as selling price and makes it more affordable. Thus preparation of such sand replaced roof tiles will significantly reflect healthy environmental and economic benefits.

INVESTIGATION OF LIGHT WEIGHT CONCRETE USING PUMICE STONE

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Concrete is the commonly used manufactured building material in the world, owing to its usefulness and relatively low cost. One of the disadvantages of conventional concrete is its high self-weight. This heavy self-weight of concrete will result in uneconomical structural material. To decrease the self-weight of concrete, the coarse aggregate is replaced partially by lightweight aggregate. This is known as lightweight concrete having low density, reduction of dead load and to increase thermal insulation. There are two types of lightweight aggregate - natural lightweight aggregate and artificial lightweight aggregate. One of the most

commonly available natural lightweight aggregate called pumice aggregate is used as a replacement for coarse aggregate. Pumice aggregate is used because of its low density than conventional coarse aggregate, and it is easily available. Lightweight concrete is prepared by partially replacing the coarse aggregate with pumice aggregate by 50%, 80% & 100%.

COMPRESSIVE BEHAVIOR OF MORTAR CUBE OF RIVER SAND AND MSAND WITH PVA FIBRE

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Concrete is still now the most popular material in construction and one of the most environmentally harmful materials. Fly ash is an alternative material which can act as a replacing material of ordinary Portland cement. Fly ash used in various proportions (5%,10%,15%), which is cheap and will reduce environmental pollution to a large extent. Fly ash is one of major waste materials available from thermal power plants. To overcome this tribulation, M-sand is used as a replacement of River sand. The current study assesses the mechanical property of fiber reinforced concrete polyvinyl alcohol with various proportion (0.5%,1%,1.5%). An approach introduced to improve the post peak behaviour and ductile performance of concrete is using as intrinsic reinforcement. In this experimental work has an analysis the strength and durability properties of Fly ash and M-sand based fiber reinforced concrete by using polyvinyl alcohol fiber. Key Words: M-sand, Fly ash, polyvinyl alcohol fiber

ANALYSIS FOR SEISMIC RETROFITTING OF BUILDINGS

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The strengthening and enhancement of the performance of deficient structural elements or the structure as a whole is referred to as retrofitting. Retrofitting aims at structural strengthening of a building after or before an earthquake to a predefined performance. The seismic performance of a retrofitted building

is superior to that of the original building. Complete reconstruction would be a costly affair. The entire redevelopment of building would cost much higher than the retrofitting cost. In the present thesis, a residential four storey building is being converted to commercial building which results in increase of live load in existing building. Hence, the building should be retrofitted with suitable technique to increase its service life. The existing building is modelled in ETABS 2016 software, and analysis is carried out with additional live loads on slab under linear static analysis method. R.C retrofitting technique enhances the axial load and moment carrying capacity in beams and column, and was concluded that the RC jacketing method is effective in strengthening RC frames in the building. **KEYWORDS:** DCR value, Seismic Retrofitting, Linear static analysis

CAUSES PREVENTION AND REPAIR OF CRACKS IN BUILDING

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Cracking is the most tough and confusing trouble for the engineers today. Many designers are seeking to take away the problems of cracking, however cracking is unavoidable reaction of any structure. Since cracks are the most commonplace kind of problem in homes, It is very necessary to understand the causes and remedial measures required to be undertaken for preventing cracks, As cracks in various types of building structures cannot be removed absolutely but may be avoided and managed by using good enough materials which complements the properties of the shape and additionally adopting required adjustments in layout standards. Due to a few faulty designs and other unavoidable factors cracks begin growing on numerous structural and nonstructural parts of the building. Hence, timely measures ought to be followed to save you and manipulate cracks and its formation. Not all of the cracks evolved are dangerous but there are some form of cracks which can be severely structurally unsafe.

CORROSION MECHANISM, PREVENTION & REPAIR MEASURES OF RCC STRUCTURE

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The concrete is a very durable construction material and his use is based on the principle that concrete is an ideal environment for steel if properly proportioned and placed. In general, reinforced

concrete has proved to be successful in terms of both structural performance and durability. However, there are instances of premature failure of reinforced concrete components due to corrosion of the reinforcement. Experience has shown that there are certain portions of exposed concrete structures more vulnerable than others. Methodology for concrete repair it addresses to suggestions of the types of repair methods and materials and a detailed description of the uses, limitations, materials, and procedures for Repair of Concrete. At same the time the methodology presents recommendation on materials, methods of mixing, application, curing and precautions to be exercised during placement. This work presents guidelines for managing reinforced concrete components and specifies the repair strategy with inhibitors incorporating. Key words: reinforced concrete, steel corrosion, inhibitor, methodology

INVESTIGATION ON THE CAUSES OF PAVEMENT FAILURE

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Pavement failure is defined in terms of decreasing serviceability caused by the development of cracks and ruts. Before going into the maintenance strategies, we must look into the causes of failure of bituminous pavements. Failures of bituminous pavements are caused due to many reasons or combination of reasons. Application of correction in the existing surface will enhance the life of maintenance works as well as that of strengthening layer. It has been seen that only 3 parameters i.e., unevenness index, pavement cracking and rutting are considered while other distresses have been omitted while going for ma. The report describes lessons learnt from pavement failures and problems experienced during the last few years on a number of projects in India. Based on the past experience's various pavement preservation techniques and measures are also discussed which will be helpful in increasing the serviceable life of pavement. The results revealed that the roads investigated experienced severe failures in the forms of cracks, potholes and rutting in the wheel path. The causes of those failures were found mainly linked to poor drainage, traffic overloading, expansive subgrade soils and the use of low-quality materials in construction.

THE COMPARATIVE ANALYSIS OF THE STRENGTH OF CONCRETE MADE FROM VARIOUS AGGREGATE

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The cost of river sand is much due to excessive cost of transportation from its natural sources. Also huge amount of depletion of these sources leads to environmental problems. Also environmental transportation and other constraints make the availability and use of river sand less attractive, hence it is very necessary now to find substitutes or replacements for river sand. The result for the sieve analysis carried out showed that the aggregates fell within the upper and lower limits of grading requirement. The specific gravity of river sand used was 2.6, while that of grit was determined and the results obtained from two outcomes were 2.23 and 2.45, and the average found was 2.34. The bulk density of river sand was found to be 1550kg/m³ and that of grit was 1650kg/m³. The slump obtained from specimens with different W/C of 0.35, 0.45 and 0.60 ranged from 51 – 86mm. The concrete produced from 100% grit as fine aggregate with a water-cement ratio of 0.45, produced a maximum compressive strength of 29.56 N/mm² at the highest curing age in days, while sand alone as fine aggregate in one of the concrete mix, produced the least compressive strength of 17.33 N/mm². Hence, the use of grit in construction is considered more economical since it offers optimum utilization and it is commonly available at different quarry sites

EFFECTS OF AGGREGATE SIZES ON THE CONCRETE STRENGTH

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Aggregate grading is an important element in concrete mixing and the resultant compression strength. An experiment was conducted to determine the effect of aggregate size on the compressive strength of concrete. The experiment had three treatments, which were the aggregate sizes (9.5 mm, 13.2 mm and 19.0 mm) and the control. A constant mix of 1:2:4 with a water/cement ratio of 0.5 was used throughout the experiment. Tests that were conducted included the slump and compressive strength tests. Fresh concrete batches were formulated from each of the coarse aggregate sizes and the slump test was conducted to test for workability. Three cubes (150 mm × 150 mm) were cast from each batch and the compressive strength

was determined using a concrete load testing machine (Pro-Ikon cube press) after 7 days curing. The results reflected that workability (slump) increased with increasing aggregate size. The concrete made from the 9.5 mm, 13.2 mm and 19.0 mm aggregate sizes had workability (slumps) of 10 mm, 13.5 mm and 20 mm, respectively. The mean compressive strength for the 9.5 mm, 13.2 mm, and 19 mm were 15.34 N/mm², 18.61 N/mm² and 19.48 N/mm², respectively

COST EVALUATION OF ROAD TRAFFIC ACCIDENT USING HUMAN CAPITAL APPROACH

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Traffic accident takes the lion's share of the risk having highest number of vehicular accidents with corresponding fatalities and injuries which has a great impact on cost and the socio-economic development of the society. It is therefore necessary to gauge the monetary value of these losses in order to highlight the extent of damage incurred to society as a whole. This research is focused on using Gross-Output Model or Human Capital Approach to compute the cost of traffic accident on Abuja-Lokoja road. The aim of this research is to formulate a model that can be used for estimating the total cost of road accidents at all levels of severity. The extent of injury levels, property damaged and general cost resulting from an accident using secondary data were obtained from the Polices, Research and Statistics department of the Federal Road Safety Corps (FRSC) for a period of eleven years (2000-2010).

CORROSION MECHANISM, PREVENTION & REPAIR MEASURES OF RCC STRUCTURE

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In reinforced concrete structure (RCS), one of the major durability problems occur due to the corrosion of embedded steel bar. Typically, the matrix properties surrounding the steel/concrete interface influence the corrosion of steel. Corrosion of steel will not happen in the presence of chloride and carbonation unless other contributing aggressive substances enter the concrete. For instance, the carbonation process mostly affects the concrete microstructure, which is not generally harmful. Also, chloride and carbonation cannot impair the integrity of concrete. However, concrete integrity may be considered to have been impaired once chloride ingress and/or carbonation occur, as the potential for

corrosion then arises. Some acid and aggressive ions such as sulphate destroy concrete integrity and subsequently allow chloride, carbon dioxide and oxygen ingress, and the corrosion problem starts. Therefore, the aim of this paper is to describe the reinforcement corrosion mechanism in concrete and its measurement methods. Finally, this review paper may help researchers and designers to understand the corrosion mechanism in concrete and availability of their proper measurement methods. Keywords: Corrosion rate; Micro-cell corrosion; Macro-cell corrosion; Passive film; Half-cell potential; Polarization resistance

RELIABILITY ANALYSIS OF A PRESTRESSED CONCRETE BEAM

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The Reliability Analysis of a Prestressed Concrete Beam (PCB) was presented using First Order Reliability Method and Euro code 2 procedures to carry out the analysis. The results show that the safety of the PCB in bending decreased from 2.9 to 1.0 and 3.1 to 2.6 as prestress force and the depth from the extreme compressive fiber to the neutral axis of the beam increased from 20kN to 100kN and 150mm to 350mm respectively, therefore the PCB is safer at low prestress force and depth to the bottom layer of the beam.

OPTIMIZATION OF BAGASSE ASH CONTENT IN CEMENT STABILIZED LATERITIC SOIL

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Optimization of construction materials with laboratory data is a very possible way of minimizing waste of resources (materials and cost). There had been several successful attempts of optimization of construction materials. However, optimization in soil stabilization for road-work has been very rare because of its complexities. Compaction, California bearing ratio, unconfined compressive strength and durability tests were carried out on cement-stabilized soil. Constant cement contents of 2%, 4%, 6% and 8% with variations of bagasse ash from 0% to 20% at 2% intervals and all percentages used were by the weight of dry soil. The classical method was applied in this work to optimize the amount of bagasse ash content in cement-stabilized lateritic soil. Geometric models that govern the relationships of cost of bagasse ash content, cement content, optimum moisture content and strength characteristics of the stabilized-soil matrix were used to develop non-linear programming mode