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CHEMICAL EXTRACTION FOR THE DELAYED RELEASE OF ORGANIC NITROGEN FERTILISER IN THE INDUSTRIAL, CHEMICAL, OR AGRICULTURAL INDUSTRIES USING BIO OIL

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Abstract
The pyrolysis of biomass yields bio-oil, an alternative liquid fuel that may be used to create chemicals. The efficiency of bio-oil is increased by separating chemicals from it. An efficient technique to use bio-oil is to remove the chemicals from it and use those chemicals as feedstock's in a biorefinery. The compounds recovered from bio-oil can be employed in the food, chemical, and agricultural industries as phenolic resins, de-icers, flavouring additives, and organic fertilisers that release nitrogen slowly.
Keywords: Bio-oil, chemicals, feed stocks, pyrolysis

Introduction

Bio-chemical oil's makeup differs greatly from that of fuels made from crude oil. It is made up of many substances that are produced during the degradation of polyose, hemicellulose, and lignin. Depending on the kind of biomass feedstock and other operational factors, bio-chemical oil's makeup varies. Bio-oil is often made up of a combination of water and complex, oxygen-rich organic compounds, including the majority of these types, such as alcohols, organic acids, ethers, esters, aldehydes, ketones, phenols, etc. By using GC-MS analysis, the element distribution of bio-oil is often also determined. Lignocellulose-derived crude bio-oil can have a colour, be thick but free-flowing, and have a strong odour. Crude bio-oil has associate degree gas content of The water content of bio-oil ranges from fifteen to fifty World Trade Center. The high water content of bio-oil derives from water within the feedstock and dehydration reactions throughout biomass shift (Bridgwater, 2012). Heating worth is a vital indicator for fuel oils. The heating worth of bio-oil is sometimes under twenty MJ/kg, abundant under that of heating oil. The high water content and gas content ar 2 factors to blame for its low heating worth. The density of bio-oil derived from quick shift is at intervals the vary 1100-1300 kg/m3. The hydrogen concentration worth of bio-oil is sometimes within the vary 2-3 because of the presence of carboxyl acids like and carboxylic.

The sturdy acidity will corrode pipe and burner parts. Measurements of the corrosiveness of bio-oil have shown that it will induce a lucid mass loss of steel and also the breakdown of a internal-combustion engine burner (Wright et al., 2010). recent bio-oil may be a homogenized liquid containing an exact quantity of solid particles. when long-run storage, it should separate into 2 layers and serious parts is also deposited at all-time low. As mentioned on top of, the high content of gas and volatile organic compounds ar contributory to the ageing issues of bio-oil. The organic compound condensation of aldehydes and alcohols and self-aggregation of aldehydes to oligomers ar 2 of the foremost doubtless reactions to require place. Coke and inorganic parts within the bio-oil can also have a chemical action impact, thereby enhancing the ageing method (Rick & Vix, 1991).

The aerated compounds in bio-oil will cause many issues in its direct combustion, like instability, low heating worth, and high corrosiveness. though higher water content will improve the flow properties and cut back Nox emissions within the fuel combustion method, it causes more issues. It not solely decreases the heating worth of the fuel, however additionally will increase the corrosion of the combustor and might lead to flame-out. The low hydrogen ion concentration worth of bio-oil additionally aggravates corrosiveness issues, which can cause

higher storage and transportation prices. several researchers have tested the combustion of bio-oil in gas boiler systems, diesel engines, and gas turbines (Czernik & Bridgwater, 2004). recent bio-oil from totally different feedstocks will usually reach stable combustion in a very boiler system. One downside, however, is that the problem of ignition. The high water content of bio-oil not solely decreases its heating worth, however additionally consumes an outsized quantity of heat of vaporization (Bridgwater & Cottam, 1992). Thus, the direct ignition of bio-oil in a very cold chamber isn't simple, associate degreed an external energy supply is required for ignition and pre-heating of the chamber. The combustion of bio-oil in diesel engines is tougher. Its long ignition delay time, short burn length, and lower peak heat unleash have restricted its combustion properties (Vitolo & Ghetti, 1994). Experiments using bio-oil in gas turbines have proven for the most part unsuccessful. The high consistency and high ash content of bio-oil lead to severe obstruction and attrition issues within the injection system. Moreover, acid within the bio-oil is harmful to the mechanical parts of the turbine. Bio-oil may be a mixture of the many organic chemicals, like carboxylic acid, turpentine, methanol, etc. several compounds in bio-oil ar vital chemicals, like phenols utilized in the resins trade, volatile organic acids wont to manufacture de-icers, levoglucosan, hydroxyacetaldehyde, and a few agents applied within the pharmaceutical, fibre, and fertiliser industries, further as flavourer agents for food product (Radlein, 1999).

Bio-oil can not be directly applied as a top-quality fuel thanks to its inferior properties, like high water and gas contents, acidity, and low heating worth. Thus, it's necessary to upgrade bio-oil to supply a top-quality liquid fuel which will be utilized in engines (Bridgwater, 1996; Czernik & Bridgwater, 2004; Mortensen et al., 2011). seeable of its molecular structure and practical teams, and exploitation existing chemical processes for reference, like hydrodesulfurization, chemical action cracking, and fossil fuel steam reforming, many generic bio-oil upgrading technologies are developed, together with chemical process, cracking, esterification, emulsification, and steam reforming. parts with unsaturated bonds, like aldehydes, ketones, and alkenyl compounds, influence the storage stability of bio-oil, and chemical process may be wont to improve its overall saturation (Yao et al., 2008). chemical process are able to do a degree of deoxygenation of regarding eightieth, and remodel bio-oil into high-quality liquid fuel (Venderbosch et al., 2010; Wildschut et al., 2009). This method needs a high of chemical element, that will increase each the quality and value of the operation. Alcohol radical, carbonyl, and carboxyl teams were simply hydrodeoxygenated, and phenol radical and ether teams were additionally reactive, whereas furans, having a cyclic structure, were harder to convert (Furimsky, 2000). when the separation of bio-oil, the parts with alcohol radical, carbonyl, carboxyl, phenol radical, and ether teams is expeditiously hydrodeoxygenated at an occasional chemical element pressure, whereas the hydrodeoxygenation of a lot of complicated parts, like ethers and furans, is also achieved by developing special catalysts.

Catalytic cracking of bio-oil refers to the reaction whereby gas is removed within the style of CO, CO2, and H2O, within the presence of a solid acid catalyst, like water softener, yielding a hydrocarbon-rich top-quality liquid fuel. within the method of cracking, aerated compounds in bio-oil ar thought to endure initial deoxygenation to create light-weight olefins, that ar then cyclized to create aromatics or endure another reactions to supply hydrocarbons (Adjaye & Bakhshi, 1995a). Since bio-oil contains a comparatively low H/C quantitative relation, and dehydration is amid the loss of chemical element, the H/C quantitative relation of the ultimate product is mostly low, and carbon deposits with massive aromatic structures tend to be shaped, which might cause deactivation of the catalyst (Guo et al., 2009a). The cracking of crude bio-oil is often terminated in a very short time, with a coke yield of regarding two hundredth (Adjaye & Bakhshi, 1995b; Vitolo et al., 1999). Alcohols, ketones, and carboxyl acids ar expeditiously born-again into aromatic hydrocarbons, whereas aldehydes tend to condense to create carbon deposits (Gayubo et al., 2004b). Phenols additionally show low reactivity and coking happens promptly (Gayubo et al., 2004a). Besides, some thermally sensitive compounds, like pyrolitic polymer, may endure aggregation to create a precipitate, which might block the reactor and cause deactivation of the catalyst. Consequently, efforts are created to avoid this development by separating these

compounds through thermal pre-treatment (Valle et al., 2010). Therefore, to keep up the steadiness and high performance of the cracking method, it's necessary to get fractions appropriate for cracking by separation of bio-oil, to realize the partial conversion of bio-oil into organic compound fuels.

Bio-oil contains a high content of carboxyl acids, thus chemical action esterification is employed to neutralize these acids. Each solid acid and base catalysts show high activity for the conversion of carboxyl acids into the corresponding esters, and also the heating worth of the upgraded oil is thereby raised markedly (Zhang et al., 2006). Since this technique is a lot of appropriate for the transformation of carboxyl acids that represent a comparatively tiny proportion of crude bio-oil, associate degree organic compound fuel with a high heating worth is expected to be made from the esterification of a fraction enriched with carboxyl acids obtained from the separation. The emulsion fuel obtained from bio-oil and diesel is homogenized and stable, and might be burned in existing engines. Analysis on the assembly of emulsions from crude bio-oil and diesel recommended that the emulsion made was a lot of stable than crude bio-oil. Later tests of those emulsions in numerous diesel engines showed that thanks to the presence of carboxyl acids, the widget nozzle was unsound, and this corrosion was accelerated by the high-speed flow within the spray channels (Chiaramonti et al., 2003a; Chiaramonti et al., 2003b). Besides corrosion, the high water content of bio-oil can lower the heating worth of the emulsion as a fuel, and a few high mass parts like sugar oligomers and pyrolitic polymer can increase the density and cut back the volatility of the emulsion. Thus, it's useful to check the emulsification of the separated fractions that contain less water and fewer high mass parts.

Catalytic steam reforming of bio-oil is additionally a vital upgrading technology for changing it into chemical element. Analysis on the steam reforming of carboxylic acid and grain alcohol is currently relatively mature, with high conversion of reactants, chemical element yields, and stability of the catalysts (Hu , 2007). However, some aerated compounds in bio-oil show inferior reforming behavior. Phenol can not be utterly born-again even at a high steam-to-carbon quantitative relation, whereas m-cresol and aldohexose not solely show low reactivity, however also are simply coked (Constantinou et al., 2009; Hu 2009). To boost the reforming method, some additional investigations of steam reforming supported different separating ways ar required. Therefore, it's necessary to mix crude bio-oil utilization with these upgrading technologies. Taking advantage of economical bio-oil separation to realize the enrichment of compounds within the same family or the parts that ar appropriate for a similar upgrading technique may be a vital strategy for the long run utilization of top-quality bio-oil.

Separation Technologies

Solvent extraction: The solvents for extraction embody water, ester, paraffins, ethers, ketones, and alkalescent solutions. In recent years, some special solvents, like critical CO2, have additionally been used for extraction or different analysis. By choosing acceptable solvents for extraction of the specified product, sensible separation of bio-oil is achieved. Some researchers have used non-polar solvents for the first separation of bio-oil, like dissolvent and n-hexane, so proceeded to extract the solvent-insoluble fraction with water; finally, the soluble and water-insoluble fractions were additional extracted with inhalation general anesthetic and chloride, severally (Garcia-Perez et al., 2007; Oasmaa et al., 2003). Tons of organic solvents are consumed throughout the method. Considering the value of those solvents and also the problem of the recovery method, the operational prices are unacceptable that hinders its industrial enterprise.

Supercritical fluid extraction relies on {the totally different|the various} dissolving skills of critical solvents below different conditions. Critical fluid extraction at low temperatures contributes to preventing undesirable reactions of thermally sensitive parts. Researchers sometimes use CO2 because the critical solvent. In a very critical CO2 extraction, compounds of low polarity (aldehydes, ketones, phenols, etc.) are by selection extracted, whereas acids and water stay within the residue part (Cui et al., 2010).

Column chromatography: The principle of chromatography is that substances ar separated supported their totally different sorption capabilities on a stationary part. In general, extremely polar molecules aresimply adsorbable on a stationary part, whereas weak polar molecules aren't. Thus, the method of chromatography involves sorption, desorption, re-adsorption, and redesorption. Colloid is often used because the stationary part, associate degreed an eluent is chosen per the polarity of the parts. Paraffin eluents, like alkane series and pentane, ar wont to separate open-chain compounds. Aromatic compounds ar sometimes eluted with benzol or dissolvent. {some different|another} polar compounds ar obtained by extraction with methyl alcohol or other polar solvents (Ertas & Alma, 2010; Onay et al., 2006; Putun et al., 1999).

Distillation: Distillation may be a common separating technology within the industry. This technique separates the parts in turn per their totally different volatilities, and it's essential for the separation of liquid mixtures. air pressure distillation, vacuum distillation, steam distillation, and a few different forms of distillation are applied in biooil separation. Thanks to its complicated composition, the boiling of bio- thermal sensitivity of bio-oil limits the operational temperature of distillation. Seeable of the unacceptable results obtained by air pressure distillation, researchers have utilized vacuum distillation to lower the boiling points of parts, and bio-oil might thereby be separated at an occasional temperature. Characterization of the distilled organic fraction showed that it had a way higher quality than the crude bio-oil, containing very little water and fewer aerated compounds, and having the next heating worth. Steam distillation is performed by introducing steam into the distilling vessel, to heat the bio-oil and reduce its consistency, and eventually the volatile parts ar expelled by the steam. In a very study combining steam distillation with reduced pressure distillation, bio-oil was 1st steam distilled to recover fourteen.9% of a volatile fraction. The recovered fraction was then additional distilled by reduced pressure distillation to recover sixteen sub-fractions (Murwanashyaka et al., 2001). During this method, a syringol-containing fraction was separated and syringol with a purity of ninety two.3% was obtained. Thanks to its thermal sensitivity, it's tough to expeditiously separate bio-oil by typical distillation ways. Molecular distillation looks to supply a possible means that of realizing biooil separation, as a result of it's the benefits of low operational temperature, short heating time, and high separation potency.

Molecular distillation: There are forces between molecules, which might be either repulsive or engaging counting on unit spacing. Once molecules are approximate, the repulsion is dominant. Once molecules aren't terribly on the brink of one another, the forces acting between them are engaging in nature, and there ought to be no unit forces if the gap between molecules is extremely massive. Since the distances between gas molecules are massive, the unit forces are negligible, except once molecules touch one another.

The molecular mean free path is reciprocally proportional to the pressure and also the sq. of the effective molecular diameter. below sure conditions, that is, if the temperature and pressure ar fastened, the mean free path may be a perform of the effective molecular diameter. Apparently, a smaller molecule contains a shorter mean free path than a bigger molecule. Moreover, molecular mean free path can increase with increasing temperature or decreasing pressure.

Molecules can move earlier once the liquid mixture is heated. Surface molecules can overcome unit forces and escape as gas molecules after they acquire adequate energy. With associate degree raised quantity of gas molecules on top of the liquid surface, some molecules can come back to the surface. Below sure conditions, the molecular motion can reach dynamic equilibrium, that is manifested as equilibrium on a macroscopical scale. Ancient distillation technology separates parts by variations in their boiling points. However, molecular distillation (or short-path distillation) is kind of totally different and exactly depends on the varied mean free methods of various substances. The gap between the cooling and heating surfaces is a smaller amount than the mean free path for a lightweight molecule, however bigger than that for a significant molecule. Therefore, the sunshine molecules escaping from the heating surface will simply reach the cooling surface and be condensed. The equilibrium is thereby broken, and also the light-weight molecules ar ceaselessly discharged from the liquid

part. On the contrary, the serious molecules aren't discharged and come back to the liquid part. During this means, the sunshine and serious molecules ar effectively separated. Molecular distillation technology has been wide utilized in the chemical, pharmaceutical, and foodstuff industries, further as in research to concentrate and purify organic chemicals. It's a possible method for the separation of thermally unstable materials, taking into consideration that it solely takes a couple of seconds to complete the separation method. Bio-oil may be a complicated mixture of the many compounds with a good varies of boiling points. It is thermally sensitive and simply undergoes reactions like decomposition, chemical change, and natural action. In addition, most of the compounds ar gift in low concentrations. Molecular distillation isn't restricted by these unfavorable properties and is appropriate for the separation of bio-oil to facilitate analysis and quantification of its constituent compounds.

Conclusion

Bio-oil, a byproduct of biomass, has chemical constituents that make it difficult to use and reduce the efficiency of research. Sugars and synthetic resin compounds are two components of bio-oil that are essential to the industry. Due to the wide variety of differences that may arise and pose a risk of interfering with various components of bio-oil, each is challenging to study. On top, many chemical separation techniques are described. Applications for the various chemicals in the food, agricultural, and chemical sectors are completely different.

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MEDICAL DECISION SUPPORT SYSTEM WITH INTEGRATED MACHINE LEARNING FOR CLINICAL PREDICTION

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ABSTRACT
Healthcare clinical decision-making is already impacted by forecasts or suggestions given by data-driven technologies. Numerous machine learning applications, particularly for outcome prediction models, have been reported in the most recent clinical literature. These outcomes range from death and cardiac arrest to acute renal damage and arrhythmia. In this article, we provide a framework that makes it possible to make medical decisions in the face of incomplete information. Ontology-based automated reasoning serves as its fundamental building block, and machine learning techniques are combined to improve the current working models of patient datasets in order to deal with the issue of missing data. In this review article, we summarize the state-of-the-art in related works covering data processing, inference, and model evaluation, in thecontext of outcome prediction models developed using data extracted from electronic health records. In short, we demonstrate the potential for machine learning to support a task where there is a critical need from medical professionals by coping with missing or noisy patient data and enabling the use of multiple medical datasets.
KEYWORDS: Machine Learning in medicine, Feature extraction and classification, Knowledge representation and reasoning.

INTRODUCTION

Recent advances in artificial intelligence (AI) aim to have a positive influence on clinical practice and medicine [1]. With several successful applications in automated speech recognition, computer vision applications, and natural language processing, machine learning (ML), an application of AI, finds patterns in vast amounts of medical data to generate predictions about the future [2]. Applications of machine learning (ML) have found success in a number of medical fields, including disease prediction [3] using a variety of data modalities, such as speech signals and medical imaging [4], [5], and clinical outcome prediction to detect deterioration, such as cardiac arrest, mortality, or intensive care unit (ICU) admission [6]. This article's goal is to give a technological assessment of current studies on clinical outcome prediction models that highlight the many domains in which they have been used. Medical decision support systems (MDSS) map patient information to promising diagnostic and treatment paths. The value of such systems has been shown in various healthcare settings [7]. The properties of data, including representation,heterogeneity, availability andinteroperability play a critical role in ensuring the success of MDSS. A decision making process should use all relevant data from many distributed systems (instead of a single data source) to maximize its effectiveness, but real-world medical decisions are often based on incomplete information due to the challenges that appear when engaging in data synthesis if we seek to enforce these properties. Patient monitoring tools, such as early warning systems [8], are widespread across different hospital wards to continuously assess for patient deterioration. The definition of what exactly constitutes clinical deterioration has evolved over time based on the data collection and processing techniques. Early attempts to define clinical deterioration focused on medical neglect and its end result of clinical complications. Subsequent studies focused on more discrete clinical events, such as severe sepsis, unexpected cardiac arrest, ICU admission or mortality [9], and tend to select one or more end-point measures of clinical deterioration. Such events incur high costs of prolonged hospital stays, litigation, staff time, impact on patients

and staff, and broader economic consequences [10].Our system leverages the benefits of machine learning, structured knowledge representation, and logic-based inference in a novel fashion. We demonstrate on real world data that it is capable of providingrobust, intelligent decision support, despite the complexity of medical relationships and the inter dependencies inherent in medical decisions.

LITERATURE SURVEY

The framework of outcome prediction models also varies across the literature. Some studies predict the risk of an outcome only once using the patient‟s first N hoursof data after admission, such as 24 or 48 hours. Others choose to predict the risk of an outcome, such as ICU readmission, usingthe patient‟s last N hours of data prior to discharge. Another common methodology isto develop a real-time alerting score, which computes the risk of deterioration every timea set of clinical observations is collected [11], as in clinical early warning systems[12].

In order to validate our proposed framework, we created a proof of concept implementation focused around the knowledge management component and the query execution component from an existing ontological decision support system design [13]. We chose insomnia treatment as our line of inquiry, and used the following real-world datasets:

Patient records drawn from the Center for Disease Control (CDC) Behavioral Risk Factor Surveillance System (BRFSS) telephone survey. The BRFSS dataset contains a wide array of respondentinformation including age, race, sex, and geographic location, along with information about a wide range of common medical conditions like cancer, asthma, mental illness, and diabetes. Many behavioral risk factors including alcohol consumption, drug use, and sleep deprivation are also tracked. The dataset contains information on 450,000 individuals defining over 450 attributes for each individual. All of the data isnumerically coded and stored in a structured format similar to a relational database.

A prescription protocol drawn from the Mayo Clinic for use as expert decision making rules describing when to prescribe various sleep aids.

A drug interaction registry to identify drug-to-drug interactions.

Various types of data can be used to develop outcome prediction models, such as imaging, speech, or claims data [14]. Here, we focus on data extracted from electronic health records (EHR), which are beingincreasingly deployed in hospitals worldwide. EHRs are used in hospitals to store longitudinal information of patients collected in a care delivery setting. First, EHRs are complex as they may include structured and unstructured data; an exampleof the latter is textual information which could require natural language processing techniques to process [15]. Additionally, categorical data, such as diagnostic coding, may adopt different coding systems across different institutions.

MACHINE LEARNING BASED ELECTRONIC HEALTH RECORDS

Knowledge management component: To instantiate the knowledge managementcomponent of the system design, we createda simplified ontology to define the relevant key concepts and their various relationships, shown in Figure 1. We created inference rules in accordance with the Behavioral Risk Factor Surveillance system (BRFSS) codebook which defined the semantics ofdifferent values for the data attributes,to

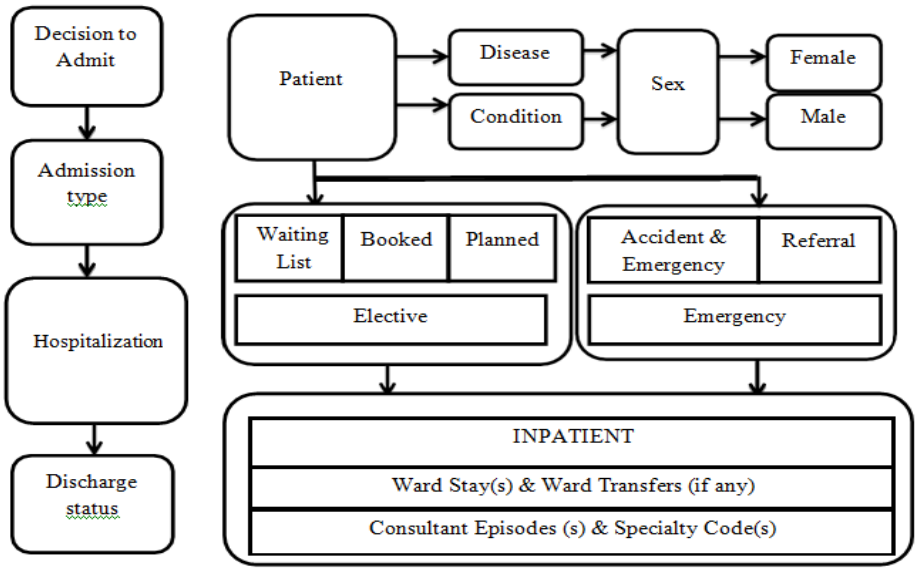

Fig.1 CHART FLOW FOR REPRESENTING THE ELECTRONIC RECORDS OF PATIENTS ADMITTED IN HOSPITAL

transform the numerically coded BRFSS data records into corresponding instances of the „Patient" concept. These rules were then applied to all records to create a semantic knowledge-store of the BRFSS dataset.

Another important dimension is data completeness, which may be defined as "the proportion of observations that are actually recorded in the system". Incompleteness of EHRs can be a result of health service fragmentation due to inefficient communication following patient transfer among institutions; the recording of data taking place only during healthcare episodes that correspond to illness, or the increased personalization of attributes per patient. Completeness may also vary across institutions based on adopted protocols.

Hand-crafted Features: Domain expertise is commonly used to provide guidance on the design of the data pre- processing pipeline. This involves

(i) Preliminary feature selection from the input space,

(ii) Designing hand-crafted features and

(iii) Incorporating prior knowledge of the structure of the data in the model design.

Data Standardization: ML algorithms require further data preparation steps to ensure stability of learning. Here, related works reduce the noise, scarcity and irregularity of the clinical data, as well as align the scales of the various predictor variables.

Time-Series Modeling: Time-series modeling is widely used in studies pertaining to early warning models. It is often used either (i) to infer a pattern of the physiological trajectory or (ii) as an interpolation technique to overcome the sparsity and irregularity of physiological data.

Query Execution Component: To instantiate our query execution component, we combined a semantic reasoner called „Euler Proof Mechanism: EulerSharp with the WEKA machine learning toolkit. The semantic reasoner provided the main mechanism for logic-based decision making in the system, while WEKA acted in a supporting role to impute missing data.

Learning-based system: In order to assess the usefulness of our hybrid system over a purely learning-based system, we Those statistical methods mainly assess the performance of the model in terms of accuracy metrics.

Performance Metrics: Model discrimination refers to the model"s ability in separating classes of interest. In the context of outcome prediction models, we will here refer to patients who experience an adverse outcome as the positive class, and those who do not as the negative class. Many ML models are trained to compute the probability of the positive class, which is then converted to a binary value by fixing a decision threshold. The predictions are then compared to the true labels and can classify into one of four categories:

(1) True Positives (TP):This modelcorrectly predicts the positive class.

(2) True Negatives (TN):Thismodelcorrectly predicts the negative class.

(3) False Positives (FP):Thismodelincorrectly predicts the positive class and

(4) False Negatives (FN):This model incorrectly predicts the negative class. Accuracy, which summarizes the proportion of correctly classified samples across all samples, is highly biased when using highlyimbalanced datasets. Therefore, other metrics are usually considered. Sensitivity, or the True Positive Rate (TPR), assesses the model‟s ability to correctly predict the positive class.

$$TPR = \frac{TP}{TP+FN} \qquad (1)$$

Began by evaluating the performance of four different machine learning algorithms

(decision stump, C4.5-R8, Bagging and AdaBoost) using the BRFSS dataset as follows. We generated 50 different

$$TNR = \frac{TN}{TN+FP} \qquad (2)$$

Specificity, also known as the True Negative Rate (TNR), assesses the model‟s ability to correctly predict the negative class. 2,500 exemplars and 5,000 exemplars, and used an information gain-based feature selection algorithm to reduce each set to its 30 most informative attributes.

RESULTS

The performance of supervised outcome prediction models on the testing set is evaluated using various statistical methods.The receiving operator characteristic (ROC) curve plots the TPR on the vertical axis and (1-TNR), also known as the False Positive Rate (FPR), on the horizontal axis. The integral under the curve is the Area underthe Receiving Operator Characteristic Curve(AUROC). The AUROC assesses themodel‟s overall diagnostic ability as the decision threshold is varied. Precision, also known as the Positive Predictive Value (PPV), assesses the proportion of correctly predicted positive class across all of the true positive class. analysis. The progress of the field relies on increased multidisciplinary collaborationsbetween ML research scientists and clinicians.

While it will take time for both parties to speak the same language, we hopethat this review would demystify the overall The Precision-Recall curve, where recall is essentially sensitivity, plots the TPR on the horizontal axis and the Precision on the vertical axis and integrates the area under the curve. The integral under the curve is theArea under Precision-Recall Curve(AUPRC).

The following graph represents the accuracyand F1 score of the proposed machine learning based EHR system was developed which gives efficient and accurate resultswhen compared with other methods. The efficiency of the proposed method is represented with the help of followingdiagram which is shown in Fig.2 below

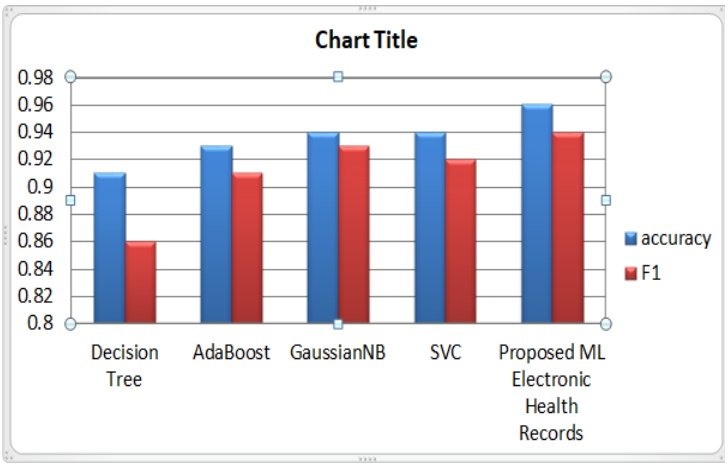

Fig.2: COMPARISON GRAPH ON PROPOSEDML BASED EHR SYSTEM FOR STORING MEDICAL DATA

CONCLUSION

The prediction of clinical outcomes is essential to detect deterioration in a timely manner and to reduce the burden of clinical staff. The development of the ML pipelines and their subsequent performance can alsobe improved by accounting for a few considerations.While recently developed ML models perform well within retrospective studies, validating their success in practice requires prospective ML pipeline and summarize the assumptionsand techniques of the state-of-the-art.

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A STUDY ON THE DESIGN AND IMPLEMENTATION OF COMMERCIAL BUILDINGS USING E-TABS

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ABSTRACT
Structural analysis is a discipline of engineering that focuses on figuring out how structures behave in order to forecast how various structural components will react to loads. Every structure will be susceptible to one or more of the groups of loads, which typically include dead load, live load, wind load (under IS875-1987), and earthquake load (IS1893-2016). Software called ETABS (Extended Three Dimensional Analysis of Building System) integrates all of the main analysis engines, including static, dynamic, linear, and non-linear. This computer software is used to evaluate and design buildings as well as to calculate forces, bending moments, stress, strain, and deformation or deflection for a complicated structural system. Our project "Structural study on commercial Building Designing and Implementation Using E-tabs" is an attempt to analyze and design a commercial building using ETABS. A G+5storey building is considered for this study. The Analysis is carried out by static method and design is done as per IS 456:2000 guidelines. Also, an attempt has been made to design the structural elements manually. Drawing is done using AUTOCAD. The primary objective of this project is to gain sufficient knowledge in planning, analysis and design of the building. Our project deals with the Analysis and design of a commercial building by TABS(2016). It is a reinforced concrete framed structure consisting of G+5.IS 456:2000 codes are the basic code for general construction in concrete structures, hence all the structural members are designed using limit state method in accordance with the IS 456:2000 code and design aids. The commercial building has proper ventilation; it is provided with sufficient Exits are also provided.

INTRODUCTION

In civil engineering, a structure with several parts, such as a foundation, walls, columns, floors, roofs, doors, windows, ventilators, stair lifts, various types of surface coatings, etc., is referred to as a "building." A structure is created using structural analysis and design such that it can withstand all applied loads without failing for the duration of its planned life. RISA, STAADPRO, ETABS, STRUD, MIDAS, SAP, and RAM, among others, are some of the software programmers that are now on the market for evaluating and designing almost all sorts of structures. In general, the primary goal of our project is to become familiar with the many design elements, such as planning, analysis, and design. We have planned to design a Hostel Building structure consisting of G+5 Floors.

1) The elements of the building should be strong and capable to withstand the likely adversely effects of natural agency
2) Strength, stability, convenience, and comfort of the occupants should be the first consideration in planning.
3) Elevation should be simple but attractive. The number of doors and windows provided should be less for a commercial building.

LIVE LOAD ON SLABS	
ASSIGNED ON	KN/m²
LIVING ROOM	2
KITCHEN	6
CORRIDOR	3
DINING	5
TOILETS	2
STAIRCASE	3

1.1.1Practical considerations: Besides all the fundamentals of planning discussed, The following practical points should be additionally considered:

2. LOADS

2.1. DEAD LOAD: (IS 875:1987) PART-1

The dead load comprises of the weight of the walls, partition floors finishes, false ceiling, false floors and the other permanent constructions in the building. The dead loads may be calculated from the dimensions of various members and their unit weight

2.2. IMPOSED LOADS: (IS 875:1987) PART-2

The Imposed load is produced by the intended use or occupancy of a building including the weight of movable partitions, distribution and concentrated load..

2.3. WIND LOAD: (IS 875:2015) PART-3

Wind is air in motion relative to the surface of the earth. The primary cause of wind is traced to the earth's rotation and differences in terrestrial radiation

2.4 SEISMIC LOAD :(IS1893:2002)PART1

3 Load Calculations

3.1. Assigning of Dead loads

BEAM-300X450MM

Total load =(length*breadth*height)*unit weight

Total load/length = 0.3x0.45x25

=3.375 kn/m

SLAB-200MM THICK

Total load = unit weight*area*thickness

Total load/area = 0.2x25

= 5kN/sq.m

Walls

Outer wall-0.23m

Total load =(length*breadth*height)*unit weight of brick

Total load/length = (0.23x2.1)x20

=9.66kN/sq.m

Inner wall – 0.115m

Total load =(length*breadth*height)*unit weight of brick

Total load/length = (0.115x2.1)x20

=4.83kN/sq.m

3.2. Assigning of Live loads

Live loads are assigned for the entire structure as per IS 875-1987 (PART 2)

4 Model Analysis

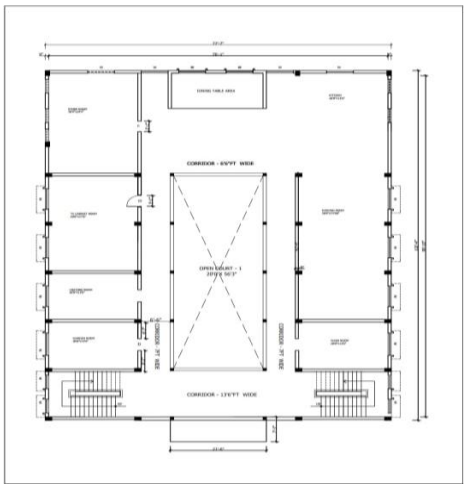


Fig 1: typical ground plan

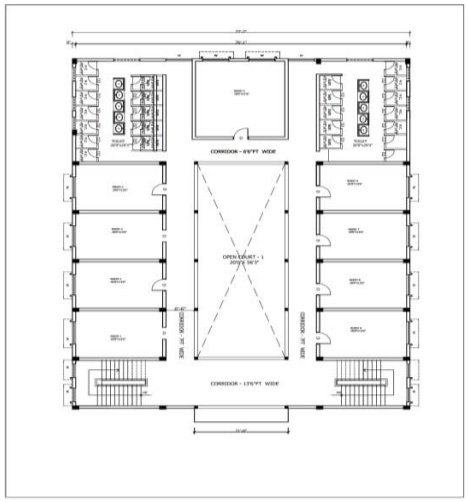


Fig 2 : Typical Floor Plan(First Floor To Fifth Floor)

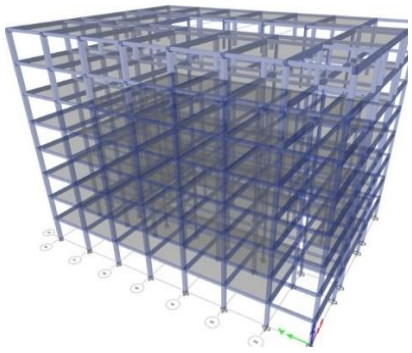


Fig 3: 3-D VIEW MODEL

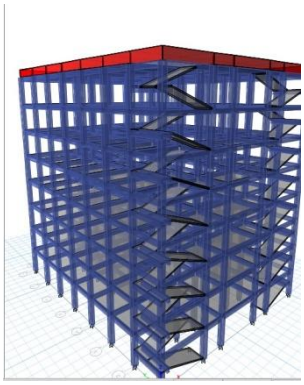


Fig.4 : 3-D View Along With section properties

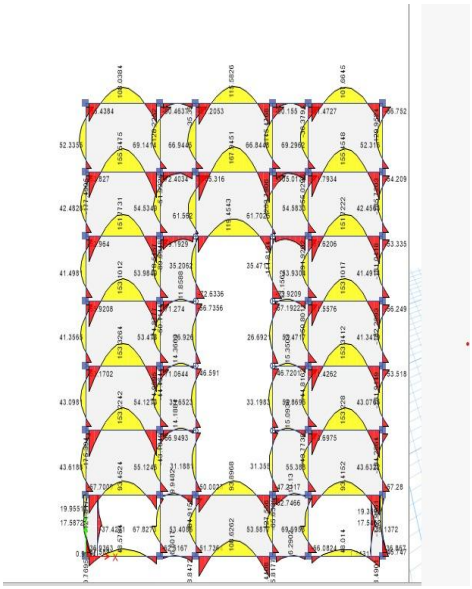
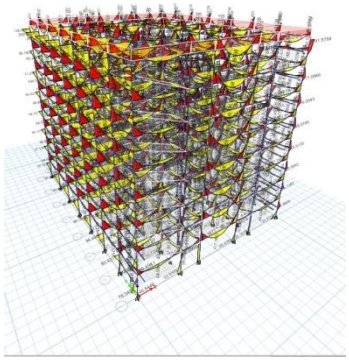


FIG.5 : Moment Diagrams For Frames(Single Floor)



5.0 Design

5.1. Defining Section Property

After Defining Material property, we define section size by selecting frame sections as shown below & added the required section for beams, columns, Slabs etc.

SECTION PROPERTIES:

COLUMN DIMENSIONS:

C1- 500X550 MM

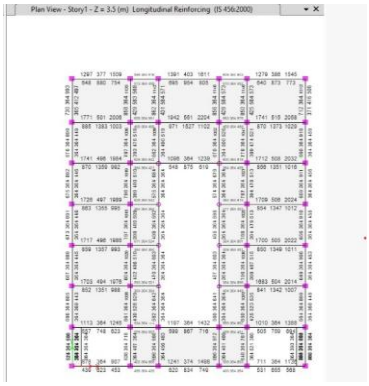
C2 400mm

BEAM DIMENSIONS:

B1-300X450MM

SLAB DIMENSIONS:

TWO WAY SLAB-200 MM Thick



RESULT:

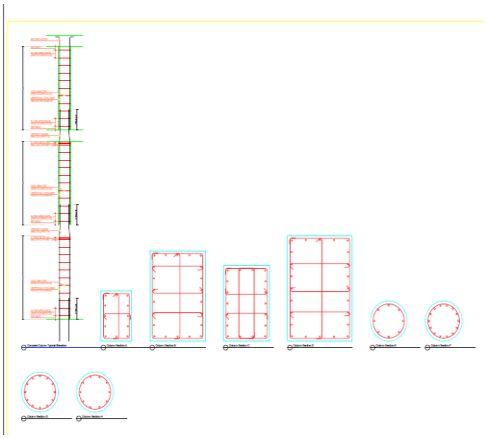


Fig:column sections

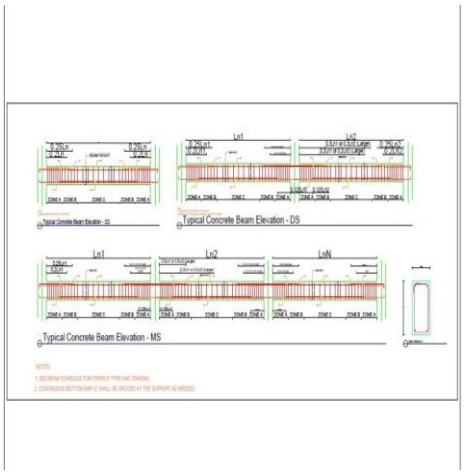
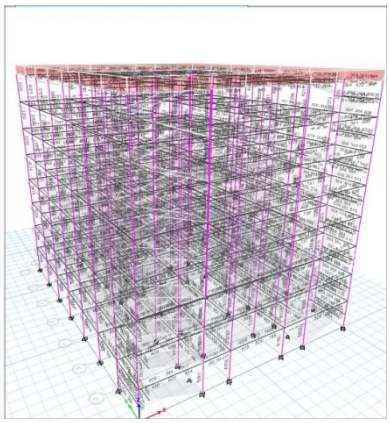


Fig:Beam section



CONCLUSION

The structure's design is based on the idea of LIMIT STATE METHOD and the ETABS, which together offer sufficient strength, serviceability, and durability in addition to being cost-effective.

In the planning and design of the G+5GIRLS HOSTEL BUILDING, the project preparation has given us a fantastic opportunity to establish ourselves. If any beam or column fails, its measurements should be adjusted, and reinforcement detailing can be created.

The ETABS Software reduces work time and aids in precise structural design.

The G+5 Hostel Building Plan was created using the AutoCAD programme, and it includes designs for the stairs, slabs, footings, beams, and columns. Using IS 875-1987 Part I and Part II, the Dead load and Live load are evaluated.

According to IS 456.2000, the Loads are designed, and SP-16 by considering the concrete grade of M25 and Fe415 steel are used.

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ASSESSMENT OF THE USE OF AUTOCAD AND STADA PRO SOFTWARE IN THE PLANNING AND DESIGNING OF AN AUDITORIUM BUILDING

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ABSTRACT
This study focuses on the design, analysis, and layout of a potential college auditorium that could be built in The auditorium can be utilized for any type of formal assembly, including lectures, seminars, banquets, award presentations, and cultural events including musical productions and concerts featuring singing and dance. With 600 seats, the facility is designed as a multipurpose auditorium. The limit state notion is the main foundation of the project design. The building must be built to withstand any forces that could exert pressure on it. It must also meet the serviceability criteria, which include cracking and deflection restrictions. Designing structural components such steel trusses, beams, columns, and pedestals is part of the overall project. Design is primarily based on steel IS code 800: 2007,IS code 456:2000 for concrete references.
The main concept of design of auditorium building is vision and acoustical propose. The dimensions of auditorium building are 30*25sq.mtswithout include of compound wall and balcony arena. Required area is calculated as per IS 2526:1963 (Code of practice for acoustical design of auditorium and conference hall)and height of building excluding truss is6 meters. This project includes planning, analyzing and designing structural elements based on the loads (dead load, live load and wind load) imposing on them. The shape of the auditorium building is rectangular. The design pattern of seating is linear and staggered arrangement. The drafting of auditorium plan was done by using AUTOCAD software. Analyzing and designing was done by using STAAD Pro software.
Keywords- footing, column, Auditorium, Dead load, design, STAAD Pro, AUTOCAD

1. INTRODUCTION

The auditorium is a significant and crucial area. It is utilized for formal assembly lectures of every kind, award presentations, musicals, dance contests, and more. It is crucial that everyone in the room can hear and see everything that is presented in a clear and enjoyable manner for all events. This essay examines college auditorium planning, design, and analysis. The auditorium building plan was created using AUTOCAD software. The region and additional details are obtained from IS2526-1963 (code of practice for acoustical design of auditorium and conference hall). For the design of various members, we are employing the limit state method using IS 456-2000 (concrete) and IS 800-2007 (steel). STAAD Pro software will be used to analyze the structure. A steel building design frame work is taken up. The building subjected to both vertical loads as well as horizontal loads. The vertical loads consists of dead load of structural components such as steel columns, beams, truss etc.., and live load. The horizontal load consists of wind forces, thus building is design for dead load and live load as per IS 875 part 1, 2&3.

2. SPECIFICATION

The design is made using software on structural analysis and design (STAAD Pro). The building is subjected to both vertical loads as well as horizontal loads. The vertical load consists of dead load of structural components such as beam, columns etc and live loads. The building is designed for the maximum and minimum bending

moments and shear forces as per IS 456-2000.The help is taken from software available in institute and computations of loads, moments and shear forces is obtained from this software.

- Utility of building : Auditorium
- shape of building : rectangular
- Type of construction : STEEL framed structure
- steel sections used :i sections for columns, roll steel tubes and t & c , sections for roof truss
- roof of building : steel truss
- All steel grades : Fe415 grade
- Concrete grade : M30
- Plan area : 750 SQ.M
- seating capacity : 600 persons
- seating pattern : linear pattern
- seating arrangement : staggered arrangement
- Height of building : 9m

3. PLAN OF AUDITORIUM

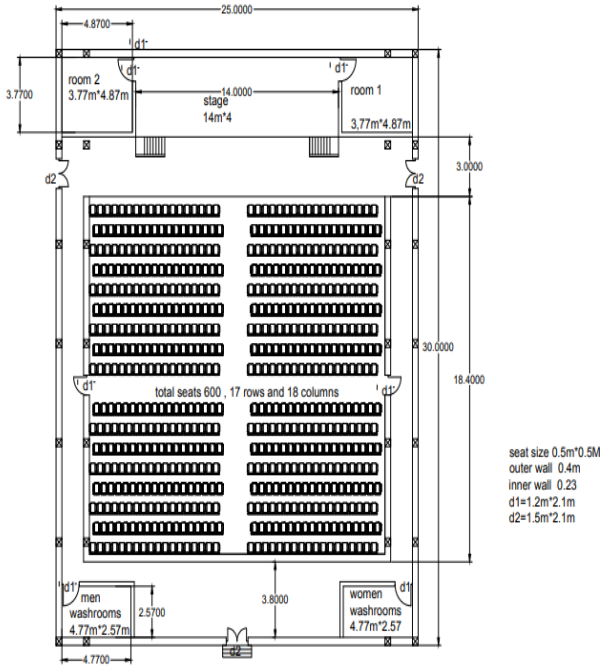

Fig 1: Autocad Plan

4. TYPES OF LOADS

The various loads considered for analysis were:-

4.1 Dead loads

These are the self-weights of the structure to be designed. The dimensions of the cross section are to be assumed initially which enable to estimate the dead load from the known unit weights of the structure. The values of the unit weights of the materials are specified in IS875:1987(Part-I).

4.2 Live loads

They are also known as imposed loads and consist of all loads other than the dead loads of the structure. The values of the imposed loads depend on the functional requirement of the structure. Commercial buildings will have comparatively higher values of the imposed loads than those of the residential buildings. The standard values are stipulated in IS 875:1987(Part-II).

4.3 Wind load

Wind is air in motion relative to the surface of the earth. The primary cause of wind is traced to earth's rotation and differences in terrestrial radiation. The radiation effects are mainly responsible for convection current either upwards or downwards. The wind generally blows horizontal to the ground at high speeds. Since vertical components of atmospheric motion are relatively small, the term 'wind' denotes almost exclusively the horizontal wind while 'vertical winds' are always identified as such. The wind speeds are assessed with the aid of anemometers or anemographs, which are installed at meteorological observatories at heights generally varying from 10 to 30 meters above ground.

- Local Topography
- Terrain co-efficient

5 LOAD COMBINATIONS

The concept of characteristic loads has been accepted to ensure at least 95 percent of the cases, the characteristic loads considered will be higher than the actual loads on the structure. The characteristic loads are to be calculated on the basis of average/mean load of some logical combinations of all loads mentioned below.

Table -1: Load factor as per IS 456-2000

LIVE LOAD	DEAD LOAD
1.5	1.5
1.2	1.2
0.9	0.9

- In structural design, we often encountered different load combinations in structural codes. A load combination results when more than one load type acts on the structure.
- The concept of characteristic loads has been accepted to ensure at least 95 percent of the cases, the characteristic loads considered will be higher than the actual loads on the structure.
- The characteristic loads are to be calculated on the basis of average/mean load of some logical combinations of all loads mentioned below.

Load combinations

1. (DL+ LL)*1.7
2. 1.7*DL
3. (DL+LL)*1.3
4. (DL+WL)*1.7
5. (DL-WL)*1.7
6. (DL+LL+WL)*1.3
7. (DL+LL-WL)*1.3

6 MODELLING

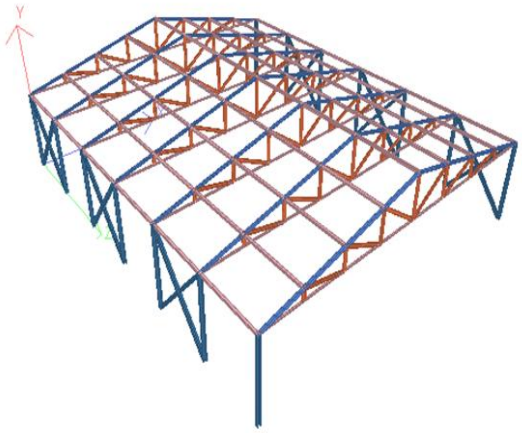

Fig 2: 3D View of the model

7 Results

The dimension of the auditorium building is 750 SQ.m. Auditorium has been designed for the accommodation of 600 persons, these sections are considered in designing

1. ISHB 300 – For column and bracings
2. TUB1001004 – For battens
3. TUB90903.7 – For webs and struts
4. TUB72723.2 – For bottom chord
5. TUB172925.4 – For upper chord

			Horizontal	Vertical	Horizontal	Resultant	Rotational		
	Node	L/C	X mm	Y mm	Z mm	mm	rX rad	rY rad	rZ rad
Max X	4	9 GENERATE	**7.081**	-0.226	0.398	7.096	-0.001	0.000	0.000
Min X	110	9 GENERATE	**-7.087**	-0.226	-0.398	7.102	0.001	0.000	-0.000
Max Y	28	3 WIND LOA	0.600	**5.065**	-8.860	10.224	0.004	-0.001	-0.000
Min Y	28	4 GENERATE	1.147	**-31.416**	0.477	31.440	-0.000	0.000	0.001
Max Z	113	8 GENERATE	3.748	-11.508	**178.970**	179.378	-0.077	-0.000	0.000
Min Z	5	8 GENERATE	-3.739	-11.508	**-178.970**	179.378	0.077	0.000	-0.000
Max rX	5	8 GENERATE	-3.739	-11.508	-178.970	179.378	**0.077**	0.000	-0.000
Min rX	113	8 GENERATE	3.748	-11.508	178.970	179.378	**-0.077**	-0.000	0.000
Max rY	9	8 GENERATE	-4.213	-11.463	-144.333	144.848	0.069	**0.021**	-0.000
Min rY	117	8 GENERATE	3.273	-11.540	144.168	144.666	-0.069	**-0.021**	-0.000
Max rZ	108	4 GENERATE	0.553	-21.943	-0.004	21.950	0.000	-0.000	**0.005**
Min rZ	31	4 GENERATE	-0.553	-21.943	0.004	21.950	-0.000	-0.000	**-0.005**
Max Rs	113	8 GENERATE	3.748	-11.508	178.970	**179.378**	-0.077	-0.000	0.000

Fig 3: Node Displacement

	Beam	L/C	Node	Fx kN	Fy kN	Fz kN	Mx kNm	My kNm	Mz kNm
Max Fx	32	4 GENERATE	92	**139.254**	4.581	0.252	-0.002	-0.607	7.575
Min Fx	48	4 GENERATE	25	**-136.319**	-0.074	-0.005	-0.008	0.016	-0.735
Max Fy	239	4 GENERATE	36	1.502	**5.355**	0.053	0.000	-0.045	2.406
Min Fy	39	4 GENERATE	103	1.502	**-5.355**	-0.053	0.000	0.045	-2.406
Max Fz	210	7 GENERATE	125	-3.045	-0.911	**3.960**	-0.011	-4.135	-0.756
Min Fz	204	7 GENERATE	17	-2.743	-0.904	**-3.951**	0.011	4.140	-0.751
Max Mx	251	8 GENERATE	12	-51.659	-0.222	0.093	**1.856**	-1.479	-0.600
Min Mx	257	8 GENERATE	120	-48.704	-0.506	-0.111	**-1.897**	1.485	-0.874
Max My	163	8 GENERATE	6	24.845	0.830	-2.502	-0.083	**6.444**	0.522
Min My	135	8 GENERATE	114	24.845	-0.830	-2.499	-0.083	**-6.444**	0.522
Max Mz	265	4 GENERATE	4	40.392	3.046	-0.103	0.000	0.402	**10.179**
Min Mz	13	4 GENERATE	110	40.392	-3.046	0.103	0.000	-0.402	**-10.179**

Fig 4: BEAM END FORCE

			Horizontal	Vertical	Horizontal	Moment		
	Node	L/C	Fx kN	Fy kN	Fz kN	Mx kNm	My kNm	Mz kNm
Max Fx	37	8 GENERATE	**29.581**	28.807	4.050	-2.533	0.504	-6.015
Min Fx	93	8 GENERATE	**-30.279**	17.334	-6.191	-3.526	-0.490	8.346
Max Fy	21	10 GENERAT	-23.980	**61.932**	13.191	-1.896	-0.609	7.878
Min Fy	21	3 WIND LOA	16.481	**-14.373**	-3.029	-0.046	0.025	-0.763
Max Fz	1	8 GENERATE	21.697	44.161	**51.215**	-2.230	0.725	-6.832
Min Fz	111	8 GENERATE	-16.474	44.153	**-51.215**	2.230	0.724	6.837
Max Mx	19	8 GENERATE	25.056	17.325	6.192	**3.525**	-0.489	-8.349
Min Mx	93	8 GENERATE	-30.279	17.334	-6.191	**-3.526**	-0.490	8.346
Max My	1	10 GENERAT	17.735	50.809	43.158	-1.735	**0.822**	-8.300
Min My	21	4 GENERATE	-3.340	56.553	12.100	-2.557	**-0.755**	9.004
Max Mz	93	10 GENERAT	-24.307	27.419	-1.942	-2.745	-0.639	**9.498**
Min Mz	19	10 GENERAT	20.313	27.412	1.943	2.745	-0.638	**-9.500**

Fig 5: Static Check

			Horizontal	Vertical	Horizontal	Moment		
	Node	L/C	Fx kN	Fy kN	Fz kN	Mx kNm	My kNm	Mz kNm
Max Fx	37	8 GENERATE	**29.581**	28.807	4.050	-2.533	0.504	-6.015
Min Fx	93	8 GENERATE	**-30.279**	17.334	-6.191	-3.526	-0.490	8.346
Max Fy	21	10 GENERAT	-23.980	**61.932**	13.191	-1.896	-0.609	7.878
Min Fy	21	3 WIND LOA	16.481	**-14.373**	-3.029	-0.046	0.025	-0.763
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Min Mx	93	8 GENERATE	-30.279	17.334	-6.191	**-3.526**	-0.490	8.346
Max My	1	10 GENERAT	17.735	50.809	43.158	-1.735	**0.822**	-8.300
Min My	21	4 GENERATE	-3.340	56.553	12.100	-2.557	**-0.755**	9.004
Max Mz	93	10 GENERAT	-24.307	27.419	-1.942	-2.745	-0.639	**9.498**
Min Mz	19	10 GENERAT	20.313	27.412	1.943	2.745	-0.638	**-9.500**

Fig 6: Support Reactions

CONCLUSION

This article wraps up the design, analysis, and plan for a hypothetical college auditorium that is 25 meters long and 30 meters wide. The building of an auditorium offers a solution for the hosting of several cultural event programmers. This project served as an illustration of exposure to diverse field practices for the study and design of long-span RCC and steel-frame structures. The auditorium was built with 600 spectators in mind. The structural components of the auditorium were designed and analyzed using generic loads in the STAAD Pro

software, which has proven to be a high-end programmed with great potential in the analysis and design sector of the construction industry. The plan of the auditorium was created using the AUTOCAD software. The analysis and design were done according to standard specifications using IS 800:2007 for steel member i.e., followed by limit state method and IS 456:2000 for RCC footings. The results were obtained corresponding to the imposed loads on the members which proved that the structure under various load combinations is stable without any failure.

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ANALYSIS ON THE STRENGTH OF CONCRETE MADE USING SUGARCANE BAGASSE ASH AND M-SAND IN THE M40 GRADE CONCRETE

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ABSTRACT
The most common composite building material in all construction is concrete. When concrete is hardened, better qualities are added thanks in large part to fine aggregate and cement. When cement is manufactured, a lot of carbon dioxide and other chemicals are emitted, and for every tone of cement produced, half a tone of CO2 is discharged. Therefore, substituting sugarcane bagasse ash for some of the cement can help to improve the qualities of concrete while also maintaining the environment. On the other hand, ongoing sand mining from riverbeds depletes groundwater supplies and has a negative impact on the ecosystem. To mitigate this issue, I'm utilizing M-sand as a partial replacement for fine aggregate. The paper presents an experimental investigation on the properties of concrete and enhances the strength and quality of concrete. In this project, first i am partially replacing the cement with SCBA in different percentages they are 5%, 10%, 15%. By comparing the results, the percentages where the optimum strength was obtained will be taken as a common percentages and i will partially reinstate the sand with M-sand in different percentages are 5%, 10%, 15% & 20%. The concrete was tested for slump test in fresh concrete and also properties of concrete in harden state i.e, compressive strength, flexural strength, split tensile strength are studied. The mix design was carried out for M40 grade of concrete.

1. INTRODUCTION

Concrete is the building material that is used the most globally. It is a composite building material primarily made of cement, water, and aggregate. Concrete is the perfect passive participle of the Latin word "concrescere," which is derived from the words "con" (together) and "crescere" (to compress). The Latin word "concretes" implies "compact or condensed" (to grow). After being mixed with water and deposited, concrete undergoes a chemical process called hydration that causes it to solidify and harden. Cement and water combine to create a solid, stone-like substance that binds the other elements together. Concrete is the most often used man-made material on the globe and comes in a number of formulae with various properties.

Bagasse is a by-product of the sugar industry that is burned to produce electricity for various manufacturing activities. Bagasse ash, which has pozzolanic properties and might be utilized as a cement replacement material, is produced when bagasse is burned. Sugarcane production in the globe is estimated to reach more than 1500 million tones. Because bagasse makes up approximately 30% of sugarcane, the sugar recovered is about 10%, and the bagasse leaves around 8% bagasse ash as a waste (this figure varies depending on the grade and type of boiler; contemporary boilers release less bagasse ash), the disposal of bagasse ash will be a major problem. Sugarcane bagasse ash has lately been studied for use as a cement substitute in several regions of the world. In particular replacement percentages and fineness, bagasse ash was shown to improve various qualities of the paste, mortar, and concrete, including compressive strength and water tightness. It was claimed that the greater silica concentration in bagasse ash was the key reason for the benefits. Although the silicate content of the ash varies depending on the burning conditions and other properties of the raw materials, such as the soil on which the sugarcane is grown, it has been reported that the silicate undergoes a pozzolanic reaction with the cement's hydration products, resulting in a reduction of free lime in the concrete.

2. LITERATURE REVIEW

B. Vijaya etal. (2013):

The behaviour of concrete was observed for several grades ranging from M25 to M60. According to their research, the normal mix with 100 percent manufactured sand has a maximum strength of 53 MPa, whereas the mix with natural sand has a maximum strength of 49 MPa. They also discovered that produced sand has superior physical qualities and better particle packing, which leads in a greater binding effect and higher strength.

Pallavi S.Kumbhare (2019):

She stated that they had chemically and physically described "partial replacement of cement in concrete with sugarcane bagasse ash" and partial replaced in the ratios of 10%, 20%, and 30% by weight of cement in concrete. The SCBA concrete had much better compressive strength than the concrete without SCBA, according to the findings. It was discovered that SCBA could be used to substitute cement up to 25% of the time. In a concrete mix, replacing cement with sand increases the strength while lowering the cost.

3. MATERIALS USED AND MIX DESIGN

OPC 53 Grade cement

In the sequence of cement processes, the Ordinary Portland Cement (OPC) 53 grade is employed. The concrete specimens' binding substance is cement. Because it is a basic element of concrete, mortar, stucco, and most non-specialty grout, Portland Cement (also known as OPC) is the most prevalent
form of cement in general usage across the world.
Limestone is the source of this substance.

Fig 1: OPC 53 Grade cement

Fine aggregates

Natural sand, crushed stone sand, or crushed gravel stone dust make up fine aggregate. It should be hard, durable, chemically inert, clean, and free of organic matter, with no visible clay balls or pellets, as well as other detrimental contaminants such as alkaline, salt, mica, dead vegetation, lumps, and so on. The fine aggregate grade is listed below.

Fig 2: Fine aggregates

M- Sand

Manufactured sand (m-sand) is a concrete building material that may be used instead of river sand. Crushed hard granite stone is used to make manufactured sand. Only VSI crusher/Rotopactor produced sand is cubical and angular in form. Other types of machinery produce flaky sand, which is difficult to deal with. Jaw crushers are commonly used to reduce stones to metal or aggregates. Jaw sand that has been manufactured All sand particles should have a higher crusher, since cone and roll crushers frequently have a larger percentage of dust and flaky particles.

Fig 3: M Sand Coarse aggregates

Throughout the experiment, crushed coarse material with a size range of 10 to 20 mm was obtained from local crusher facilities. In compliance with IS:2386-1963 and IS:383-1970, the aggregate was evaluated for physical parameters such as gradation, fine modulus, specific gravity, water absorption, and bulk density.

The coarse aggregate comes from a closer zone. The collected material is sieved via a 20 mm sieve before being kept on a 10 mm sieve. The characteristics of newly mixed concrete are influenced by particle form and surface roughness more than the qualities of cured concrete. Smooth, rounded compact aggregate requires more water to generate workable concrete than rough textured, angular, and elongated particles.

Fig 4: Coarse aggregates

Sugarcane Bagasse Ash

SCBA is a sugar agro-industry by-product that is widely available in various parts of the world and possesses cementitious qualities, indicating that it may be used in conjunction with cement. It is somewhat utilized as a source of energy. However, bagasse ash (SCBA) is classified as garbage, posing a disposal issue. Furthermore, the SCBA can be reused if sugarcane bagasse is burnt under regulated conditions.

Fig 5: Sugarcane Bagasse Ash

Water

Water is an important component in the production of concrete. The quality of the water used in concrete should be considered. "If you can drink it, you can create concrete with it," says an old adage about water quality. Municipal water sources are used to make a considerable volume of concrete. Good quality concrete, on the other hand, may be manufactured with water that does not meet regular drinking water requirements.

Super plasticizer

Naphthalene based super plasticizer commonly used in daily engineering construction was selected and the effects of the super plasticizers on the setting time, compressive strength, workability. It was the first to extract naphthalene from coal tar in 1819. When soft coal is burned in an insufficient quantity of air, coal tar forms, which is a brown to black thick liquid. It is made up of a complex hydrocarbon mixture. It is extracted by heating the raw material to a temperature of 200c to 25oc, resulting in middle oil is distilled to separate its many components one of which is naphthalene.

Fig 6: Naphthalene

Mix design

Mix design can be defined as the process of selecting suitable ingredients of concrete and determining with the object of producing of certain minimum strength and durability as economically as possible. Mix design for M40 grade concrete has been done with trail method by making the use of specification and guideline given by EFNARC and IS:10262-2009.

From the test results, the maximum strengths obtained at 10%. Now it is considered as standard value and partially replace the normal sand with M-sand.

Tests to be conducted on concrete

The following are the 3 tests which are carried out on the concrete after curing process for the respected 7days, 14days and 28 days curing period which are

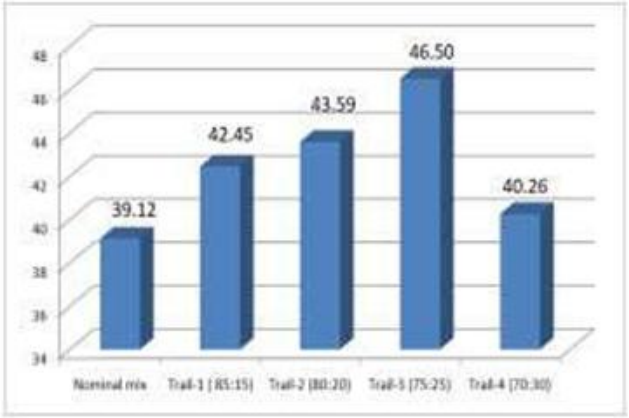
1. Compressive strength
2. Split tensile strength
3. Flexural strength

4. RESULTS AND ANALYSIS

Compressive strength

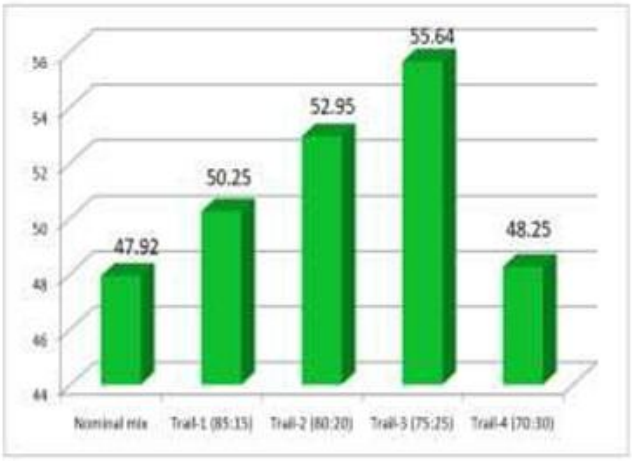
7days

Graph 1: Comparison of 7days compressive strength



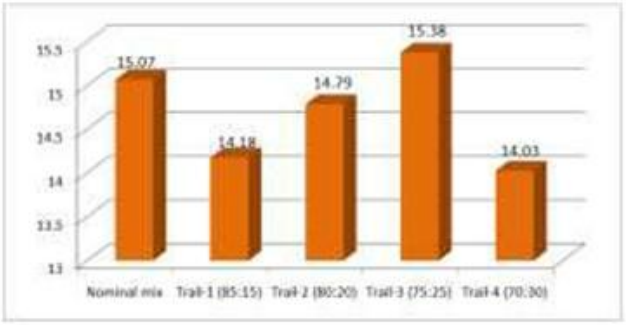
14days

Graph 2: Comparison of 14days compressive Strength



28days

Graph 3: Comparison of 28days flexural strength



CONCLUSIONS

Recycled garbage has a lot of room to grow as a suitable and environmentally friendly solution for the construction industry's commitment to sustainable development. According to the test results, concrete made with sugarcane bagasse ash fared better than concrete made with regular cement up to a 10% SCBA replacement. The presence of a large amount of silica is mostly to blame for the rise in strength. SCBA is used on concrete not just as a waste-reduction strategy but also to conserve cement. On the 10 percent sugarcane bagasse ash in concrete, sand was swapped out for M-Sand, increasing the strength value by 15%. The hardened concrete strength values gradually decline as the M-Sand ratio in the SCBA is raised above 15%. The safe level of M-Sand that can be replaced on the SCBA concrete is about 0 to 15%. From this experimental study, by comparing the conventional concrete with replaced SCBA and M-Sand in concrete, the hardened concrete strengths increased. Such as compressive strength, split tensile strength, flexural strength. A safe percentage for the replacement of sugarcane bagasse ash in place of cement in M40 grade concrete is up to 10%. A safe percentage for the replacement of M-sand in place of sand in M40 grade concrete is upto 15%

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REDUCTION OF PERMEABILITY ON FIBRE REINFORCED CONCRETE USING SIFCON AND FERRO CEMENT

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ABSTRACT
Concrete uses fibres to minimize permeability, manage shrinkage, and prevent cracks. Additionally, fibres exhibit outstanding resilience to impact and abrasion. Slurry-infiltrated fiber-reinforced concrete, or SIFCON, is one of the more contemporary building materials. It is a unique variety of fiber-reinforced concrete that contains a lot of fibre. When unexpected or abnormal loads are encountered, it is a special type of building material with tremendous potential for structural applications due to its high strength and large ductility. "Ferro cement is a type of thin-walled reinforced concrete that is frequently made of hydraulic cement mortar and reinforced with layers of continuous wire mesh that are quite small in size and positioned closely together. The mesh can be created from metal or other appropriate materials. In this project, we are using steel fibres of aspect ratio 50, steel mesh of diameter 0.62mm with spacing of 5mm.1:1 mix was taken to cast the cylinders (30cm X 15cm). Tests were conducted on cylinders to determine compressive strengths & split tensile strength as well as stress–strain behavior. Fibres of 5%,10% & 15% were added in both parallel and random orientation. Steel mesh of 5%,10% & 15% were added in parallel manner and results are compared among those and as well as with conventional cement mortor.
Keywords : Fibres, SIFCON, Ferro cement, hydraulic cement mortar.

INTRODUCTION

Concrete that has been reinforced with fibrous material, or fibre reinforced concrete (FRC), has a higher structural integrity. It has uniformly distributed, short discrete fibres that are randomly orientated. Fiber reinforced concrete performs better in terms of toughness and impact resistance than regular concrete. Concrete now has greater versatility because to fibre reinforcement, which helps to overcome its fragility. They might be flat or spherical. The "aspect ratio" is a useful statistic that is frequently used to describe fibre. The ratio of a fiber's length to diameter is known as the aspect ratio. Common aspect ratios range from 30 to 60.

Every type of fibre has been tried out in cement and concrete, not all of them can be effectively and economically used. Each type of fibre has its characteristic properties and limitations. Steel fibres are made of cold drawn steel wire with low content of carbon (C) or stainless steel wire. According to Construction projects, steel fibres are of different types.

Slurry Infiltrated Fibrous Reinforced Concrete (SIFCON) is a relatively new high performance and advanced materialand can be considered as a special type of Steel Fibre Reinforced Concrete (SFRC). If percentage of steel fibres in cement matrix could be increased, one could get a material with very high strength properties which can be called as SIFCON.

The process of making SIFCON is different, because of high steel fibre content. While in SFRC the steel fibres aremixed intimately with wet (or) dry mix of concrete, prior to mix being poured into forms. SIFCON is made by infiltrating low viscosity cement slurry in to a bed of steel fibres “pre packed” in forms (or) moulds.

The matrix in SIFCON has no coarse aggregates, but a high cementations content. SIFCON is a high-strength, high- performance material containing a relatively high volume percentage of steel fibres as compared to SFRC. It is also sometimes termed as „high-volume fibrous concrete“. The origin of SIFCON dates to 1979, Prof. Lankard carried out extensive experiments in his laboratory in Columbus, Ohio, USA and proved that, if the percentage of steel fibres in a cement matrix could be increased substantially, then a

material of very high strength could be obtained, which he christened as SIFCON.

SIFCON has properties like ductility,crack resistance, penetration and impact resistance very high compared to other materials like SFRC, concrete it is best suited to applications in following areas: - Pavement rehabilitation and pre castconcrete products overlays, bridge decksand protective revetments. Seismic and explosive resistant structures Security concrete applications. (Safety vaults, strong rooms). Refractory applications (soak-pit covers, furnace lintels, saddle piers) Sea protective works. Military applications such as anti-missile hangers, underground silos Aerospace launching plat forms. Repair, rehabilitation and strengthening of structures. Concrete mega structures like offshore and long span structures, solar towers. "Ferro cement is a type of thin wall reinforced concrete, commonly constructed of hydraulic cement mortar, reinforced with closely spaced layers of continuous and relatively small size wire mesh. The mesh may be made of metallic or other suitable materials".

Light weight Ferro cement is a composite material consisting of cement-sand mortar (matrix) reinforced with layers of small diameter wire meshes. It consists of closely spaced, multiple layers of mesh or fine rods completely embedded in cement mortar. Usually steel bars are used in addition, to forma steel skeleton, which helps in retaining the required shape of the Ferro cement components until the cement mortar hardens. It differs from conventional reinforced concrete primarily by the manner in which the reinforcement is arranged within the brittle matrix. Since its behavior is quite different from that of conventional reinforced concrete inperformance, strength and potential

Applications, it is classified as a separate material.

LITERATURE REVIEW

H. SudarshanaRao, K. Gnaneswar and N.V.Ramana et.al studied the "Behaviour of Simply supported steel reinforced SIFCON two way slabs in punching shear". SIFCON slabs are cast with 8, 10 and 12% fibre volume fraction and for comparison, fibre reinforced concrete (FRC) with 2% fibre volume fraction and reinforced cement concrete (RCC) slabs are cast and tested. The results of the experimentation show that the SIFCON slabs with 12% fibre volume fraction exhibits excellent performance in punchingshear among other slabs. The experimentalresults have been compared with the provisions of ACI and ARE codes. Naman and boccouche, et.al presented the shear response of dowel reinforced SIFCON. They observed that the shear strength of SIFCON is 10 times higher than that of plain matrix. The behaviour of reinforced concrete beam with SIFCON matrix has been studied by Namanetal[(6)]. They reported that use of SIFCON eliminates the need of shear stirrups in RCC beams.

Parameswaranetal et.al have studied the flexural behaviour of SIFCON beam specimen under cyclic loading and reported that the flexural strength is 500 % more when compared with plain mortorspecimens and 100% more to that of Ferro cement specimens.

The ACI committee 549 et.al has defined Ferro cement a "thin wall reinforced concrete commonly constructed of hydraulic cement mortar reinforced withclosely spaced small diameter wire mesh". The mix is generally of cement and sand mortar, where the wire meshes having wide openings which makes adequate bonding of mixture.

Al-Rifaie and Hassan et.al investigated the experimental and theoretical structural behavior of thin Ferro cement one-way bending elements. The elements of different span and widths were chosen to study their relative feasibility for adoption to roofing of small size residential houses. Nine folded plate models (a channel type cross-section) were constructed and tested to failure. In each of these models, the web-depth, and the thickness of' cross- section were kept constant while the span and the flange-width were varied. The models were subjected to two different loading conditions, namely point loads and four symmetrical point loads.

Alrifaie and Tnkha (136) et.al investigated uniformly) loaded Ferro cement slabs (500x500 mrn) in which three different arrangements alternately. a) All layers oriented in one direction: b) all layers oriented in orthogonal direction and c) twin layers-each twin layer consisting of two orthogonally oriented meshes in contact with each other were investigated. A total of I2 square slabs (20 mm and 30 mm thick) were tested

under uniform load.Based on the above studies they concludedthat the arrangement consisting of twin layers with two meshes orthogonally and placed in contact is superior to the other two arrangements consisting of all the meshes uni-directionally - oriented or alternate layers equally spaced with orthogonally oriented meshes.

Nassif et.al conducted experimental study on flexural behavior of on Ferro cement / concrete composite beams made of reinforced concrete over laid on a thin don of Ferro cement. The meshes used in the Ferro cement laminate were hexagonal and square. The beams were tested under two- point loading system and results from the tests were compared to those from a reinforced concrete beam.

Mansur and Paramasivam et.al proposed a method to predicate the ultimate strengthof the Ferro cement in Flexure based on the concept: of the plastic analysis, where Ferro cement is considered as ahomogenous and a perfectly elastic-plastic material. Simple equations were derived for the direct design of a cross-section. Experimental investigation was also conducted to study the behavior and strength of Ferro cement in flexure

The use of Ferro cement was first started as early as in 1848. It took the form of rowing boat constructed by Jean Louis Lambot. The boat, still in a remarkably good condition, is on display in a museum at brig holes, France. Since then, Ferro cement was mainly used in the marine environment. In the early 1940s, Pier Luigi Nervi resurrected the original Ferrocement concept when he observed that reinforcing concrete with layers of wire mesh produced a material possessing the mechanical characteristics of an approximately homogeneous material and capable of resisting impact.

EXPERIMENTAL PROGRAM

MATERIALS USED :

In the present investigation the following materials were used Ordinary Portland Cement of 53 Grade cement conforming to IS:169-1989, Fine aggregate conforming to IS: 2386- 1963, Water, Hooked steel fibres conforming to ASTM A 820 TYPE 1, Square steel mesh

CEMENT : Cement is a material with adhesive and cohesive properties which is capable of bonding mineral fragments into a compact-solid whole. Ordinary Portland cement is the most common type of cement in general uses all around the world as a basic ingredient of concrete, mortar, stucco, and most non- specialty grout. It developed from other types of hydraulic lime in England in mid-19th century and usually originates from limestone.

It is a fine powder produced by heating materials to form clinker. After grinding the clinker, we will add small amounts of remaining ingredients. Many types of cements are available in market. Thecolor of OPC is grey color and by eliminating ferrous oxide during manufacturing process of cement we will get white cement.

Ordinary Portland Cement of 53 Grade of brand name KPC, available in the local market was used for the investigation. Care has been taken to see that the procurement was made from single batching in air tight containers to prevent it from being effected by atmospheric conditions. The cement thus procured was tested for physical requirements in accordance with IS: 169-1989 and for chemical requirement in accordance IS: 4032-1988.

SAND : Sand is an inorganic material. It consists of small angular or rounded or sharp grains of Silica. Sand is formed by decomposition of sand stone under the effect of weathering agencies. Various sizes or grades of sand are formed depending on the amount of wearing.

WATER : Water is one of the most important elements in construction but people still ignore quality aspect of the element. The water is required for preparation of motor, mixing of cement and concrete and for curing work etc...

During construction the quality andquantity of water has much effect on the strength of mortar and cement concrete in construction work. The required quantity of water is used to prepare mortar or concrete, but in practice it is seen that more water is mixed to make the mix workable. This is a bad practice and additional water weakens the strength of cement paste. Extra water also weakens adhesive quality.

STEEL FIBRES : Hooked steel fibres are used in our project

STEEL MESH : Steel mesh of square type has been used in our project

TESTS CONDUCTED

Testing of hardened and fresh concrete plays an important role in controlling and confirming the quality of cement concrete works. The test methods should be simple, direct and convenient to apply. One of the purposes of testing hardened concrete is to confirm that the concrete used at site has developed the required strength.

COMPRESSION TEST

Compression test is the most common test conducted on hardened concrete, partly because it is an easy test to perform, and partly because most of the desirable characteristic properties of concrete are qualitatively related to its compressive strength. Compression tests are used to determine how a product or material reacts when it is compressed, squashed, crushed or flattened by measuring fundamental parameters that are determine the specimen behavior under a compression load.

TENSILE TEST

Tensile strength of concrete is one of the basic and important properties. Tensile strength is an important property of concrete because concrete structures are highly vulnerable to tensile cracking due to various kinds of effects and applied loading itself. However, tensile strength of concrete is very low in compared to its compressive strength. Due to difficulty in applying uni axial tension to a concrete specimen, the tensile strength ofthe concrete is determined by indirect test method.

STRESS-STRAIN TEST

The elastic modulus or tensile modulus of an object is defined as the slope of its stress strain curve in the elastic deformation region. The stiffer material will havehigher elastic modulus. Toughness is the property of material to resist impact or it is the property of the material to absorb energy and plastically deform withoutfracturing. The area under stress strain curve is called toughness.

TEST RESULTS

COMPRESSIVE STRENGTHS:

Table : 1 Compressive Strength of SIFCONwith parallel orientation of of hooked steel fibres

S.No	Percentage of addition of fibres to mortor in parallel orientation	Compressivestrength (N/mm^2)
1.	0	28.29
2.	5	36.78
3.	10	39.5
4.	15	40.74

SPLIT TENSILE STRENGTHS

Table 2. Spilt tensile Strength of SIFCONwith random orientation hooked steel fibres

S.No	Percentage of addition of fibres to mortor in random orientation	Spilt tensile strength (N/mm^2)
1.	0	4.18
2.	5	4.25
3.	10	4.39
4.	15	4.47

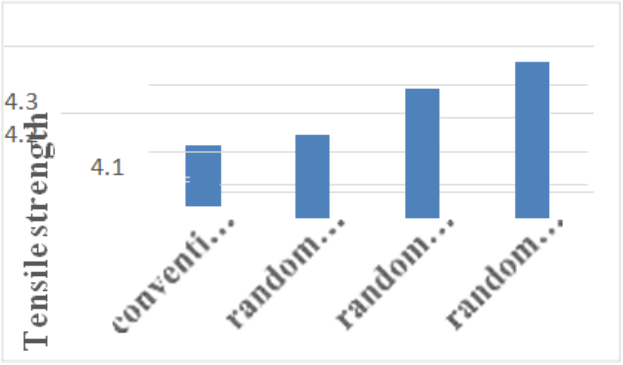

Fig .2. Tensile strength comparison between conventional cement mortor with different percentages of hooked steel fibres in randommanner

STRESS-STRAIN BEHAVIOURS

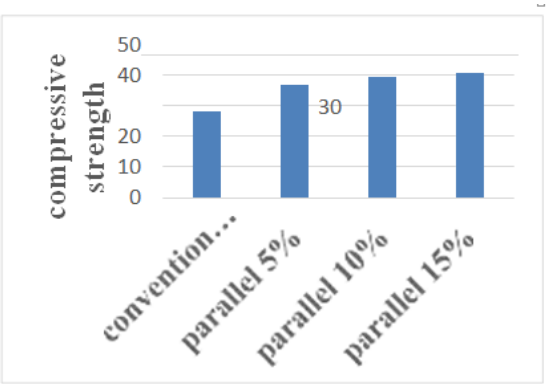

Fig 2. Compressive strength comparison between conventional cement mortor with different percentages of hooked steel fibres inparallel manner

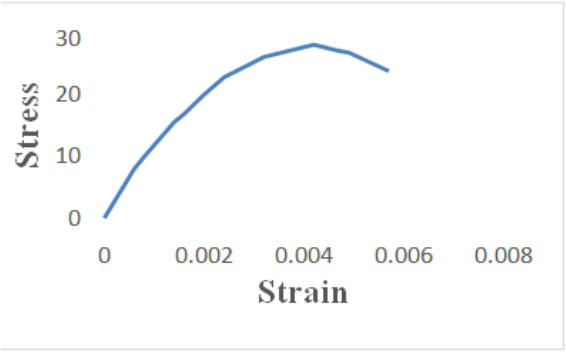

Fig 3. Stress-strain curve of SIFCON with 5% ofhooked steel fibres (parallel oriented manner)

DISCUSSIONS

WORKABILITY

Computations established that workability is getting reduced with increase in fibercontents. When compared to conventional cement mortor, workability got reduced when we have added fibers of 5%,10%, and 15% in random orientation.

Decrease in workability is due to the fibres presentation in cement mortor. They are arresting the flow or spread of mortor. Dueto presence of fibers, cement mortor is turning into harsh and making it too difficult to handle.

COMPRESSIVE STRENGTH : Experimental observations establish anincrease in compressive strength in comparison with conventional cement mortor when 5%, 10% and 15% of hooked steel fibres addition in parallel manner. It is observed that there is an increase in compressive strength in comparison with conventional cement mortor when 5%, 10% and 15% of hooked steel fibres addition in random manner. It is evident from the study that there is decrease incompressive strength in comparison with conventional cement mortor when 5%, 10% and 15% of steel mesh addition in parallel manner.

Decrease in compressive strength is due to the obstruction of mesh which is added by 3 layers in cylinders. Due to this, cylinder is divided into four zones. The top most layer and bottom most layer is taking the load and middle two layers are not taking the load due to obstruction of mesh. Mesh is not allowing the load to pass through it.

SPILT TENSILE STRENGTH Observations concluded that the tensile strength of conventional cement mortor with 5%, 10% and 15% of hooked steel fibres addition in parallel manner got decreased when compared with conventional cement mortor. It is established that the tensile strength of conventional cement mortor with 5%, 10%and 15% of hooked steel fibres addition in random manner got increased when compared with conventional cement mortor. Computations established that the tensile strength of conventional cement mortor with 5%, 10% and 15% of steelmesh addition in parallel manner gotdecreased when compared with conventional cement mortor.

It is observed that the tensile strength of SIFCON with parallel orientation of fibres and FERRO CEMENT got decreased when compared with conventional cement mortor . The decrease in strength is due to alignment of fibres to the direction in which load is applied. We are applying the load in perpendicular direction to the fibersin spilt tensile strength test, this is because we have to place the cylinders in horizontal direction to perform spilt tensiletest.

STRESS –STRAIN BEHAVIOUR Stress – strain behaviour of SIFCON and FERROCEMENT is similar to conventional cement mortor and changes have been observed at only peak stresses and strains. It is observed that the additionof steel fibres has increased the strain afterthe peak stress and these results in an increase of area under stress – strain curves when fibres are introduced in conventional cement mortor. Whichindicates that there is an increase in toughness? slope from stress-strain is the modulus of elasticity or young'smodulus. The stiffer material will have higher elastic modulus.

CONCLUSION

Based on experimental research on compressive strength and split tensile strength, conclusions have been drawn. When compared to a standard cement mortor, workability decreased. Compared to FERRO CEMENT and normal cement mortar, SIFCON concrete has a higher compressive strength.

The stress-strain behavior of SIFCON and FERRO CEMENT is comparable to that of a traditional cement mortor. When compared to SIFCON with random fibre orientation and standard cement mortar, FERRO CEMENT has demonstrated lower tensile strength. When fibres are inserted in a random orientation, SIFCON concrete exhibits a larger increase in tensile strength than normal cement mortar. When fibres are inserted in a parallel orientation, SIFCON concrete exhibits a lower tensile strength than normal cement mortar. Compressive loads can be handled by SIFCON concrete and FERROCEMENT. These can be used where there is necessary to withstand compressive loads of huge amount. More amounts of fibres addition is leading toturn the mix harsh. Toughness property gotincreased due to fibre addition. Young's modulus of SIFCON andFERROCEMENT got increased when compared with conventional cement mortor.

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EVALUATION ON EXCHANGING SOME OF THE SAND WITH QUARTZ POWDER, CONCRETE'S STRENGTH QUALITIES

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ABSTRACT
The use of easily available materials on the market to reinforce existing structural elements is one of the main problems and areas of current research in the discipline of structural engineering. The use of conventional and cutting-edge materials to enhance various structural components has been the subject of numerous studies. Numerous researchers have attempted to increase strength using quartz powder. Because of this, utilizing Quartz Powder Concrete composites has compatibility in strength and a higher weight to strength ratio. An inexpensive way to make concrete resistant to weathering is to utilize quartz powder in place of some of the sand. The author outlines a concrete mix design technique for doing this. In the present work, the mechanical properties were evaluated by the workability property was assessed by conducting slump cone test for conventional concrete for the mixes procedure in which sand is replaced with 0%, 5%, 10% and 15% of quartz powder. The research also revealed that there is possibility of replacing fine aggregate withquartz sand in the production of structural concrete. The mix proportion adopted was 1:1.5:2.66 as per IS 10262:2019. Compressive and flexural strength tests were carried out to evaluate the strength properties of concrete at the age of 7 and 28 days. Modulus of elasticity tests were carried out at the age of 28 days.
Keywords: Quartz powder, Slump Cone Test, Compressive strength, Flexural strength.

I INTRODUCTION

One of the major contributors to the release of carbon dioxide (CO2) globally is the construction industry. Due to CO2 emissions, the production of cement and the energy needed for building present significant issues. The manufacturing of one tone of Portland cement is thought to result in the release of around one tone of CO2 into the atmosphere. Therefore, in order to save energy and lessen pollution, additives that are less expensive than regular Portland cement (OPC) are employed in cement-based materials. Despite extensive research and study into the viability of using fly ash, volcanic ash, and steel slag as cement substitutes, many parts of the world face issues with a consistent supply of these supplementary cementations materials. Accordingly, in order to reduce the cement content in concrete and develop new cementing material, all available materials need to be carefully studied. Quartz powder is commonly used in the manufacture of high-performance concrete and Ultra-high-performance concrete (UHPC). Quartz powder is considered to be chemically inert at

normal ambient temperatures, but is not completely inert at high temperaturesand high pH values.
The added inert substances have relatively little hydraulic effect on cement. Inert fillers (such as plastic powder) only dilute Portland cement. Nonetheless, it has been shown that the hydration degree of cement could be increased by fillers based on the study of the combinationof non-hydraulic filler (Rutile Powder) and the main components. When these inert materials are mixed with Portland cement, although there is no chemical reaction, they have physical effects and can also accelerate the hydration reaction of the clinker component. This phenomenon may be the result of the fillers providing more nucleation sites for calcium silicate hydrate (C-S-H) growth. Performed a study to observe the nucleation and growth of C-S-H Phases on mineral admixtures such as quartz and calcite also demonstrated that the early hydration of cement was accelerated and the time of initial setting was reduced by limestone and quartz powder. Although abundant studies have been performed about quartz powder blended concrete, there are some points which have not been considered in previous studies. First, in previous studies, the w/b ratios of specimens are generally higher than 0.3. For concrete with a very low w/b ratio of 0.2, the available experimental results are very limited. Second, for producing UHPC, the w/b ratio is about 0.2. Quartz powder and silica fume are generally used together as UHPC components. However, the effect of one individual component such as quartz powder on the properties of concrete has not been fully clarified.This study compared the effects of w/b ratios (0.5 and 0.2) and quartz contents (0, 10, and 20%) on the performance of cement–quartz paste. Moreover, this study not only analyzes the relationship between compressive strength and porosity and the relationship between chemically bound water and calcium hydroxide, (but also analyzes the relationship between hydration heat and compressive strength, and the relationship between chemically bound water and compressive strength). The experimental methods used herein include compressive strength test, X-ray fluorescence (XRF) spectroscopy, X-ray diffraction (XRD), mercury intrusion porosimetry (MIP), Scanning electron microscopy (SEM), isothermal calorimetric, and thermo gravimetric (TG) analysis.
Concrete is a composite material which has evolved after the usage of burnt limestoneand clay in ancient world which then improved over years by combining with other materials over time which is now the modern Concrete. The necessity for this evolution is the low setting period of the ancient concrete and to bring ease in workability. Therefore concrete is a versatile member suitable and can be modified in all environmental accepts [1]. Due to its brittle nature reinforced concrete was brought to add more strength, depending upon the purpose the reinforcement is also improved by its emerging techniques. Concrete technology is emerging day by day with innovative ideas by using different constituents in the concrete over the control constituents either by fully or partially replacing it. Although fully replacement of cement or aggregates has not achieved the expected strength like the control concrete, partial replacement has achieved the desired strength or more [2]. Later in order to increase its strength and durability additives like Chemical and Mineral admixtures came into play. The continuous use ofthe control constituents in the concrete may lead to scarcity of them which in turn becomes the cause of depletion of the sources beyond its limit. Therefore, it is more significant and essentialto find substitute constituents for the concrete [3]. Thus, making concrete a sustainable and a big step towards conservation of resources which makes it preferable in today's world. This paper presents to examine the experimental and theoretical investigations of the mechanical crack formations of reinforced concrete beams. This also gives an experimental and theoretical investigations of the durability of reinforced concrete beams [4]. This helps to learn and professionalize techniques such as Digital Image Correlation Technique, X-Ray micro computed Technique and the young's modulus of the concrete is also studied. This emp hasises on monitoring the crack formation and assessing the quality measures aimed at strengtheningconcrete structures [5]. Cement is a binder substance used in construction that set and can bind other material together. The total production of cement world-wide is of 2000MT [6]. India is thesecond largest cement producer in the world. The installed production capacity at present is nearly 165million tones (MT) annually. Cement is becoming a scare resources all over the world because of demand day by day. The construction activities have increased in

almost all the developing countries of the world [7]. There always has been great effort in improving the quality and standard of the properties of concrete as a construction material. Traditionally fly ashis added to concrete as a Pozzolanic material to enhance the properties of concrete [8]. The useof quartz powder as a pozzolana material has increase in recent year because when mixed in certain proportion. It enhances the properties of both fresh and hard concrete like durability, strength, permeability, and compressive strength, flexural strength and tensile strength. Quartz powder is a very fine crystalline material [9]. Quartz is the most abundant silica minerals. Pure Quartz is colorless and transparent. It occurs in most igneous, metamorphic and sedimentary rocks. It is mainly made up of silica. The chemical formula for quartz is Sio2. Quartz dust is a fine rock particle. Pozzolanic materials are generally able to combine with the hydrate calcium hydroxide (CA (OH)2) forming the hydrate calcium silicate (C-S-H), which is the principal responsible for the strength of hydration of cement. Quartz sand is used for traction in the rail board and mining industries [10].

METHODOLOGY

Primary tests were conducted for all the materials like cement, fine aggregates, coarse aggregates, Quartz powder, steel reinforcement, water etc. that are used to carry out experiments. Moreover, the materials are taken under ISO standards.

Preliminary Test

The materials used for the experimental investigation are as follows.

All the materials used for the experimental work were tested as per the code ISprovisions.

Cement

A standard grade of 53 OPC was taken for conducting the current experiments. The primary test results confirmed that S.G of cement is 3.15 and Initial setting time and finalsetting times were recorded as 46 minutes and 610 minutes respectively. It was clearly confirmed that all the other parameters are falling within the range of ISO.

Fine & Coarse Aggregate

Generally, the based on the particle diameter the fine and coarse aggregate (sand) is defined. In this work we have considered the fine and coarse aggregates according to the standards.

Quartz Powder

Quartz powder of varying percentages were mixed with sand in this work. The standard size of quartz powder has been considered in this work.

Steel Reinforcement

To create tension reinforcement F_e 415 of Mangal TMT several diameter of bars 2 numbers of 8mm and 1 number of 10 mm diameter bars are used. For the purpose of stirrups 6mm diameter considered in this work.

Water

For the concrete the permissible limits are according to IS: 3025-1991 the permissible limit of chlorides is 2000mg/l. The amount of chlorides present in water is 1100mg/l. Permissible value of sulphates is 400mg/l. The value of sulphates is 380mg/l. Alkalinity and acidity values are according to IS:3025-1991.

Mix Design

In the present investigation, the mix design was done for M25 grade concrete as per IS 10262: 2019 the guidelines form.

Step 1.

Target strength $f'ck = fck + 1.65s$

$=25+1.65x5$

$=31.6\ N/mm^2$

$S=5N/mm^2$ (Table.1 IS10262:2019)

Step 2.

Selection of water cement ratio. From table-5 of IS 456:2000.

Maximum w/c ratio =0.5

Adopt w/c ratio =0.5, hence ok

Step 3.

Selection of water content. From table-2 of IS 10262:2019

Water content =186 liter (for 100-120mm slump 20mm nominal size aggregates)Estimated water content= 186 liter

For 100-125mm slump =186/ ((9/100) 186) =202 liter

Step 4.

Calculation of cement content

Cement content = water content / w/c ratio = 202/0.5 = 404 kg/m^3

Specific gravity of cement =3.15

From table-5 of IS 456:2000 minimum cement content for severeexposure condition =320kg/m^3.

404kg/m^3 > 320kg/m^3. Hence ok

Step 5.

Proportion of volume of coarse aggregates and fine aggregates 20mm nominal size aggregates and zone 3 of fine aggregates. The volume of coarse aggregate per unit volume of total aggregate for the w/c ratio is 0.64.

Volume of fine aggregate per unit volume of total aggregate

=1-0.64=0.36.

Step 6.

a) Volume of Concrete =1m^3

b) Volume of Cement

= (Mass of cement) / (Specific gravity of cement) *(1/100)

= ((404)/ (3.15*1000)) =0.1282m^3

c) Volume of water =202/1000=0.202m^3.

d) Volume of all aggregate

d= [a- (b + c)] = [1- (0.1282 + 0.202)] =0.6698m^3

Mass of Coarse Aggregate = d x volume of coarse aggregate x specific gravity of coarse x 1000

= 0.6698x0.64x2.8x1000= 1200.28 kg/m^3

Mass of fine aggregate =d x vol. of fine aggregate x specific gravity of fineaggregate x 1000

=0.6698x0.36x2.51x1000

= 605.23 kg/m^3

Mix Proportion for M251: 1.5: 2.66: 0.5

Compressive Strength

Procedure for Compressive Strength Test

In the figure 1 the compressive strength test machine was carried out as per IS: 516 – 1959. The test specimens shall consist of concrete cylinders 15.0 cm in diameter and 30.0 cm long. Alternately, other sizes of cylinders or square prisms may be used provided that the height/diameter or height/width ratio is at least 2.The compressive strength of the cylinders has taken the specimen of size (100mm x 200mm) was also used. The required quantity of materials were weighed and then mixed the materials manually. The concrete was filled in the mould by four different layers and each layer was compacted well with help of tamping rod. The specimen was remolded after 24 hours and adopted three different types of curing (a) cured in clean water for 7 days and 28 days, (b) Hot water curing for 7 days, (c) Hot water and Normal water curing for 7 days and 7

days. The specimens were taken out and wiped dry and then tested in compressive testing machine as per Indian Standard. The specimen was placed in such a way thatthe load acts opposite to the compacted surface of the specimen. The load was applied until the failure of the cubes. The ultimate load was noted. The compressive strength of the specimens were calculated and mentioned the compression test shows the best possible strength concrete can achieve in perfect conditions.

Figure 1 Compression Testing Machine

Mixing of Concrete

The concrete is mixed thoroughly with the help of hand or mixer as shown in figure. Themixing of cement other aggregates must be done on a non- moisture surface till it is properly mixed together and gets uniform color.

Clean the molds and apply oil. Fill the concrete in the molds in layer approximately 5cm thick. Compact each layer with not less than 35 strokes per layer using tamping rod (steel bar 16mm diameter and 60cm long, bullet-point at lower end). Level the top surface and smoothen it with a trowel.

Figure 2 Concrete Mixing

Concrete Curing

The test specimens are stored in moist air 24 hours and after this period the specimens aremarked and removed from the moulds and kept submerged in clear freshwater until taken out prior to the test.

Procedure for testing the specimens

- Remove the specimen from the water after specified curing time and wipe out excesswater from the surface as shown in the figure 3.
- Take the dimension of the specimen to the nearest 0.2m.
- Clean the bearing surface of the testing machine.
- Place the specimen in machine in such a manner that the load shall be applied to the sideof the specimen.

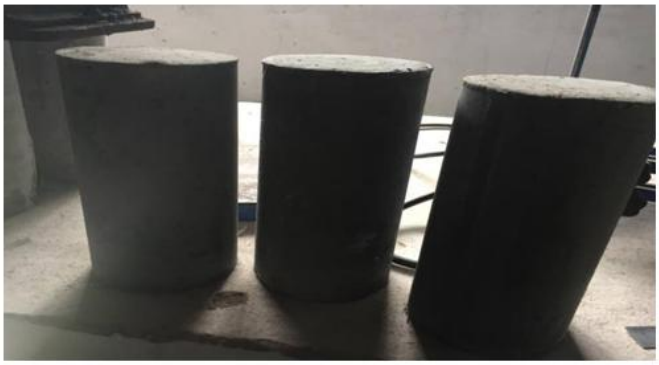

Figure 3 Cast Specimens

Flexural Strength

Reinforcement Detailing

RCC beams for the experimental study was designed using M25 grade concrete and F_e550 TMT bars. It was designed using limit state method considering it to be an under- reinforced section. The beam was designed as having 2 steel bars of 8mm diameter at compression face and 2 steel bars of 8 mm and 1 bar of 10 mm diameter at tension face. The stirrups used were of 8 mm diameter, provided at a spacing of 100 mm center to center of the Beam is 25 mm. The dimension of the beam was fixed to 1500 mm x 215 mm x125 mm overall. The reinforcement details of the designed beam as shown in the figure 4, 5 and 6.

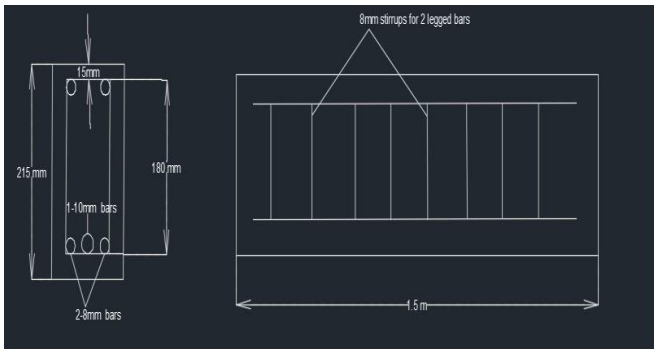

Figure 4 Reinforcement Detailing

Figure 5 Reinforcement and Stirrups

Figure 6 Steel Reinforcement

Casting and Curing for Beams

M25 grade concrete mix was selected and designed as per standard design procedure using the properties of materials found. The water-cement ratio used in the design was 0.5.The mix was designed to get a slump value of 120 mm. The Compressive strength of the concrete was mixes obtained by testing cubes after 7 days and 28 days of water curing were respectively. A concrete mixer machine was used to produce each batch of concrete. RCC beams for the experimental study was designed using M25 grade concrete and F_e550 TMT bars. The reinforcement details of the designed beam section. For the curing the beams we are using gunnybags as shown in the figure 7. The beams were cured by wet gunny bags on it.

Figure 7 Curing Beams

Testing the Beam using loading Frame

The three-point bending flexural test provides values for the modulus of elasticity in bending and the flexural stress–strain response of the material. This test is performed on a loading frame with a three-point or four-point bend fixture. The main advantage of a three-point flexural test is the ease of the specimen preparation and testing. For the three pointing loading wecan called as simply supported beam has shown in the figure 8.

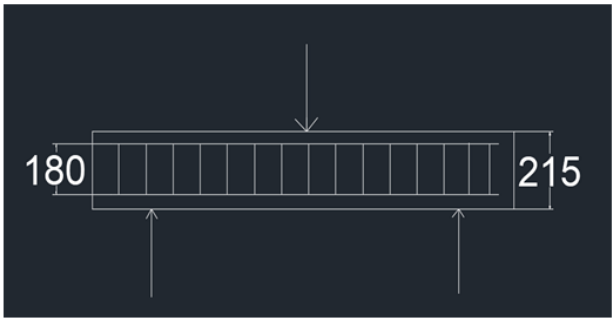

Figure 8 Testing Beam in Loading Frame

RESULTS AND DISCUSSIONS

Preliminary Results

Cement

Ordinary Portland cement has been used for casting of all the specimens thought out ofthis project and the properties of cement are tested and reported as below table1.

S. No	Properties of cement	Value obtained
1	Standard Consistency	38%
2	Grade of cement	OPC 53
3	Specific gravity	3.1
4	Initial setting time	125 min
5	Final setting time	480 min

Table 1 Properties of Cement

Fine Aggregate

For the purpose of concrete mix design locally available sand is used and conducted testson it. The results on sand have been and reported as below table 2.

S. No	Properties of cement	Value obtained
1	Specific gravity	2.5
2	Fineness modulus	2.74

Table 2 Properties of fine aggregate

Coarse Aggregate

Coarse aggregate used for mix design through out of this project has been tested and testresults shown below table 2.

Table 3 Properties of Coarse Aggregate

S.No	Properties	Values obtained
1	Size of Aggregate	20mm
2	Specific Gravity	2.8
3	Impact Value	4.5%

Quartz Powder

As a replacement of sand Quartz powder is used and it has been tested in this laboratory. In these cases, powdered quartz flour with a mean particle size of 10 – 15 μm, and the results of Quartz Powder shown in table 4.4.

Compressive Strength of Concrete

Compressive Strength for Conventional Concrete

For the M25 mix design as per IS 10262:2019 the cube specimens have been tested for compression test using compression testing machine as shown in fig.1.4,as per design the target strength is 31.6 MPa. As per the experimental investigation results are obtained, the cube compressive strength results for 7 days and 28 days as shown in tables 3 and 4.

No. of Days	Cube Compressive Strength inMPa
Sample 1	11.41
Sample 2	11.51
Sample 3	11.6

Table 4 for 7 Days Cubes Compressive Strength

The average compressive strength of concrete is 33.06 MPa which more than target compressive strength of

31.6 MPa. Hence it is recommended to use this mix through out of the project.

Partial Replacement of 5% with Quartz Powder

For the M25 mix design as per IS 10262:2019 the cube specimens are tested for compression test. As per design the target strength is 31.6 MPa. In the replacement of quartz powder with 5%. As per the experimental investigation results are obtained for 7 days and 28 days as show in the table 4 and 5.

No. of Days	Cube Compressive Strength in MPa
Sample 1	19.2
Sample 2	16.09
Sample 3	12.73

Table 5 for 7 Days Cubes Compressive Strength with 5% of Quartz Powder

Partial Replacement of 10% with Quartz Powder

For the M25 mix design as per IS 10262:2019 the cube specimens are tested for compression test. As per design the target strength is 31.6 MPa. In the replacement of quartz powder with 10%. As per the experimental investigation results are obtained for 7 days and 28 days

No. of Days	Cube Compressive Strength in MPa
Sample 1	22.3
Sample 2	20.09
Sample 3	13.5

Table 6 for 7 Days Cubes Compressive Strength with 10% of Quartz Powder

Partial Replacement of 15% with Quartz powder

For the M25 mix design as per IS 10262:2019 the cube specimens are tested for compression test. As per design the target strength is 31.6 MPa. In the replacement of quartz powder with 15%. As per the experimental investigation results are obtained for 7 days and 28 days

No. of Days	Cube Compressive Strength in MPa
Sample 1	25.4
Sample 2	21.09
Sample 3	13.73

Table 7 for 7 Days Cubes Compressive Strength with 15% of Quartz Powder

Figure 9 Compressive Strength of Concrete

Comparison of Compressive Strength for (CC) and (QPC)

In the figure 10 and 11 the graph has drawn the variation of Conventional concrete and Quartz powder for various percentages are 0%, 5%, 10%, and 15% for the 7 days and 28 days, the total average results for the compressive strength values

Percentages of Quartz Powder	Average Compressive Strength in MPa
0%	11.41
5%	16.06
10%	18.63
15%	20.07

Table 8 Average Compressive Strength for 7 Days

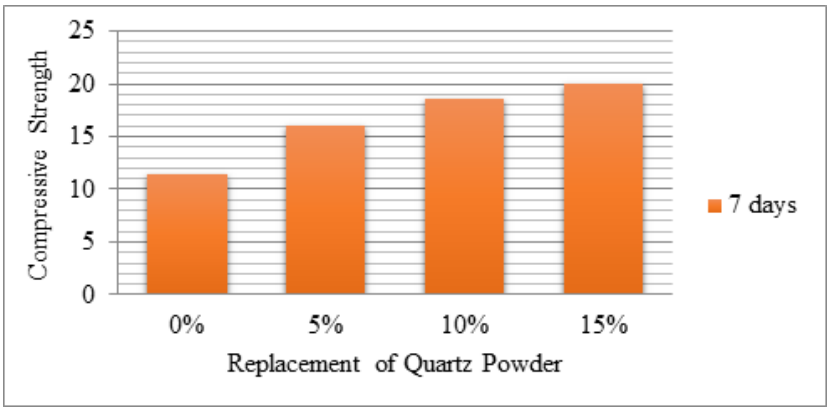

Figure 10 Compressive Strength of Concrete with Various Percentages of Mixture for 7 Days

Percentages of Quartz Powder	Average Compressive Strength in MPa
0%	33.06
5%	35.43
10%	36.43
15%	37.16

Table 9 Average Compressive Strength for 28 Days

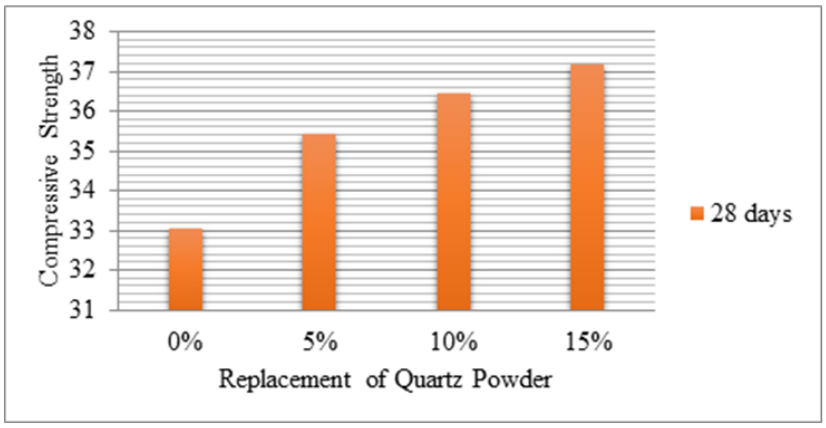

Figure 11 Compressive Strength of Concrete with Various Percentages of Mixture for 28 days

Flexural Strength of Conventional Beam and Quartz Replaced Concrete Beams

For the purpose of finding flexural strength of Reinforced concrete beams with conventional beam and Quartz replaced concrete two beams has the length is 1.5m, width is 125mm and depth is 215mm has been cast. The details of Reinforcement have been shown in figure 12. The beam is cured for 7 days.

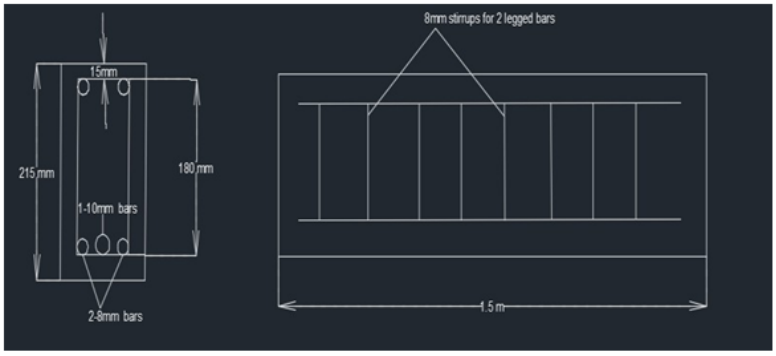

Figure 12 Details of Reinforcement

Figure 13 After Testing Quartz Beam

The deflection of the beam is occurring in the middle of span by using LVDT3513, LVDT4192 and LVDT4193 of frame as showing in the figure 14 and figure 17. It is the 3 pointing loading process of beam. The graph has drawn between the conventional beam and quartz powder has shown in figure 15. After applying the load when the maximum deflectionwill occur, at that the LVDT has removed has shown in the figure 16 and 17.

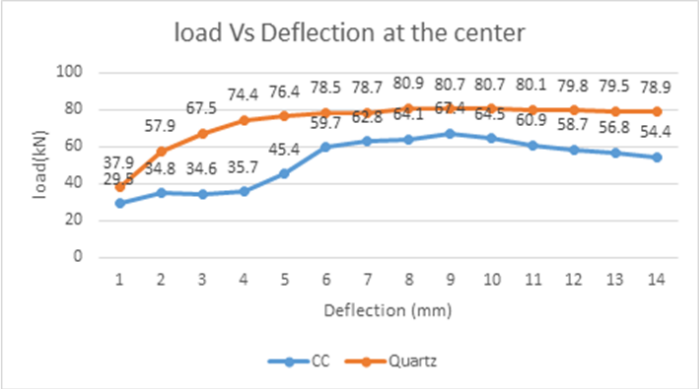

Figure 14 Comparisons of Conventional and Quartz Beam

Failure of Beam

At the load of 76 KN the (3) and (4) cracks were observed at the middle span of beam with initial crack (3) the final point cracks width is 2.5 mm at the load of 80 KN the cracks 1 and2 the width increasing at the end point the maximum crack is 9 mm for Quartz Beam and also for the Conventional Beam the maximum crack is 7 mm. When the load was applied in the beam the cracks has shown in the fig 4.11 and 4.12.

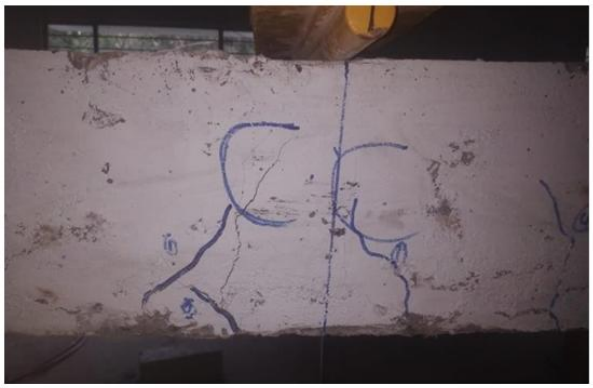

Figure 11 Cracks at the Mid Span Beam

Figure 12 Cracks Generated at Mid Span of Beam

CONCLUSION

It has been found that substituting 5 percent, 10 percent, and 15 percent of the sand in nominal strength concrete with quartz powder can increase that material's compressive strength by 40 percent, 63 percent, and 75.89 percent for seven days, and by 7.16 percent, 10.19 percent, and 12.40 percent for 28 days, respectively.

The compressive strength of concrete with a nominal strength of 15 percent can be increased by 75.89 percent for the first seven days and by 12.40 percent for the following 28 days, respectively, by replacing 15 percent of the sand with quartz powder. When the load is applied to the beam, there is more deflection visible. Flexural strength was found to be higher at the quartz beam than at the conventional beam.

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OPTIMIZATION OF 2,4,6 TRI-IODINATED BENZENE QUANTUM CHEMICALS USING CONTRAST COMPOUNDS

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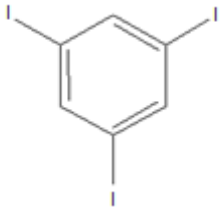
Abstract
In this investigation, the gas phase and water were used to optimize the 2,4,6 tri-iodinated benzene, iohexol (IHX), and iodixanol contrast agent. The total energy for various orbital transitions, the energy difference etween HOMO and LUMO, the electrophilicity index, the electro-negativity, the chemical hardness and oftness, and the dipole moment were all to be calculated. These computations were performed using 3LYP with the basis sets (cep-4g, cep-31g, cep-121g, and Lanl2dz). Analysis had been done on the molecules' stability resulting from charge delocalization and hyper conjugative interactions. The stabilization energy E (2) more than 40 kcal/mole for iohexol and iodixanol has been measured for each donor, NBO I and acceptor, NBO (j).
Keywords: iohexol, iodixanol, osmolality, energy gap, conjugative, stabilization.

Introduction

The contrast agents used today are They were enormously developed and pyelography applications [1]. all based on a 2,,6-triiodobenzene ring. Fig. 1. for general X-ray imaging, in angiographic

Figure 1. 2,4,6-Triiodo Benzene Structure.

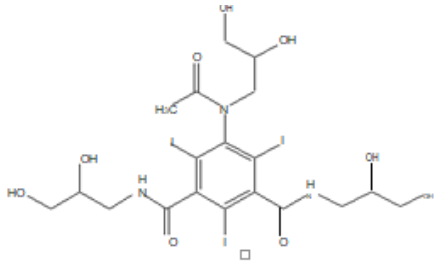


Iodinated contrast agents can exist as monomers (single tri-iodinated benzene ring), or dimers (2 tri-iodinated benzene rings linked together by an organic functional group).
So, iodinated compounds can be subdivided into 4 considerable classes: ionic monomer, ionic dimer, nonionic monomer, and nonionic dimer [2].
The first- generation contrast agents were high osmolar ionic monomers. High-osmolar contrast agents have an osmolality up to 7 or 8 times greater than blood and have connected with a high risk of adverse reactions [3].

In 1960, the second generation of contrast compounds had developed. These are non-ionic monomer compounds, which are water-soluble low molecular weight molecules that cannot ionize in a solution resulting in lower osmolality.

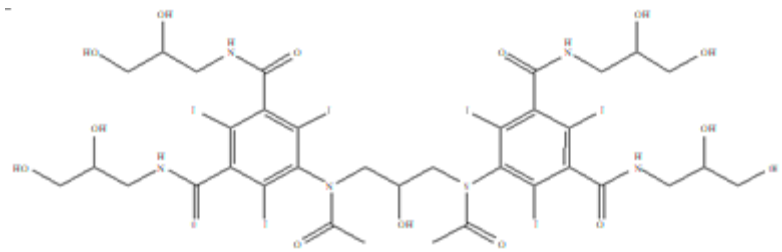
Amide function and hydroxyl group are often inserted into the molecular structure to realize sufficient water solubility at physiologic conditions. These agents include iopamidol (Isovue), ioversol (Optiray), and compounds. Figure 2.

Figure 2. Iohexol Structure.



In 1996, the first third-generation agent, iodixanol, a nonionic dimer, iso-osmolar with hydrophilic characteristics, had been approved by the US Food and Drug Administration. Iodixanol had found to have an improved safety profile [5]. Figure III illustrates the chemical structure of iodixanol, which is the other one of our title compounds.

Figure 2. Iodixanol Structure.



Remarkable clinical various have not been definitively noted among the difference low osmolar contrast agents [6].

Some studies found that when iodixanol is used, the frequency of contrast- induct nephropathy is rather lower than other low-osmolar contrast agents but other investigators did not validate these conclusions [7]. The chemical properties of the contrast compounds (nonionic vs ionic, dimer vs monomer) may lead to the development of contrast-induct nephropathy.

2. Materials and Method

The optimized molecular structure of the 2,4,6-triiodobenzene and its derivatives iohexol, and iodixanol had calculated at the B3LYP level with the basis sets cep-4g, cep-31g, cep-121g, and Lanl2dz to examine the basis set dependence of HOMO and LUMO energies. Single point energy calculations had performed for natural bond orbital analysis. The stability of the molecules originating from charge delocalization and hyper conjugative interactions had analyzed using natural bond orbital analysis. For each donor, NBO (i) and acceptor NBO (j), the stabilization energy E more than (40 kcal/mole) for the title compounds had investigated. Molecular properties related to High Occupied Molecular Orbitals HOMO and Law Unoccupied Molecular Orbitals LUMO such as the hardness (η), softness (s), electronegativity (χ), chemical potential (μ), electrophilicity index

(ω), nucleofugality ΔEn and electrofugality ΔEe had calculated by using the following information, the hardness is a half of the energy gap between HOMO and LUMO

$$\eta=1/2(E_{LUMO}-E_{HOMO}) \quad (1)$$

The softness can be calculated from hardness that

$$S=1/2\eta \quad (2)$$

Electronegativity can be calculated from EHOMO and ELUMO using the following equation

$$\chi=-1/2\,(E_{LUMO}+E_{HOMO}) \quad (3)$$

From electronegativity, chemical potential can estimated that

$$\mu=-\chi \quad (4)$$

$$\mu=1/2(E_{LUMO}+E_{HOMO}) \quad (5)$$

Electrophilicity index (□), nucleofugality□□En, and electrofugality□Ee had calculated from chemical potential μ and the hardness η by the following :[8]

Electrophilicity index

$$\omega=\mu^2/2\eta \quad (6)$$

Nucleofugality

$$\Delta En=(\mu+\eta)^2/2\eta \quad (7)$$

Electrofugality

$$\Delta Ee=(\mu-\eta)^2/2\eta \quad (8)$$

3. Results and Discussion

3.1. HOMO-LUMO energy calculation

The surfaces of HOMO, LUMO of iohexol and iodixanol were drawn and given in Figure 4, to understand the bonding scheme of the present compound. The energy of High Occupied Molecular Orbitals energy (EHOMO) and Low Unoccupied Molecular Orbitals ELUMO of title compounds in the gas phase by using the B3LYP method and cep-4g, cep-31g, cep-121g, and lanl2dz basis sets had reported in Table 1

Figure 4 :The Surfaces of HOMO, LUMO of IHX and HOMO, LUMO of IDX.

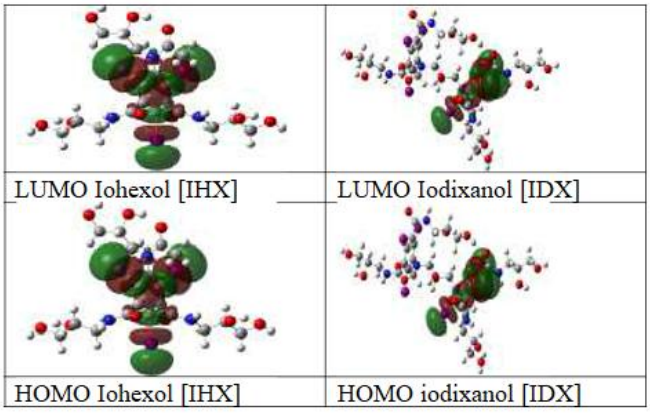


Table 1. The Energies of HOMO and LUMO in The Gas Phase.

M	C	LUMO+1	LUMO	HOMO	HOMO-1

		(eV)	(eV)	(eV)	(eV)
cep-4g	TIB	2.21	1.18	-9.27	-9.33
	IHX	-2.77	-2.83	-6.00	-6.67
	IDX	-2.56	-2.70	-6.25	-6.59
cep-31g	TIB	-1.35	-2.36	-6.99	-7.00
	IHX	-1.81	-2.55	-6.84	-7.03
	IDX	-2.07	-2.59	-6.35	-6.46
cep-121g	TIB	-1.34	-2.39	-7.04	-7.04
	IHX	-1.81	-2.59	-6.92	-7.08
	IDX	-2.11	-2.61	-6.41	-6.52
Lanl 2dz	TIB	-1.31	-2.16	-6.98	-6.98
	IHX	-1.77	-2.37	-6.71	-6.98
	IDX	-1.87	-2.41	-6.28	-6.39
Method, M. Compounds, C					

As seen in Table 1, for the title compounds, the energies of HOMO have negative values, and they became less negative by substitution. For example, in the B3LYP/cep- 121g method, EHOMO of TIB was -7.04 eV, this value became less negative to record, -
6.92 eV, -6.41 eV for IHX and IDX respectively.

On the other hand, the energies of LUMO had negative values, and they became more negative by substitution. For example, in the same method, B3LYP/cep-121g, ELUMO of TIB was -2.39 eV. It became more negative by substitution. It was -2.59 eV, -2.61 eV for IHX and IDX respectively. When the title compounds had optimized in the solution phase, by using water as a solvent, the results were affected by the solvation as seen in Table2,

Table 2. The Energies of HOMO and LUMO in Water.

M	C	LUMO+1 (eV)	LUMO (eV)	HOMO (eV)	HOMO-1 (eV)
cep-4g	TIB	-2.27	-2.27	-7.29	-7.29
	IHX	-2.92	-2.92	-6.57	-6.98
	IDX	-2.87	-2.91	-6.76	-6.95
cep-31g	TIB	-1.24	-2.25	-6.93	-6.93
	IHX	-1.79	-2.51	-7.12	-7.14
	IDX	-2.27	-2.27	-7.29	-7.29
cep-121g	TIB	-2.92	-2.92	-6.57	-6.98
	IHX	-2.87	-2.91	-6.76	-6.95
	IDX	-1.24	-2.25	-6.93	-6.93
Lanl 2dz	TIB	-1.79	-2.51	-7.12	-7.14
	IHX	-2.27	-2.27	-7.29	-7.29
	IDX	-2.92	-2.92	-6.57	-6.98
Method, M - Compounds, C					

For example; in the (B3LYP/cep-121g) method in the solution phase, HOMO energy values of TIB, IHX became less negative by solvation to recorded -6.57 eV, -6.76 eV which was -7.04 eV, -6.92 eV in the gas phase. In contrast to IDX, which recorded more negative values – 6.96 eV in the solution phase, which was -6.41 eV in the gas phase, and this maybe was due to the presence of two 2,4,6-triiodobenzene rings

On the other hand, by using the same method (B3LYP/cep–121g) in the solution phase, the LUMO energy became more negative values, for TIB, IHX, and less negative value for IDX. The LUMO energy values of TIB and IHX were -2.92 eV, -2.91 eV respectively, in the solution phase, these values were only -2.39 eV, -2.59 in the gas phase. In contrast to IDX, which recorded less negative values – 2.25 eV in the solution phase, which was - 2.61 eV in the gas phase.

These changes in values of HOMO and LUMO energy by substitution in the title compounds, led to a decrease in the energy gaps between HOMO and LUMO as they had reported in Table 3. As instant, on the same basis set, B3LYP/cep-121g, the energy gap of [TIB] was 4.65 eV, this value decreased in [IHX] and [IDX] to record 4.33 eV, 3.80 eV respectively. These values indicated that [TIB] is more stable than its derivatives compounds [IHX] and [IDX].

On the other hand, the values of energy gaps between HOMO and LUMO increased by solvation for the title compounds. In the same basis set, B3LYP/cep -121g, energy gaps in the gas phase for [TIB], [IHX] and [IDX] were 4.65, 4.33 and 3.80 electron volt respectively and these values increased in water as a solvent to register 4.70, 4.63 and 4.39 electron volt respectively, as it appeared in Table 5. These results indicate that the title compounds are more stable in the solution phase.

The electrochemical properties such as the electronegativity χ, the hardness η, the softness S, the chemical potential μ, the electrophilicity index ω, nucleofugality ΔEn, and electrofugality ΔEe had calculated from EHOMO and ELUMO in the gas phase, and the solution phase and were reported In Tables 3, 4 and 5, 6, respectively.

From Tables 3, it is easy to note that the hardness decreased by substitution for the title compounds in the gas phase. For example, by using the B3LYP/cep -121g basis set, the hardness had recorded 2.32 eV for TIB. This value decreased by substitution, to record 2.17 eV, and 1.90 eV for IHX, and IDX, respectively.

From Tables 5, it is easy to note that the hardness increased by the solvation in the title compounds. For example, by using the B3LYP/cep -121g basis set, the hardness recorded 2.32 eV, 2.17 eV, and 1.90eV in the gas phase for TIB, IHX, and IDX, respectively. These values increased by solvation to record 2.35 eV, 2.31 eV, and 2.19 eV for TIB, IHX, and IDX, respectively.

These results were in agreement with the fact, an increase in hardness is a measure of the movement of the system toward a more stable configuration. [9]

Table3. Some Parameters in Gas Phase**.**

Method	compound	EHOMO (eV)	ELUMO (eV)	ΔE (eV)	χ (eV)	η (eV)
Cep-4g	TIB	-7.29	-2.25	5.04	4.77	2.52
	IHX	-6.00	-2.83	3.17	4.42	1.59
	IDX	-6.25	-2.70	3.55	4.47	1.77
Cep-31g	TIB	-6.99	-2.36	4.63	4.68	2.31
	IHX	-6.84	-2.55	4.29	4.70	2.14
	IDX	-6.35	-2.59	3.76	4.47	1.88

Cep-121g	TIB	-7.04	-2.39	4.65	4.72	2.32
	IHX	-6.92	-2.59	4.33	4.75	2.17
	IDX	-6.41	-2.61	3.80	4.51	1.90
Lanl2dz	TIB	-6.98	-2.16	4.81	4.57	2.41
	IHX	-6.71	-2.37	4.34	4.54	2.17
	IDX	-6.28	-2.41	3.87	4.35	1.94

Table4. Some Parameters in Gas Phase.

Method	compound	S $(eV)^{-1}$	μ (eV)	ω (eV)	ΔEn (eV)	ΔEe (eV)
Cep-4g	TIB	0.20	-4.77	4.52	1.01	10.56
	IHX	0.32	-4.42	6.15	2.52	11.36
	IDX	0.28	-4.47	5.64	2.06	11.00
Cep-31g	TIB	0.22	-4.68	4.73	1.21	10.57
	IHX	0.23	-4.70	5.15	1.52	10.91
	IDX	0.27	-4.47	5.32	1.79	10.73
Cep-121g	TIB	0.22	-4.72	4.79	1.23	10.67
	IHX	0.23	-4.75	5.21	1.54	11.05
	IDX	0.26	-4.51	5.37	1.80	10.82
Lanl2dz	TIB	0.21	-4.57	4.34	0.97	10.12
	IHX	0.23	-4.54	4.74	1.29	10.36
	IDX	0.26	-4.35	4.88	1.50	10.19

Table 5. Some Parameters in Water.

Method	compound	HOMO (eV)	LUMO (eV)	ΔE (eV)	χ (eV)	η (eV)
Cep-4g	TIB	-7.29	-2.27	5.02	4.78	2.51
	IHX	-6.57	-2.92	3.65	4.74	1.82
	IDX	-6.76	-2.91	3.85	4.84	1.92
Cep-31g	TIB	-6.93	-2.25	4.68	4.59	2.34
	IHX	-7.12	-2.51	4.61	4.82	2.31
	IDX	-6.89	-2.58	4.31	4.74	2.16
Cep-121g	TIB	-6.98	-2.28	4.70	4.63	2.35
	IHX	-7.17	-2.54	4.63	4.85	2.31
	IDX	-6.96	-2.57	4.3	4.77	2.19

				9		
Lanl2dz	TIB	-6.94	-2.07	4.87	4.51	2.43
	IHX	-7.11	-2.35	4.76	4.73	2.38
	IDX	-6.89	-2.42	4.47	4.65	2.23

Table 6. Some Parameters in Water.

Method	compound	S $(eV)^{-1}$	μ (eV)	ω (eV)	ΔEn (eV)	ΔEe (eV)
Cep-4g	TIB	0.20	-4.78	4.55	1.03	10.59
	IHX	0.27	-4.74	6.18	2.35	11.84
	IDX	0.26	-4.84	6.09	2.21	11.88
Cep-31g	TIB	0.21	-4.59	4.50	1.08	10.26
	IHX	0.22	-4.82	5.02	1.36	10.99
	IDX	0.23	-4.74	5.20	1.54	11.01
Cep-121g	TIB	0.21	-4.63	4.55	1.10	10.36
	IHX	0.22	-4.85	5.08	1.39	11.09
	IDX	0.23	-4.77	5.18	1.51	11.05
Lanl2dz	TIB	0.21	-4.51	4.17	0.88	9.89
	IHX	0.21	-4.73	4.69	1.16	10.61
	IDX	0.22	-4.65	4.85	1.31	10.62

From Tables 4, it appeared that the softness S, the electrophilicity index **ω,** the electrofugality ΔEe. and the nucleofugality ΔEn of the title compounds increased by substitution. For example, the optimization of title compounds using B3LYP/cep -121g, in the gas phase indicated that the softness of [TIB] was 0.22 eV^{-1}. This value increased to 0.23 eV^{-1} and 0.26 eV^{-1} for [IHX], and [IDX], respectively. The electrophilicity index **ω** was 4.79 eV for TIB, and it increased to 5.21 eV and 5.37 eV for IHX, and IDX, respectively. The electrofugality ΔEe was 10.67 eV for TIB, and it increased to 11.09 eV, 11.05 eV for IHX, and IDX, respectively.
Likewise, the nucleofugality ΔEn recorded 1.23 eV for TIB, and this value increased to 1.54 eV, 1.80 eV for IHX, and IDX, respectively.

On the hand, from Tables, 4,6, one can note that the softness S, the electrophilicity index **ω,** the electrofugality ΔEe decreased by solvation in the water. For example, from the optimization of the title compounds using B3LYP/cep -121g, the softness of TIB, IHX, and IDX recorded 0.22 eV^{-1},0.23 eV^{-1} and 0.26

eV^{-1} in the gas phase. These values decreased by solvation to record 0.21 eV^{-1},0.22 eV^{-1} and 0.23 eV^{-1}, respectively. The electrophilicity index ω of TIB, IHX, and IDX recorded 4.79 eV, 5.21 eV, and 5.37 eV, in the gas phase. These values decreased by solvation to record 4.55 eV, 5.08 eV, and 5.18 eV, respectively.

3.2 Dipole Moment Calculations.

The dipole moment of the title compounds had investigated in the gas, and the solution phases, by using water as a solvent, and the results had reported in Table 7.

As it has appeared in Table 7, the dipole moment is directly proportional to the increase of substitution units.

Table 7. The Dipole Moment of The TIB, IHX and IDX Compounds.

Method	compound	Dipole Moment **(**Debye) Gas	Dipole Moment(Debye) water
Cep -4g	TIB	0.0015	0.003
	IHX	7.5332	8.1698
	IDX	11.1896	14.622
Cep -31g	TIB	0.0014	0.0005
	IHX	9.8661	11.7428
	IDX	15.0918	21.7633
Cep-121g	TIB	0.0029	0.0032
	IHX	9.9534	11.8064
	IDX	14.8346	18.6151
Lanal2dz	TIB	0.0013	0.0007
	IHX	10.0078	11.9517
	IDX	15.5192	21.3946

For example, in the gas phase, when the title compounds had optimized by using the B3LYP/cep -121g basis set, the dipole moment for TIB was 0.0029 Debye, and this value increased by substitution. It became 9.9534 Debye, 14.8346 Debye for DTZ, and IOG, respectively.

By solvation in the water, we noted that the dipole moment of the title compound recorded notable increasing. For instance; when the title compounds had optimized by using the same basic set B3LYP/cep -121g in solution phases, the dipole moment for TIB, IHX, and IDX recorded 0.0032, 11.086 and 18.6151 Debye respectively which were 0.0029, 9.9534 and 14.8346 Debye for TIB, IHX, and IDX respectively in the gas phase.

3.3. Natural bonding orbitals [NBOs] calculations.

The perturbation energy of donor-acceptor interaction more than (40 kcal/mole) for IHX and IDX using the B3LYP/cep -121g basis set had indicated in Table 8

Figure 5 The Geometric Structure of Iohexol [IHX] and Iodixanol [IDX].

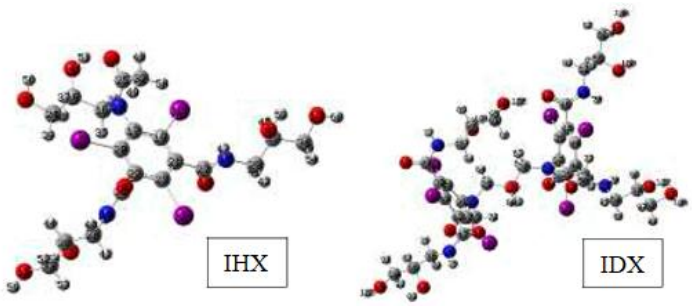


Table 8. Analysis of Second-Order Perturbation Theory of The Fuck Matrix in NBO Basis of Iohexol [IHX] and Iodixanol [IDX] Using B3LYP/cep -121g Basis Set.

Compound	Donor (i)	Acceptor (j)	Type	ED(j)I	E(2) kcal/mol
IHX	LP1N13	O6-C25	π*	0.269	45.59
	LP1N14	O9-C26	π*	0.289	47.13
IDX	LP1N15	O10-C27	σ*	0.303	54.00
	LP1N22	O8-C33	π*	0.258	52.39
	LP1N23	O9-C34	π*	0.269	58.39
	LP1N24	O10-C47	σ*	0.323	74.00
	LP1N25	O11-C48	σ*	0.302	44.84
	LP1N26	O12-C49	σ*	0.315	72.33

From Table 8, the intramolecular hyper-conjugative interactions in iohexol compound had formed by the orbital overlap between
(N13 and π*(O6 –C25) bond orbitals),
(N14 and π*(O9 –C26) bond orbitals), and
(N13 and π*(O10 –C27) bond orbitals.
These intramolecular hyper-conjugative interactions reported ED 0.269ē, 0.289 ē and o.303ē respectively, leading to stabilization energy of 45.59 kcal mol-1, 47.13 kcal mol-1 and, 54.00 kcal mol-1, respectively.
From the same Table 8, the intramolecular hyper-conjugative interactions in iodixanol compound had formed by the orbital overlap between, LP1N22 and π*(O8–C33) bond orbitals),
LP1N23 and π*(O9–C34) bond orbitals),
LP1N24 and π*(O10–C47) bond orbitals),
LP1N25 and π*(O11–C48) bond orbitals), and
LP1N26 and π*(O12–C9) bond orbitals).
These intramolecular hyper-conjugative interactions reported ED 0.258, 0.269, o.323 ē, 0.302ē, and 0.315 ē respectively, and leading to stabilization energy of 52.39 kcal mol-1, 58.39 kcal mol-1, 74.00 kcal mol-1, 44.84 kcal mol-1, and 72.33 kcal mol-1 respectively.

Conclusion

Through the optimization of 2, 4, 6-tri-iodobenzene, iohexol, and iodixanol contrast agents by using Lee-Yang-Parr correlation functional and gradient corrected with Becke's three-parameter hybrid exchange functional B3LYPmethod, our calculations indicated that the values of energy gaps between HOMO and LOMO in the title compounds decreased by nonionic substitution and were effected by presences of two 2,4,6-triiodobenzene ring in case of IDX compound.

This change led to a change in the other energy gap dependent values, such as chemical potential, electronegativity, chemical hardness, electrophilicity index, and dipole moment. From a second-order perturbation treatment of the Fuck matrix in the NBO basis, the intramolecular hyper-conjugative interactions in the title compounds led to high stabilization energy which illustrated that IHX and IDX are more stable than TIB. So the quantum chemical calculations have a long-established great interest in finding ways to reliably and accurately predict the molecular and electronic properties of the compounds especially drug compounds to investigate any side effects of drug-drug interaction and moreover to predict new drugs.

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AN INVESTIGATIONAL STUDY ON FIBRE REINFORCED CONCRETE USING BARYTES POWDER AND SLAG FROM AN IRON BLAST FURNACE

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ABSTRACT
One of the most often used building materials worldwide is cementing concrete. There is an increasing need for civil infrastructure due to urbanization, population growth, and human desires. Iron blast furnace slag or blast furnace slag is the slag created at the blast furnace during the production of pig iron. In India and other organized labor settings, such as in the production of land fill and railroad ballast iron, blast furnace slag is mostly employed as an increment. A non-metallic by-product of the iron-making process, blast furnace slag is made of silicates, alumino silicates, and calcium-alumina silicates. Barium sulphate makes up the mineral known as barite (BaSO4). The characteristics of concrete with various percentages and complete replacements of fine-aggregates by iron slaws can be determined for M3the 0grade of concrete. For all the mix proportions mechanical propertieswill be found out of form optimum replacement of sand with iron blast furnace slag in concrete cement replacement of barytes powder in concrete. In this work, 150 x150x mm cubes were casted for testing of compressive strength the cubes can be immersed in water in curing tanks 14, 28 days the testing is done. The testing is done as per that procedure given in IS516- 1959.
Keywords: Cement concrete, Iron Blast furnace slag, Barite, BaSO4 (Barium Sulphate).

INTRODUCTION

One of the most often used building materials worldwide is cementing concrete. According to a research by the Indian Institute of Technology Bombay, metropolitan India needs around 60 million metric tons of sand annually. In India, blast furnace slag is mostly utilized to make cement and for various unorganized projects like landfills and railroad ballast.

From plant to plant, the cost of iron blast furnace slag +varies. The health of society depends on sustainability. Utilizing locally accessible materials that require little maintenance, have excellent durability, and consume little energy is essential. Barytes or Barites in soft crystalline mineral form of barium sulphate ($BaSO_4$) Mangampeta deposit in Kadapa district Of A.P, India is the Single largest barites deposit in the world greater amount of chlorideion were fixed during the hydration C_3A synthesized the presence of Baso4. Synthesized C_3A but also opc mortar can fix greater amounts of chlorides in the presence of $BaSo_4$. Many researchers have carried out investigations on the concrete with replacement of sand by iron blast furnace slag. There are a few studies made on finding the suitability of locally available (in Kadapa district) Iron blast furnace slag as replacement to sand and the effect of barites powder on the concrete with replacement of sand and also addition glass fibers. In the present study an attempt is made to find the

effect ofIron Blast furnace slag fine aggregate as a partially replacement to sand with and without the partial replacement of cement by locally available barites powder on the mechanical properties of M30 grade concrete.

The growing population, urbanization and the desires of human beings necessitate the need for more and more civil infrastructure. The growing industrialization and the greed of human beings demand the need for utilization of the industrial waste and economical use of materials. The industrial waste product safe disposal / usage have become a tough problem which is yet to be addressed fully. To make use of materials effectively and economically and for sustainability, it has become inevitable to make use of the waste/bi-products making them into resources and use the locally available materials in the construction. To make use of the locally available material the sustainability of the materials for theconstruction and the interaction of these materials with the traditional natural materials need to be established.Cement concrete is the third largest material after food and water consumed by human beings. It is also proved that the cement concrete is susceptible for accepting many industrial waste / bi-products without damaging the properties of it and thus contributing much for the safe utilization of waste material duly the value to them. To overcome the deficiencies of the OPC and to make use of the locally available waste and other cheaply available material natural / mineral resources, it is proposedto use glass fiber, barites power and iron blast furnaces slag in OPC concrete and find the mechanical properties of concrete. The relevant information is collected various national and international journals and used in this mini-project.

Barite is a mineral composed of barium sulfate ($BaSO_4$). It receives its name from the Greek word "barys" which means "heavy."This name is in response to barite's high specific gravity of 4.5, which is exceptional for a non-metallic mineral. The high specific gravity of barite makes itsuitable for a wide range of industrial, medical, and manufacturing uses. Baritealso serves as the principal ore of barium.

Uses for regular glass fiber include mats and fabrics for thermal insulation, electrical insulation, sound insulation, high-strength fabrics or heat- and corrosion-resistant fabrics. It is also usedto reinforce various materials, such astent poles, pole vault poles, arrows, bows and crossbows, translucent, roofing, panels, automobile bodies, hockey sticks, surfboards, boat hulls, and paper honeycomb. It has been used for medical purposes in casts. Glass fiber is extensively used for making FRP tanks and vessels. Open-weave glass fiber grids are used to reinforce asphalt pavement. Non-woven glass fiber/polymer blend mats are used saturated with asphalt emulsion and overlaid with asphalt,producing a waterproof, crack-resistantmembrane.

LITERATURE SURVEY

P. Meenakshi et al [1] have done experiment on Partial replacement of cement by barite sand lime powder in concrete. The barite sand lime powder has been replaced with cement at dosage of0%, 10%, 20%, and 30%. The compressive strength at 7, 14, 28 days has been conducted. The 7 days compressive strength of 10% replacement and 20%replacemen of barite sand lime powder both(5%,10%each)showed highest value of approximately 1.5 times the control mix.

SakshiGuptha et. al., [2] have conducted a study on Partial replacement of cement by fly ash and glass fiber in light weight fiber reinforced concrete. Replacement of cement by glass fiber in different fractions with 0%, 1%,1.5%, 2%, 2.5%, 3% and

30% of fly ash has been used. The flexural and compressive strength tests have been carried out.

Yogesh Iyer Murthy, ApoorvSharda, Gourav jain et. al., [3] have studied compressive strength, flexural strength of concrete with glass fiber. M30 grade of concrete was used. The compressive strength goes on increasing till 1.5% ofglass fiber. The maximum value obtained was 40.44Mpa. The flexure strength goes on increasing up to 1.5% and the maximum value obtained was 5.3 Mpa.

Samprati Mishra [4] has studied the compressive strength of M25and M40grade of concretes using glass fibre. The glass fibre used here are 12mm in length and thediameter of each fibre is 14microns. The strength goes on increasing upto 2% addition of glass fiber. Maximum compressive strength is attained in addition of 2% addition of Glass Fibre with M40 grade of concrete.

Nandini Reddy, P.Gopal [5] studied thecompressive strength M20 grade ofconcrete was adopted. Subsequent to adding 10% iron slag in the blend, there is an expansion of 26% following 7 days, half increment following 28 days and 43% expansion following 56 days when contrasted with the control blend. By adding 20% and 30% iron slag , there is huge measure of expansion in rate for example 68%, 91%, 78% and 125%, 113%
, 87% following 7, 28 and 56 daysseparately.

Komal Chawla and Bharti Tekwani [6] Have studied the GLASS FIBERREINFORCED CONCRETE COMPOSITES. The tests were conducted on compressive strength , flexural strength The results show that the increase in compressivestrengthisupto37%incaseofadding0.33%fibercontentincomparison ofconventional concrete. The percentage increase in flexure strength of glass fiber isobserved to be 130% when compared with ordinary plain concrete.

Muhammad S.Menon And Shamim A.Sheikh [7] have studied the Scismic resistance of square concrete columnsretrofitted with glass fiber reinforced concrete. The tests was done on constant axial load. The cyclic loading was applied to the specimen by pushing the column in the downward direction. Hifzurrahman Zeeshan Khan Mirzamicbag [8] have studied glass fiber reinforced with artial replacement of cement fly ash. The tests were conducted on compressive strength, split tensile strength, In this study, glass fibers in different volume fraction with 20%, 30% and 40% replacement of cement by fly ash were used. The maximum compressive strength value is obtained when 20% of cement replaced with fly ash along with 2% of glass fiber..

B. Prasanthi, N. Vidya Sagar et. al.,[9] have studied the mechanical properties and strain behavior of glass fiber reinforced concrete. The tests were conducted on Compressive strength M20 and M40 grade of concrete were used. Compressive strength ofconcrete increased with the increase in percentage of glass fibers. Of the three fiber contents, i.e., 0.03%, 0.06% and 0.09%, Specimen with 0.09% gave higher increase in strength than the other two. P.Sangeetha [10] have studied the compression and impact strength of glass fiber reinforced concrete with combination of admixtures. The dosages of glass fiberin this experiment are 0%, 0.1%, 0.2% and 0.3% weight of concrete. The combination of admixtures with super plasticizer are air entrain agent and retarders.

FIBER REINFORCED CONCRETE BY USING IRON BLAST FURNACE SLAG AND BARYTES POWDER

The procedures for casting and testing of various concrete specimens are discussedin detail.

Casting of cubes: To test the compressive strength of various concretemixtures150x150x150mmcubes were casted. After the preparation of concretemixtures, the mixture in filled in the cast iron cube mould having150 x150x150mm internal dimensions. Before filled the concrete in the moulds the size of the vertically of the faces of the moulds was insured.oil was applied thinly on the bottom sides of the moulds. concrete was filled in three layers dully compacting eachlayer using table vibrator the excess concrete was removed cured in airfor24hours after 24hours the cubes for removed from moulds on immersed in water in the curing tanks.

Casting of Cylinders: The cylinders of 150mm diameter and 300 mm length were casted for testing the splitting tensile strengths of various concrete mixtures. The cylinder's specimens were casted by filling the concrete mixtures in the cast iron cylindrical moulds in 3layers after each layer of filling concrete in the cylindrical mould the concrete in vibrated using in table vibrator. After through compaction, the excess concrete was removed from top of each cylinder. Then the cylindrical specimens were air cured for 24 hours, the concrete specimens were removed from the moulds and immersed in water in the curing tanks.

Mechanical Properties Of Hardenedconcrete After, casting and curing of the specimens the following tests were conducted.

Compressive strength test as per IS: 516 –1959: After casting the specimens the specimens are kept in curingfor 14 days in water curing and then taken from the curing tank and dry for 24 hrs andfor 28 days test the specimens are kept in curing for 28 days and then taken out fromthe curing tank and dry for 24 hrs. Thenthe specimens were taken for the testing.

3.1.1.2 Placing the specimen in thetesting machine: Clean the compressive testing machine before placing

the cube fortesting. The machine has the axis of the specimen aligned with the centre of the thrust of the spherically seated plate. The two plates in the machine one is movable and the other plate is fixed. When the specimen is placed in the machine the movable plate that the load shall be applied to opposite side of the cube surface the movable portion shall be rotated gentle the machine the movable plate that the load shall be applied to opposite side of the cube surface the movable portion shall be rotated gently by hand and fixed. The maximum load is applied to the specimen is to be noted.

Split tensile strength as per IS: 5816 –1999

a) The specimens removed from the water after specified curing time and wiped out excess water from the surface. The dimensions of the specimen will be noted to the nearest 0.2m.

b) The bearing surfaces of the compression testing machine will be wiped clean and any loose sand or other materials will be removed from the surfaces of the specimens which are to be in contact with rollers.

c) Two bearing strips of nominal 3mm thick,25 mm wide and of lengths lightly longer than that of the specimen provided for each specimen.

d) These two bearing strips are placed between the specimen and both the upper and lower bearing blocks of the strength testing machine. Also, they can be placed between the specimen and the supplemental bars or plates.

e) Now draw diametric lines at each end ofthe specimen using a suitable device that will make sure that they are in the same axial plane.

f) One of the bearing strips will becentered along the centre of the lower bearing block.

g) The specimen placed on the bearing strip and aligned carefully so that the lines marked on the ends of the specimenvertical and centered over the bearing strip.

h) The second bearing strip placed length wise on the cylinder, centered on the lines marked on the ends of the cylinder.

i) The load will be applied continuously and without shock, at a constant rate withinthe range of 689 to 1380 KPa/min until the failure of the specimen.These specimensare tested by compressive testing machine after 7, 14 and 28 days.

Split tensile strength =$2P/\pi LD$

Where, P = Compressive load on the cylinder , L = Length of the cylinder and D = Diameter of the cylinder.

Fig. 1: SPLIT TENSILE STRENGTHTEST APPARATUS

Flexural strength test as per IS: 516 –1959: Test specimens stored in watertested immediately on removal from thewater while they are still in a wet condition. The dimensions of each specimen noted before testing.

Placing the specimen in thetesting machine:

The bearing surfaces of the supporting andloading rollers wiped clean and any loose sand or other material removed from the surfaces of the specimen where they are to make contact with rollers. The specimen placed in the machine in such a mannerthat the load applied to the uppermost surface as cast in the mould along two lines spaced 20.0 or 13.3cm apart.

The axis of the specimen carefully aligned with the axis of the loading device. Nopacking used between the bearing surfacesof the specimen and the rollers. The load applied without shock and increasing continuously

at a rate such that the extreme fibre stress increases at approximately 7 kg/sq cm/mm that is, at a rate of loading of 400kg/min for the15cm specimens and at a rate of 180kg/min for the 10cm specimens. The load increased until the specimen fails and the maximum load applied to the specimen during thetest recorded. The appearance of the fractured faces of concrete and any unusual features in the type of failure noted. These specimens are tested by flexural testing machine after 28 days.

Flexural strength = $2PL/bd^2$,

where P is compressive load on beam, L islength of beam, B is breadth of beam and dis diameter of beam.

RESULTS

The results of various tests conducted on concrete cube specimen, cylindrical specimen, beam specimen and the discussion on the results are presented.

Compressive strength of M30 grade conventional concrete and the concrete with replacement of sand by iron blast furnace slag at 20%, 40%, 60%, 80%, and 100% found at 14 and 28 days arefurnished in table.

Table 1: SPLIT TENSILE STRENGTHRESULTS OF CSB 10% CYLINDERS

Mix designation	**% of fine aggregate replacement**	**% of Iron blast furnace slag**	**Compressive strength N/MM^2 for14 days**	**Compressive strength N/MM^2 28 days**
CS0%	100	-	24.80	32.40
CS20%	80	20	24.55	31.82
CS40%	60	40	25.36	32.58
CS60%	40	60	27.61	34.72
CS80%	20	80	26.47	34.25
CS100%	-	100	24.13	32.83

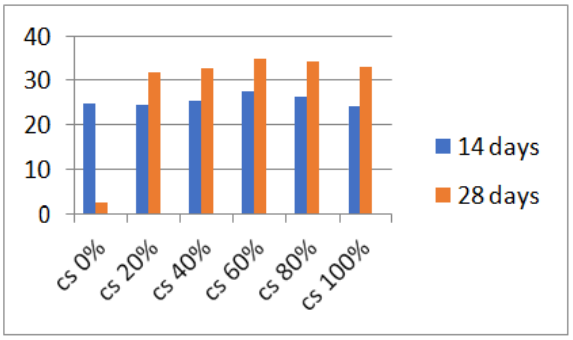

Fig. 2: CSB 10% SPLIT TENSILE STRENGTH OF CONCRETE CYLINDERS

Flexural Strength of concrete with 60% replacement of sand by iron blast furnace slag cement replaced by barites powder at 5%, 7.5% and 10% and addition of 1%glass fiber are given in table 2.

Table 2: FLEXURA; STRENGTHRESULTS CSBG% BEAMS

Mix designation	**% of fine aggregate replaceme nt**	**% of Iron blast furnace slag**	**Barayt es**	**Glas s fiber %**	**Flexur al strengt h test (28days)**
CS0%B0%G0%	100	-	0	0	3.81
CS0%B0%G1%	40	60	0	1%	4.50
CS60%B5%G1 %	40	60	5%	1%	4.64

CS60%B7.5%G1%	40	60	7.5%	1%	4.95
CS60%B10%G1%	40	60	10	1%	4.32

The flexural strength of glass fiber concrete increases with increases in baritespowder up to 7.5%. Highest flexural strength is given by the concrete with 60% replacement of sand by iron blast furnace slag 7.5% cement replaced by barytes and addition of 1% glass fiber. This strength is 29.92% higher than the flexural strength ofcontrol of M30 grade concrete and 10% more than the M30 concrete with 1% glassfiber.

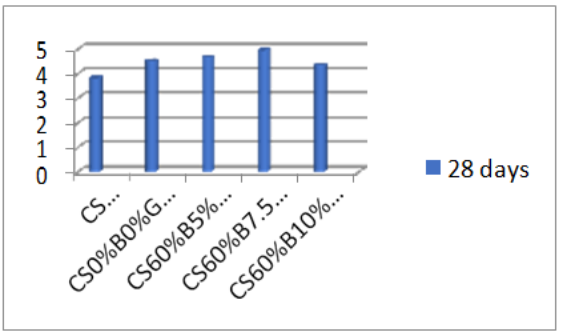

Fig. 3: FLEXURAL STRENGTH OFCONCRETE BEAMS

CONCLUSION

In the current study, the mechanical characteristics of M30 grade concrete that conforms to zone II of IS 383-1970 with the substitution of iron blast furnace slag for sand and the addition of 1 percent glass fibre are examined. Different fineness module of iron blast furnace slag may be used for the experiments. The barytes powder employed in the current investigation has a fineness of 1.8%. Concrete's mechanical properties can be studied using nano-baryte powder. One percent of glass fibre is used in the current experiment, and the mechanical characteristics of concrete of grade M30 are discovered.

In future different percentages of glass fiber can be used in different grades ofconcrete with replacement of cement by nano-barytes powder and replacement of sand by iron blast furnace slag with different fineness moduli.

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PHYTOCHEMICAL INVESTIGATION AND QUANTITATIVE ESTIMATION OF SOLANUM NIGRUM BARK EXTRACTS

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Abstract
We set out a systematic record of the relative antioxidant activity in Solanum nigrum bark of various extracts in the current investigation. Carbohydrates, glycosides, and alkaloids are all present in the highest concentrations, according to phytochemical analysis. The total phenol of the Solanum nigrum ethyl and methanolic extracts ranged from 0.311 to 0.195 mg/g in the extracts, respectively. The flavonoid concentrations of the Solanum nigrum ethyl and methanolic extracts ranged from 0.275 to 0.139 mg/gm, respectively. The higher concentration of phenolic components encourages future investigation into the ability of Solanum nigrum bark extract to scavenge free radicals.
Keywords: *Solanum nigrum;* DPPH; ABTS; Hydrogen peroxide

Introduction

Free radicals are implicated in more than a hundred human diseases, including atherosclerosis, arthritis, damage from tissue ischemia and reperfusion, damage to the central nervous system, gastritis, cancer, and AIDS [1, 2]. Free radicals from environmental contaminants, radiation, chemicals, poisons, deeply fried and spicy meals, as well as physical stress, deplete the immune system's antioxidants, alter gene expression, and influence aberrant proteins. One of the most important pathways for creating free radicals in food, pharmaceuticals, and still-living systems is oxidation development. Enzymes called catalase and hydroperoxidase convert hydrogen peroxide and hydroperoxides into non-radical forms, serving as the body's natural antioxidants. Overwhelming antioxidants may be necessary as free radical scavengers due to immune system natural antioxidants being depleted in many diseases [3-6]. At present available synthetic antioxidants similar to butylated hydroxy anisole (BHA), butylated hydroxy toluene (BHT), tertiary butylated hydroquinon and gallic acid esters, have been supposed to cause or punctual negative health effects. Consequently, strong restrictions have been placed on their application and there is a trend to substitute them with naturally occurring antioxidants. Furthermore, these synthetic antioxidants also show low solubility and reasonable antioxidant activity [7-8]. Recently there has been an increase of interest in the therapeutic potentials of medicinal plants as antioxidants in dropping such free radical induced tissue injury. Polyphenolic compounds with known properties which include free radical scavenging, inhibition of hydrolytic and oxidative enzymes and anti-inflammatory action [9]. A number of confirmations

suggest that the biological actions of these compounds are related to their antioxidant activity [10]. An easy, rapid and sensitive method for the antioxidant screening of plant extracts is free radical scavenging assay using 1,1-diphenyl-2-picryl hydrazyl (DPPH) stable radical spectrophotometrically. In the occurrence of an antioxidant, DPPH radical obtains one more electron and the absorbance decreases [11]. In particular, despite extensive use of wild plants as medicines in Iran, the prose contains few reports of antioxidant activity and chemical composition of these plants. In current study, we carried out a systematic record of the relative free radical scavenging activity in selected medicinal plant species, which are being used traditionally *Solanum nigrum* also known as Black Nightshade or Makoi (h) Kakamachi is a perennial shrub found in wooded areas. The plant height is 40 cm 130 cm and its leaves are 4-8 cm wide. The berry is used as medicine for fruit, root, leaves, flowers, and the entire plant. It grows usually in nitrogen rich soil. Since Vedic era it has relation to being used. It is an essential Ayurvedic shrub. Its white flower and purple- black berries are characteristic of this [12].

Materials and Methods

Selection and collection of plant

The Bark Extract of *Solanum Nigrum* was selected on the basis of Ethano botanical survey. Various considerations were involved in the plant selection especially for its cytoprotective and anti- bacterial activity. The barks of *Solanum Nigrum* are collected from the Pinnacle Biomedical Research Institute, Bhopal Campus.

Authentication of plant

The identification and authentication of plant was done by Dr. Saba Naaz, Botanist, from the Department of Botany, Saifia College of Science and Bhopal. A voucher specimen number 189/Saif. /Sci./Clg/Bpl. was kept in Department of Botany, Saifia College of Science, Bhopal for future reference.

Chemicals

All the chemicals used were of analytical grade and were obtained from Merck or Rankem or S. D.
Fine Chemicals Mumbai.

Solvent extraction

Plant material was extracted by continuous hot percolation method using Soxhlet apparatus. Powdered material of Bark Extract of *Solanum Nigrum* was placed in thimble of soxhlet apparatus. Soxhlation was performed at 60°C using petroleum ether as non-polar solvent. Exhausted plant material (marc) was dried and afterward re-extracted with ethyl acetate and methanol solvent. For each solvent, soxhlation was continued till no visual colour change was observed in siphon tube and completion of extraction was confirmed by absence of any residual solvent, when evaporated. Obtained extracts was evaporated using rotary vacuum evaporator (Buchi type) at 40°C.

Qualitative phytochemical analysis of plant extract

Bark Extract of *Solanum Nigrum* was subjected to the preliminary phytochemical analysis [13, 14]. The extract was screened to identify the presence or absence of various active principles like phenolic compounds, carbohydrates, flavonoids, glycosides, saponins, alkaloids, fats or fixed oils, protein and amino acid and tannins.

Quantitative phytochemical estimation

Determination of total phenolic contents in the plant extracts [15]

The amount of total phenolic in extracts was determined with the Folin Ciocalteu reagent. Galic acid was used as a standard and the total phenolic were expressed as mg/g gallic acid equivalent (GAE). Concentration of 0.01, 0.02, 0.03, 0.04 and 0.05 mg/ml of gallic acid were prepared in methanol. Concentration of 0.1 and 1 mg/ml of plant extract were also prepared in methanol and 0.5ml of each sample were introduced in to test and mixed with 2.5 ml of a 10- fold dilute folin Ciocalteu reagent and 2 ml of 7.5% sodium carbonate. The tubes were covered with parafilm and allowed to stand for 30 minutes at room temperature before the absorbance was at

read at 760 nm spectrometrically. All determination was performed in triplicate. The folin-Ciocalteu reagent is sensitive to reducing compounds including polyphenols. They produce a blue color upon reaction. This blue color was measured spectrophotometrically. Line of regression from Gallic acid was used for estimation of unknown phenol content. From standard curve of gallic acid line of regression was found to be.

$y = 0.005x + 2.569$ and $R^2 = 0.991$

Thus, the goodness of fit was found to be good for selected standard curve. By putting the absorbance of test sample (y = absorbance) in line of regression of above-mentioned GA.

Determination of total flavonoid concentrations in the plant extracts

Total flavonoids were measured by a colorimetric assay [16]. An aliquot of diluted sample or standard solution of rutin was added to a 75 µl of NaNO2 solution, and mixed for 6 min, before adding 0.15 mL AlCl3 (100 g/L). After 5 min, 0.5 mL of NaOH was added. The final volume was adjusted to 2.5 ml with distilled water and thoroughly mixed. Absorbance of the mixture was determined at 510 nm against the same mixture, without the sample, as a blank. Total flavonoid content was expressed as mg rutin/g dry weight (mg rutine/g DW), through the calibration curve of Rutin. All samples were analysed in three replications.

Line of regression from rutin was used for estimation of unknown flavonoid content. From standard curve of rutin, line of regression was found to be

$y = 0.001x - 0.020$ and $R^2 = 0.994$

Thus, the goodness of fit was found to be good for selected standard curve. By putting the absorbance of test sample (y = absorbance) in line of regression of above mentioned rutin.

Result & Discussion

Qualitative evaluation of different extracts

Table 1: Phytochemical evaluation of different extract of *S. Nigrum*

S. No	Chemical tests	Pet Ether Extract of *S. nigrum* bark	Ethyl acetate Extract of *S. nigrum* bark	Methanolic Extract of *S. nigrum* bark
	Test for Carbohydrates			
1	Molisch's Test	-ve	+ve	+ve
2	Fehling's Test	-ve	+ve	+ve
3	Benedict's Test	-ve	+ve	+ve
	Test for Protein & Amino acids			
4	Biuret's Test	-ve	-ve	-ve
5	Ninhydrin Test	-ve	-ve	-ve
	Test for Glycosides			
6	BorntragerTest	+ve	+ve	+ve
7	Killer killaniTest	+ve	+ve	+ve
	Test for Alkaloids			
8	Mayer's Test	-ve	+ve	+ve
9	Hager's Test	-ve	+ve	+ve
10	Wagner's Test	-ve	+ve	+ve
	Test for Saponins			
11	Froth Test	-ve	-ve	-ve

	Test for Flavonoids			
12	Lead acetate	-ve	+ve	+ve
13	Alkaline reagent test	-ve	+ve	+ve
	Test for Triterpenoids and Steroids			
14	Libermann-Burchard Test	-ve	+ve	+ve
15	Salkowski Test	-ve	+ve	+ve
	Test for Tannin and Phenolic compounds			
16	Ferric Chloride Test	-ve	+ve	+ve
17	Gelatin Test	-ve	+ve	+ve

Quantitative phytochemical estimation

Determination of total phenolic contents in the plant extracts

By using the UV spectrophotometer the total phenolic concentration of *Solanum nigrum* was calculated with a regression equation based on a standard curve and as a result TPC was found to be 124 mg/gm of methanolic extract of *S. nigrum* (MSN) and 66.167 mg/gm of ethyl acetate extract of *S. nigrum* (EASN) which were expressed in terms equivalent to gallic acid. In total phenolic concentration the absorbance of gallic acid was observed at the λmax = 765 nm.

Table 2: Ethyl acetate (EASN) and methanolic (MSN) extract with IC50 (inhibitory concentration)

Sample	IC50
EASN (ethyl acetate *S. nigrum* extract)	09.00
MSN (methanolic *S. nigrum* extract)	21.80

Figure: 1 Standard Curve of Gallic Acid

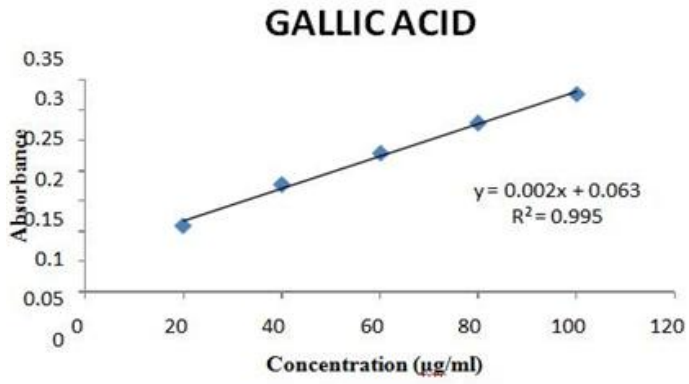


Table 3: Standard Curve Absorbance of Gallic Acid for Total Phenolic Content Determination

Standard curve of Gallic acid		
S. No.	**Concentration (µg/ml)**	**Absorbance**
1	20	0.1098

2	40	0.1763
3	60	0.2290
4	80	0.2783
5	100	0.3258

Table 4: Total Phenolic Concentration (TPC) of different extracts of *S. nigrum* and mean absorbance of Gallic Acid

TPC Expressed as mg/gm Gallic Acid Equivalent		
S. No.	**MSN (methanolic *S. nigrum* extract)**	**EASN (ethyl acetate *S. nigrum* extract)**
1	0.311	0.197
2	0.309	0.195
3	0.313	0.194
Mean Absorbance	0.311	0.195
TPC value	124.000	66.167

Determination of total flavonoid concentrations in the plant extracts

By using the UV spectrophotometer the flavonoid concentration extracts of *S. nigrum* was calculated with a regression equation based on a standard curve and as a result TFC was found to be 183.3 mg/gm of methanolic extract of *S. nigrum* (MSN) and 46.667 mg/gm of ethyl acetate extract of *S. nigrum* (EASN) which were expressed in terms equivalent to Rutin. In total Flavonoid concentration the absorbance of Rutin was observed at the λmax = 415 nm.

Figure: 2 Standard Calibration curve of Rutin for Total Flavonoid Content

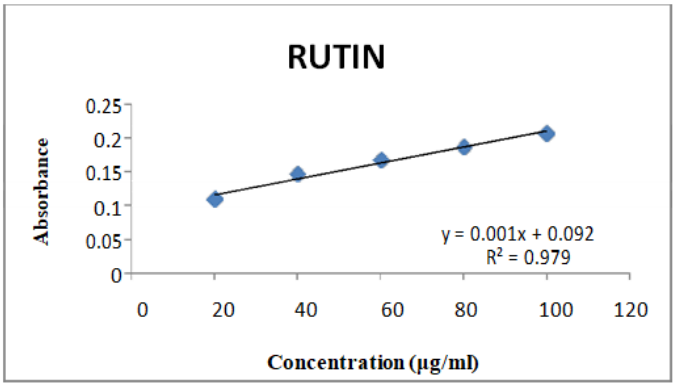


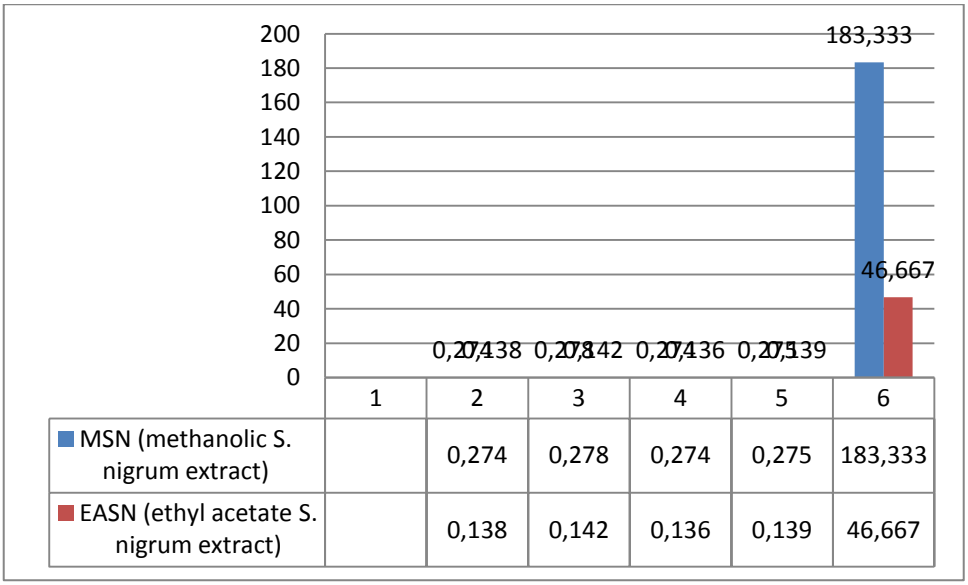
Table 6: Standard Curve Absorbance of Rutin for Total Flavonoid Content Determination

Standard curve of Rutin

S. No	Concentration (µg/ml)	Absorbance

1	20	0.109
2	40	0.146
3	60	0.167
4	80	0.187
5	100	0.207

Table 7: Total Flavonoid Concentration (TFC) of extractsof *S. nigrum* and mean absorbance of Rutin



Hydrogen peroxide assay was performed in order to found out the antioxidant activity of the extract by scavenging the free radicals. The H2O2 assay was firstly performed by taking ascorbic acid as a standard for extract and calibrations graph prepared with the regression of 0.957 at 230 nm absorbance was taken in spectrophotometer. Inhibitory concentration was measured and it was found to be 36.27 mcg/ml with regression 0.953. Likewise, this assay performed for methanolic and ethyl acetate extracts and their regression of calibration graph of different absorbance at different concentration was obtained and they were 0.994 nm and 0.958. These two extracts show the inhibitory concentration graph with the regression value 0.990 of MSN on Hydrogen peroxide assay and 0.972 of EASN on Hydrogen peroxide assay. The inhibitory concentration of MSN on hydrogen peroxide assay was found to be 95.57mcg/ml and EASN on hydrogen peroxide assay was found to be 145.13 mcg/ml respectively.

Conclusion

The current study's findings demonstrated that the bark extract of Solanum nigrum, which has the largest concentration of phenolic and flavonoid components, had the highest level of antioxidant activity. The strong scavenging capacity of Solanum nigrum may be attributed to hydroxyl groups that are accessible in the chemical

structure of phenolic compounds and can provide the essential element as a radical scavenger. Free radicals are frequently produced as byproducts of biological processes or as a result of foreign elements. Free radicals are well known to have a role in the pathophysiology of a wide range of disorders. A likely proactive treatment for the disorders might be a powerful free radical scavenger [19]. All of the extracts used in this study had varying levels of antioxidant activity. *Solanum nigrum* extract showed a higher potency than ascorbic acid in scavenging of DPPH free radical. This may be related to the high amount of flavonoid and phenolic compounds in this plant extract.

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NAIVE BAYES AND RANDOM FOREST ALGORITHMS FOR SPAMMER DETECTION AND FAKE USER IDENTIFICATION ON SOCIAL NETWORKS

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ABSTRACT
The usage of social networking sites is widespread around the world. Social networking sites like Twitter and Facebook significantly influence the unusual unintended consequences that come from user interactions that happen in our daily lives. Social networking platforms are used as a target by spammers to spread a lot of unreliable and harmful material. Twitter is a good illustration of how it has developed into one of the most significant venues for excessive spam in all times for fake people to tweet and promote businesses or services that have a significant influence on real users while also disturbing resource utilization. The author of this paper describes a technique for detecting spam tweets and false user accounts on the online social network Twitter. Author uses Twitter dataset and four different algorithms to detect fake content: Fake Content, Spam URL Detection, Spam Trending Topic, and Fake User Identification. Using the aforementioned four strategies, we can determine whether a tweet is normal or spam, and then train the dataset using the Random Forest data mining algorithm to classify the amount of spam and non-spam tweets, as well as false and non-fake accounts. To categorise tweets asspam or non-spam, the authors of each technique use different data mining techniques,however here we use the Random Forest classifier.

INTRODUCTION

By using the Internet, it is now relatively straightforward to obtain any kind of info from any source anywhere in the globe. The increased popularity of social networking sites allows users to collect a large amount of data and information on users. Large amounts of information available on these websites also attract the attention of fictitious users [1]. Twitter has swiftly become into a popular online location for collecting ongoing customer data. Customers may post anything without restriction on Twitter, an Online Social Network (OSN), including news, opinions, and shockingly, their emotional states. Several disputes may be made over a variety of topics, including politics, current events, and major occurrences.At the point when a client tweets something, it is in a flash passed on tohis/her supporters, permitting them to extended the got data at a lot more extensive level [2]. With the development of OSNs, the need to examine and dissect clients' practices in internet based socialstages has escalated. Many individuals who don't have a lot of data in regards to the OSNs can without much of a stretch be deceived by the fraudsters. There is additionally an interest to battle and placea control on individuals who use OSNsjust for promotions and consequently spamothers' records.

LITEARURE SURVEY

C.Chen et.al has proposed Statistical structures built constant identification ofdrifted Twitter spam-Twitter spam has become a major topic now a days. Late works centered on relating AI methods for Twitter spam location which utilize the measurable features of tweets. Here tweetsacts as a data index, be that as it may, we see that the factual belongings of spam tweets vary by certain period, and in this way, the presentation of prevailing AI builtclassifiers reduces. This problem is alludedto as "Twitter Spam Drift". In order to switch this dispute, , we first do a deep investigation on the measurable featuresfor more than one million spam and non- spam tweets. At this point we suggest a new Lfun conspire. The projected plan is changing spam tweets since unlabelled tweets and consolidates them into classifier's preparation procedure.
Numerous tests are made to measure the projected plan. The results show the present Lfun plan can altogether improve the spam discovery exactness in genuine world scenarios.[9]
C. Buntain and J. Golbeck has proposed Automatically recognizing phony news in prevalent Twitter strings Information quality in online life is an undeniably significant issue, however web-scale information impedes specialists' capacityto evaluate and address a significant partof the incorrect substance, or "phonynews," current stages in this paper builds up a technique for computerizingcounterfeit news location on Twitter by figuring out how to foresee precision evaluations in two validity cantered Twitter datasets: CREDBANK, which supports the exactness for instance in Twitter a publicly supported dataset of exactness appraisals for occasions in Twitter, and PHEME, which contains a set of rumours and nonrumours, We use this to Twitter set content taken from BuzzFeed's fake news dataset and models arranged against freely reinforced experts beat models reliant on journalists' assessment and models arranged on a pooled dataset of both openly upheld workers and authors. All of the three datasets, balanced into a uniform group, is additionally openly accessible. An element examination at that point recognizes features that are generally prescient for publicly supported and journalistic precision evaluations, consequences which can be related with previous results.[10]
C. Chen et.al has performed A performance evaluation of machine learning based streaming spam tweets detection-the popularity of twitter Twitter pulls in an ever increasing number of spammers. Spammers send undesirabletweets to Twitter clients to advance sites oradministrations, here destructive to typical clients. So as to stop spammers, scientists have proposed various components. Thefocal point of late workings is based on utilization of AI methods into Twitter spam location. In any case, tweets are recovered in a gushing way, and Twitter gives the Issuing API to designers and analysts to get to open tweets continuously. There come up short on apresentation valuation of present AI created gushing spam recognitiontechniques. Here we crossed over any barrier via doing a presentation valuation that is since 3 distinctive shares of data, features, and ideal. For constant spam location, here extricated 12 lightweight features for tweet portrayal. Spam locationwas then changed to a double arrangement issue in the component space and can be explained by regular AI calculations. We assessed the effect of various components to the spam recognition execution that included non-spam to spam proportion, highlight discretization preparing data size, time related data, data testing, and AI calculations. The outcomes show the spilling spam tweet discovery is as yet a major test and a strong location system should consider the three parts of information, include, and model.[11]
F. Fathaliani and M. Bouguessa has proposed A modelbased methodology for recognizing spammers in interpersonal organizations In this paper, we see the errand of distinguishing spammers in informal communities from a blenddisplaying viewpoint, in view of which we devise a principled unaided way to deal with identify spammers. In our methodology, we initially speak to every client of the informal community with an element vector that mirrors its conduct andconnections with different members. Next, in light of the evaluated clients Highlight vectors, we propose a measurable system that uses the Dirichlet circulation so as to distinguish spammers. The proposed methodology can naturally segregate among spammers and genuine clients, while existing solo approaches require human intercession so as to set casual edge parameters to distinguish spammers. Besides, our methodology is general as in it very well may be applied to various online social destinations. To exhibit the appropriateness of the proposed technique, we led probes genuine information extricated from Instagram and Twitter.[15]
C. Meda et.al has proposed Spam identification of Twitter traffic: A system dependent on irregular backwoods and non-uniform element inspecting Law Enforcement Agencies spread an essential job in the

examination of open information and need powerful strategies to channel problematic data. In a genuine situation, Law Enforcement Agencies break down Social Networks, for example Twitter, , observing occasions and profiling accounts. Sadly, between the enormous measures of web clients, there are individuals that utilization micro blogs for badgering other individuals or spreadingmalignant substance. Clients' characterization and spammers' ID is a helpful method for mitigate Twitter traffic by unhelpful substance. Analyses are done on a prominent datasets of Twitter clients. The given Twitter dataset is comprised of clients marked as genuine clients or spammers, portrayed by 54 features. Exploratory results exhibit the viability of improved highlight testing technique.[21]

PROPOSED SYSTEM

In this paper author is describing conceptto detect spam tweets and fake useraccount from online social network called twitter. To perform detection author is using twitter dataset and 4 different techniques called Fake Content, Spam URL Detection, Spam Trending Topic and Fake User Identification. Using above 4 techniques we can identify whether tweet is normal or spam and then using Random Forest data Mining algorithm we will train above dataset to classify number of spam and non-spam tweets or fake or non-fake accounts. For each technique author is using different data mining techniques to classify tweets as spam or non-spam but here we are using Random Forestclassifier.

Description of 4 techniques to detect tweetis spam or normal. The presented techniques are also compared based on various features, such as user features (retweets, tweets, followers etc.), content features (tweet content messages).

Fake Content: If the number of followers is low in comparison with the number of followings, the credibility of an account is low and the possibility that the account is spam is relatively high. Likewise, feature based on content includes tweetsreputation, HTTP links, mentions andreplies, and trending topics. For the time feature, if many tweets are sent by a user account in a certain time interval, then it is a spam account.

Spam URL Detection: The user-basedfeatures are identified through variousobjects such as account age and number of user favourites, lists, and tweets. Theidentified user-based features are parsedfrom the JSON structure. On the other hand, the tweet-based features include the number of (i) retweets, (ii) hashtags, (iii) user mentions, and (iv) URLs. Usingmachine learning algorithm called NaïveBayes we will check whether tweets contains spam URL or not.

Detecting Spam in Trending Topic: In this technique tweets content will be classified using Naïve Bayes algorithm to check whether tweet contains spam or non-spam words. This algorithm will check for spam URL, adult content words and duplicatetweets. If Naïve Bayes detect tweet as SPAM then it will return 1 and if not detected any SPAM content then Naïve Bayes will return 0.

Fake User Identification: These attributes include the number of followers and following, account age etc. Alternatively, content features are linked to the tweets that are posted by users as spam bots that post a huge amount of duplicate contentsas contrast to non-spammers who do not post duplicate tweets. In this technique features (following, followers, tweet contents to detect spam or non-spamcontent using Naïve Bayes Algorithm) willbe extracted from tweets and then classify those features with Naïve Bayes Algorithm as spam or non-spam. Later this features will be train with random forest algorithm to determine account is fake or non-fake. All extracted features will be saved inside features.txt file. Naïve Bayes classifier saved inside ‘model’ folder.

Using above techniques we can detect whether tweets contains normal message or spam message. By detecting and removing such spam messages help social networks in gaining good reputation in the market. If social networks did not remove spam messages then its popularity will be decreases. Now a days all users are heavilydependent on social networks to get current news and business and relatives information and thus protecting it from spammer help it to gain reputation.

RESULTS AND DISCUSSION

Fig 1 In above screen click on 'Upload Twitter JSON Format Tweets Dataset' button and upload tweets folder

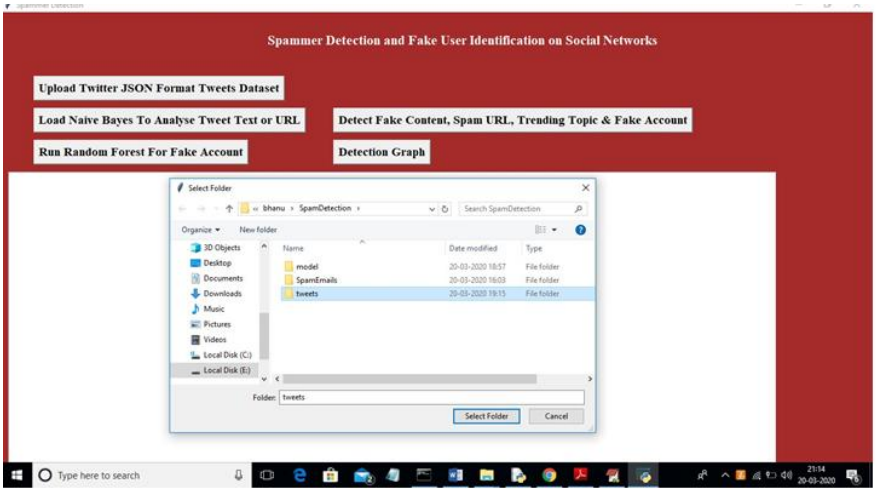

Fig 2 In above screen I am uploading 'tweets' folder which contains tweets from various users in JSON format. Now click open button to start reading tweets

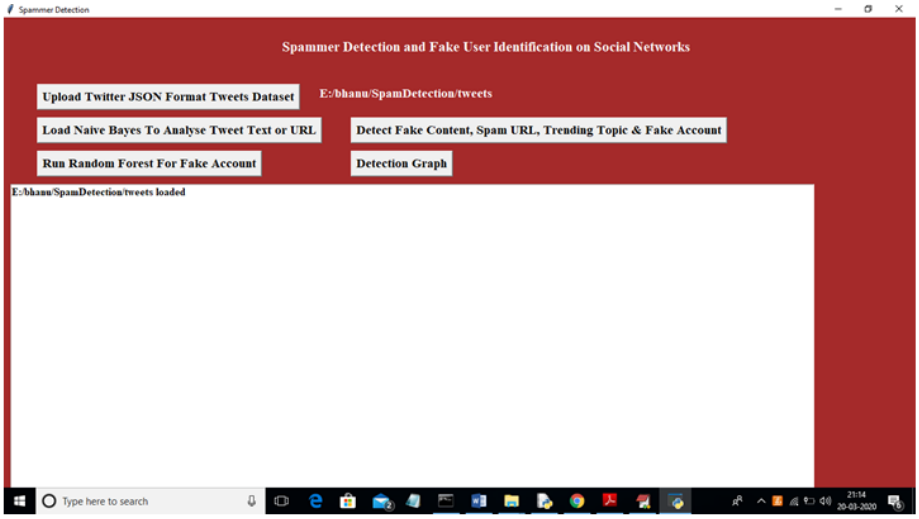

Fig 3 In above screen we can see all tweets from all users loaded. Now click on 'Load Naive Bayes To Analyse Tweet Text or URL' button to load Naïve Bayes classifier

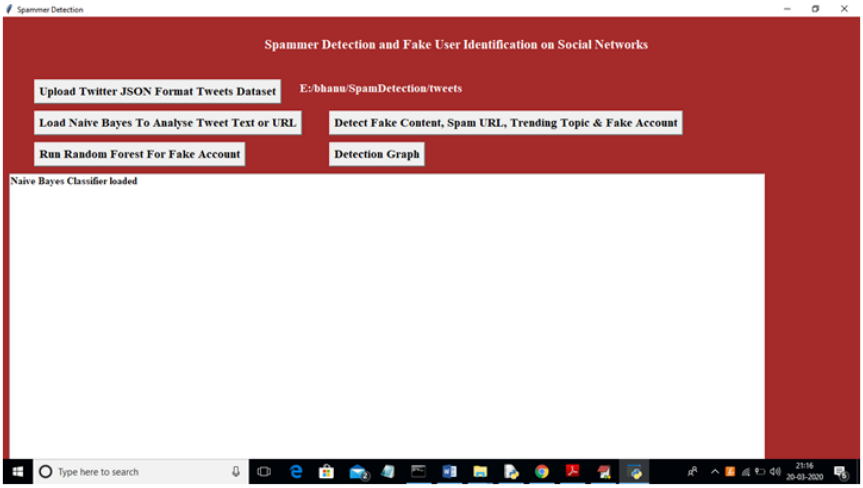

Fig 4 In above screen naïve bayes classifier loaded and now click on 'Detect Fake Content, Spam URL, Trending Topic & Fake Account' to analyse each tweet for fakecontent, spam URL and fake account using Naïve Bayes classifier and other above mention technique

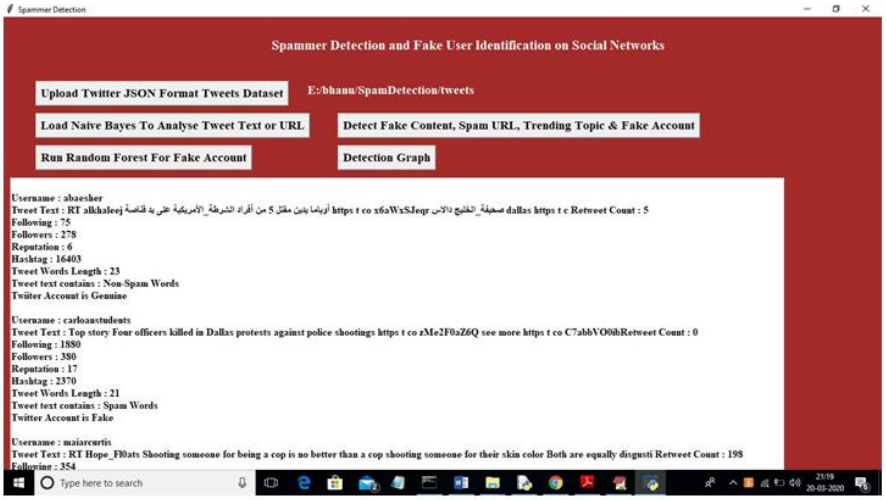

Fig 5 In above screen all features extracted from tweets dataset and then analyse those features to identify tweets is no spam or spam. In above text area each records values are separated with empty line and each tweet record display values as TWEET TEXT, FOLLOWERS, FOLLOWING etc with account is fake or genuine and tweet text contains spam or non-spam words. Now click on 'Run Random Forest Prediction' button to train random forest classifier with extracted tweets features and this random forest classifier model will be used to predict/detect fake or spam account for upcoming future tweets. Scroll down above text area to view details of each tweet

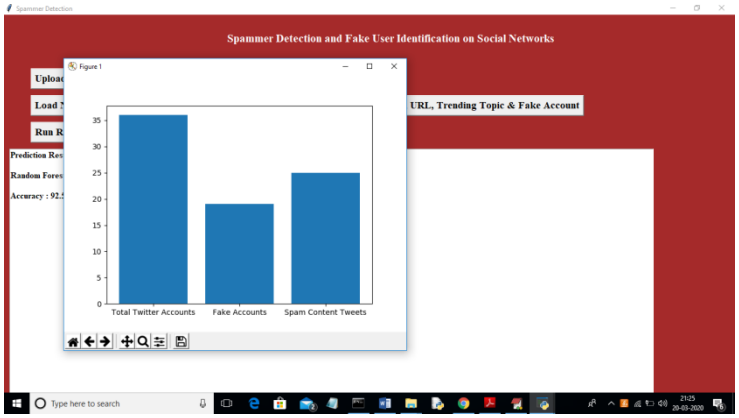

Fig 6 In above graph x-axis represents total tweets, fake account and spam wordscontent tweets and y-axis represents count of them

CONCLUSION

We conducted a review of approaches for detecting spammers on Twitter in this research. Furthermore, we offered a taxonomy of Twitter spam detection strategies, which we divided into four categories: fake content identification, URL-based spam detection, spam detection in trending topics, and fake user detection techniques. We also examined the offered strategies based on a variety of factors, including user characteristics, content characteristics, graph characteristics, structural characteristics, and temporal characteristics. Furthermore, the strategies were compared in terms of the aims they were designed to achieve and the datasets they employed. The given review is expected to aid researchers in locating information on state-of-the-artTwitter spam detection systems in a centralised way. Despite the development of efficient and successful ways for spam detection and fake user identification onTwitter, there are still some gaps in thestudy that need to be addressed. The following are a few of the issues: Because of the catastrophic ramifications of false news on an individual and communal level, false news identification on socialmedia networks is a topic that has to be investigated. The identification of rumour origins on social media is another related topic worth researching. Although a few studies using statistical methods to discover the sources of rumours have already been undertaken, more complex approaches, such as social network-based approaches, can be used due to their demonstrated efficiency.

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A FLEXIBLE 360° DRILLING MACHINE WITH REGULATION SPEED: DESIGN AND FABRICATION

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ABSTRACT
Directional drilling machine which can be used based on drilling holes in various location and movement and easily operation done with high accuracy. Productivity can be improved by reducing total machining time and reduced human effort and reduced manufacturing cycle time. In this present age the application of micromachining operations continues to grow.
These operations are required to fabricate the products required for sectors like medical science, automobile industries and electronics manufacturing etc. which deals with miniature trends. Drilling process is one of the machining processes which is used to drill micro holes not only in micro products but also in relatively larger work pieces which require ultra-small features which can be accomplished only by drilling process.
Key words: Drilling machine, Performance, Movement, Material, Operation etc.

INTRODUCTION

Drilling is a cutting process that uses a drill bit to cut a hole of circular cross- section in solid materials. The drill bit is usually a rotary cutting tool, often multipoint. The bit is pressed against the work piece and rotated at rates from hundreds to thousands of revolutions per minute. This forces the cutting edge against the work piece, cutting off chips (swarf) from the hole as it is drilled.
In rock drilling, the hole is usually not made through a circular cutting motion, though the bit is usually rotated. Instead, the hole is usually made by hammering a drill bit into the hole with quickly repeated short movements. The hammering action can be performed from outside of the hole (top-hammer drill) or within the hole (down-the-hole drill, DTH). Drills used for horizontal drilling are called drifter drills.In rare cases, specially-shaped bits are used to cut holes of non-circular cross- section; a square cross-section is possible.

LITERATURE REVIEW

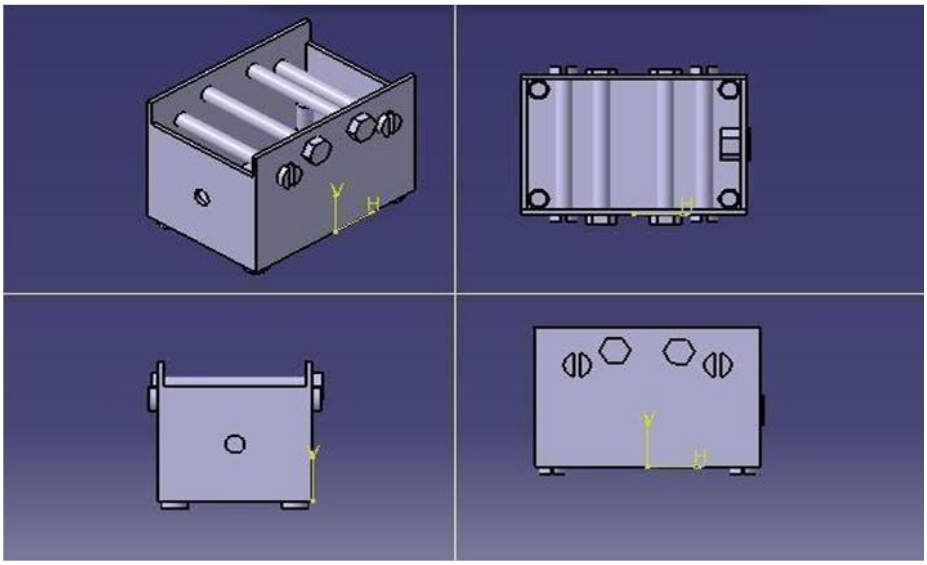
Micromachining operations play an important role in precision production industries. Out of the various machining processes, micro-drilling is used to produce micro holes in fuel injectors, printed circuit board, aerospace materials etc. Soin order to achieve the optimum working conditions various research were conducted by different researchers from across the globe. This report reviews someof the journal published by them regarding optimization processes.
YogendraTyagi,Vadansh Chaturvedi and JyotiVimal have conducted an experiment on drilling of mild steel, and applied the taguchi methods for determining the optimum parameters condition for the machining process using the taguchi methods and analysis of variance. The work piece used is mild steel (100mm×76mm×12mm) and the tool used is HSS with a point angle of 118° and diameter of 10 mm. Taguchi L9 orthogonal arrays is used here in order to plan the experiment. The input parameters are feed rate, depth of cut and spindle speed whereas the output responses are surface roughness and metal removal rate (MRR).In case of signal to noise ratio calculation, larger the better characteristics is used for calculation of S/N ratio for metal removal rate and nominal and small the better characteristics is used for the calculation of S/N ratio for surface roughness. After the analysis of the data obtained it is found that MRR is affected

mostly by feed. Confirmation experiment was conducted using the data obtained from S/N ratio graphs and it confirmed with the results of taguchi methodology. In case of surface roughness analysis same procedure was followed where thesignificant parameter was found to be the spindle speed. Here too the confirmation experiment was conducted and this confirms the successful implementation of taguchimethods

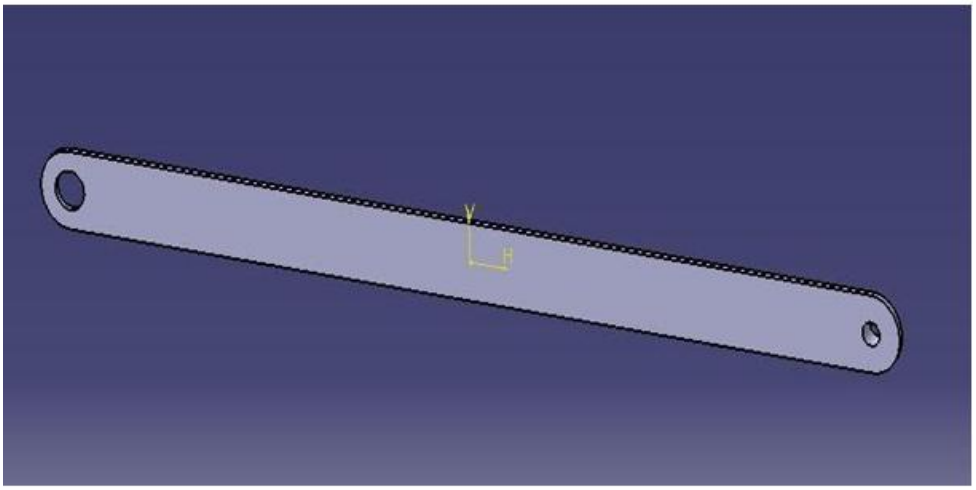
INTRODUCTION OF CATIA

We approached our design by considering all possible alternatives for a system and modelling them in CAD software CATIA V5 By using computer aided design, we are designed manual operated floor cleaning machine as shown below.

CATIA V5 serves the basic design tasks by providing different workbenches. A workbench is defined as a specified environment consisting of a set of tools that allows the user to perform specific design tasks. The basic workbenches in CATIA V5 are **Part Design**,**Wireframe and Surface Design**, **Assembly Design**, **Drafting**.



Arm holder



Connecting rod or arms

COMPONENTS DESCRIPTION

MOTOR

It is an electrical device which converts electrical energy to mechanical energy. It rotatesshaft which support by bush in it when power is supply through rectifier. This shaft connect with drill bit through chuck to rotate drill bit and make hole on work piece when it is required.Is of high torque capable which required for drilling. An electric motor is an electrical machinethat converts electrical energy into mechanical energy. The reverse of this is the conversion of mechanical energy into electrical energy and is done by an electric which has much in common with a motor.

Connecting Rod

It connects the two Frames to each other for supports between them to help to move when we required. It consists of metal strips of two sizes one of 12" (inch) and another is of 15" (inch). Both are of four pieces of equal length. A hinge is a mechanical that connects two solidobjects, typically allowing only a limited angle between them. Two objects connected by an ideal hinge rotate relative to each other about a fixed axis of rotation: all other translations rotations being prevented, and thus a hinge has one-degreeHinges may be made of flexible material lot of moving components. In a many joints function as hinges like the elbow joint. In Hinges such are included to reduce or eliminate the transfer of bending stresses between structural components, typically in an effort to reduce sensitivity to earthquakes. The primaryreason for using a hinge, rather than a simpler device.

Screws

A screw joint is a one-degree-of-freedom kinematic pair used in mechanisms. Screw joints provide single-axis translation by utilizing the threads of the threaded rod to provide such translation. This type of joint is used primarily on most types of linear actuators and certain types of Cartesian robots.

Drill Bit

In which drill bit are used of twisted type drill. It is of material Carbon Steel. Its diameter is of10mm. This is used to make drill on wood, plastic and light metals. Drill bits are cutting tools used to remove material to create holes, almost always of circular cross-section. Drill bits come in many sizes and shapes and can create different kinds of holes in many different materials.

Arm Holder

Arm holder is strong rigid material which is less in weight and bear both fluctuated and vibrational forces acting on it. It is made up of steel, arm holderis prepared by cutting the sheet metal and bending the cutting portion and tightened by nut and bolt. Two arm holder are joined by long straight nut&screw. arm holders holds the both rectangular arms and vertical arms andalso holds drilling machine and baseplate

SPECIFICATIONS OF MOTOR

a. Type of Motor – D.C. Motor
b. Speed – Max 5000 rpm
c. Voltage – 12 Volt
d. Supply – D.C. Supply
e. Current – 0.2 – 1.2 AMP
f. Power – 2.4 – 15 watt
g. Frequency – 50 Hz
h. Controller – Hand
i. Weight – 150gm
j. Shaft dia. – 3.17 mm
k. Diameter – 36mm
l. Length (Body) – 50mm
m. Length (Shaft) – 16mm

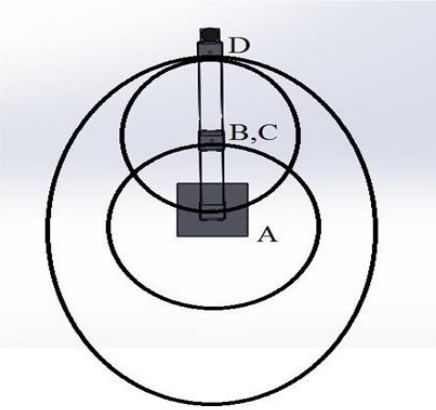
PROCEDURE OF DRILLING MACHINE

Pneumatic multi-operation machine make use of compressed air obtained from compressor passes through pressure regulator & then passes through pneumatic gun. Inpneumatic gun air exerts a axial spinning force on the spindle located inside the toolhead which causes the drill tool to rotate inside the work piece with required RPM. Box A is mounted on a plate, which can be further mounted on the table or wall for stability. The whole mechanism can rotate 360° at the vertical axis of box A.

Box B is attached to Box A with the help of two slant links, hence keep a angle of 45 degrees between both boxes. Now the box B can rotate 360° at the vertical axis of box A.

Box C is mounted on Box B in such a way that it can rotate 360 degrees on its verticalaxis.

Box D is attached to box C with the help of four movable links, hence achieving a verticalmotion of box D. So now the box D can rotate 360 degrees at vertical axis of box C.



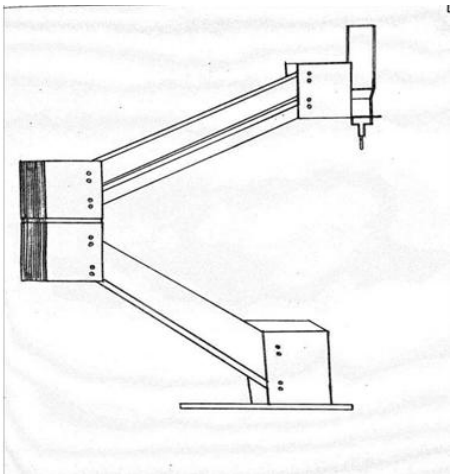
WORKING PRINCIPLE

The working principle of this flexible drilling machine is initially started from the D.C. motor through full wave rectifier. In which there is one power sources, received from the rectifier. Then the arm rotates at 360 degree and moves anywhere when drilling is required up to its maximum arm length. With the help of my projectwe can drill in complicated partsaccurately.

BLOCK DIAGRAM

Equipment's used for the experiment as shown:

- Base plate
- Verticalarm
- Horizontalarm
- Regulator
- Rollerbearing
- Motor
- Drillbit
- Switch board
- Copperwire



PROJECT OVERVIEW

Over view of the project

ADVANTAGES

1. Efficient drilling and tapping.
2. Flexible.
3. 360 degree rotation.
4. Easy to use.
5. Reduce handling cost.
6. Reduce time.
7. Reduce overall manufacturing cost Increase productivity

CONCLUSION

1. So with help of this project we can remove many disadvantages of hand drill machine which are mentioned above. And this mechanism is not costly, so it will be affordable to anyone. We can mount this mechanism horizontally as well as vertically depending on where to drill.
2. This project is an efficient operation and competitive cost. Since a number of operation and hole can be performed in a simpleunitbuy hitis efficient and economical. Considering its uses and cost of project, it becomes relatively cheap when compared to other units.

FUTURE SCOPE

- We can use servo motor in our machine to provide automation by giving autofeed.
- We can use telescoping arm to increase the working envelop of the machineto reach in any directioneasily.
- We can use hydraulic system or hydraulic lubrication to operate the machine in smooth manner without including the less fatigue of manpower.
- In future it is used in every field where drilling isrequired.

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ANALYSIS ON SURVEILLANCE ROBOT USING NIGHT VISION AND METAL DETECTOR

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ABSTRACT
The main objective for developing the robot is for the surveillance of human activities in the war field or rescue operations in order to reduce attacks from the enemy side. The robot consists of night vision wireless camera which can transmit live videos of the war field in order to prevent any damage and loss to human life. Military men have a huge risk on their lives while entering an unknown territory. The robot will serve as an appropriate machine for the defence sector to reduce the loss of human life and will also prevent illegal activities. It will help all the military people and armed forces to know the condition of the territory before entering it. This can also be used in various rescue operations to save the man power and to monitor hazardous situations. The main advantage of this project is that we can easily control the robot using an android mobile by a blynk app. An ESP 32MICROCONTROLLER is used for the desired operation. A smart cell phone with IP web cam application is mounted on the robot body for spying purpose even in complete darkness by using infrared lighting. This will send the videos wirelessly at the transmitter side (laptop).
Keywords: Robot, War Spying robot, Android app (Smart Cell Phone)

LITERATUREREVIEW
Amit Kumar Shingankar **,** Author :- Arduino controlled war field spy robot using night vision wireless camera and android application. The main objective behind the robot is for surveillance of human activity in the war field or border regions in order to reduce infiltration from the enemy side The robot sends the signal to the RF receiver mounted on the robot via RF transmitter at the base station.
Neha Roy, Suraj Chavan, **,** Author :- Military spying and metal mines detection wire less robot with night vision camera. The project is designed to develop a robotic vehicle using RF technology for remote operation attached with wireless camera for monitoring purpose. The robot along with camera can wirelessly transmit real time video with night vision capabilities. This is kind of robot can be helpful for spying purpose in war fields.
Selvam, M. "Smart phone based robotic control for surveillance applications."Dept. of ECE, Karpagam University, Coimbatore, Tamil Nadu, International Journal of Research in Engineering and Technology (2014).
Pahuja, Ritika, and Narender Kumar. "Android Mobile Phone Controlled Bluetooth Robot Using 805 Microcontroller." Electronics & Communication Engineering, Department, BRCM College of Engineering & Technology, Bahal, India, International Journal of Scientific Engineering and Research (IJSER) www. ijser. in ISSN (Online) (2014): 2347-3878.

Objective
The main objective behind developing this robot is for the surveillance of human activities in the war field or border regions. The robot consists of night vision wireless camera &IOT Technology.

Basic Concept of Design:

Saving human life and providing security to the same both are two different aspects but both of them are essential and instead mandatory. This innovative system is made for operations which involve high risk for humans to enter, especially for some criminal case and may prove very beneficial for military area for spying purposes. This spy robot can be used in the areas where there can be threat from intruders or terrorists. At the time of war where it can be used to collect information from the enemy terrain and monitor at a far secure area and safely devise a plan for the counter attack , Tracking location of terrorist organization and the plan attack at suitable time making a surveillance of any affected area where human being cannot go. This is kind of robot can be helpful for spying purpose in war fields and in order to minimize the attacks like 26/11 in Mumbai in future. It can also be helpful where living being cannot reach.

Research Methodology

- Study of hardware materials & Software used in project.
- Implementation of hardware models. .
- Implementation of software coding.
- Installing various hardware components.

SYSTEM REQUIREMENTS AND SPECIFICATIONS 1 Hardware requirements

- ESP 32 microcontroller
- DC motor
- Motor Driver (L293D)
- Battery Chassis
- Wheels
- Metal detector
- Night vision camera
- Bread board and connecting wires

2 Software requirements

- BLYNK – Smartphone Google play Application for IOT
- Arduino IDE

1.1 ESP 32 microcontroller

ESP32 is capable of functioning reliably in industrial environments, with an operating temperature ranging from –40°C to +125°C. ESP32 is highly-integrated with in-built antenna switches, RF balun, power amplifier, low-noise receive amplifier, filters, and power management modules. Engineered for mobile devices, wearable electronics and IoT applications, ESP32 achieves ultra-low power consumption with a combination of several types of proprietary software.ESP32 can perform as a complete standalone system or as a slave device to a host MCU, reducing communication stack overhead on the main application processor. ESP32 can interface with other systems to provide Wi-Fi and Bluetooth functionality through its SPI / SDIO or I2C / UART interfaces.

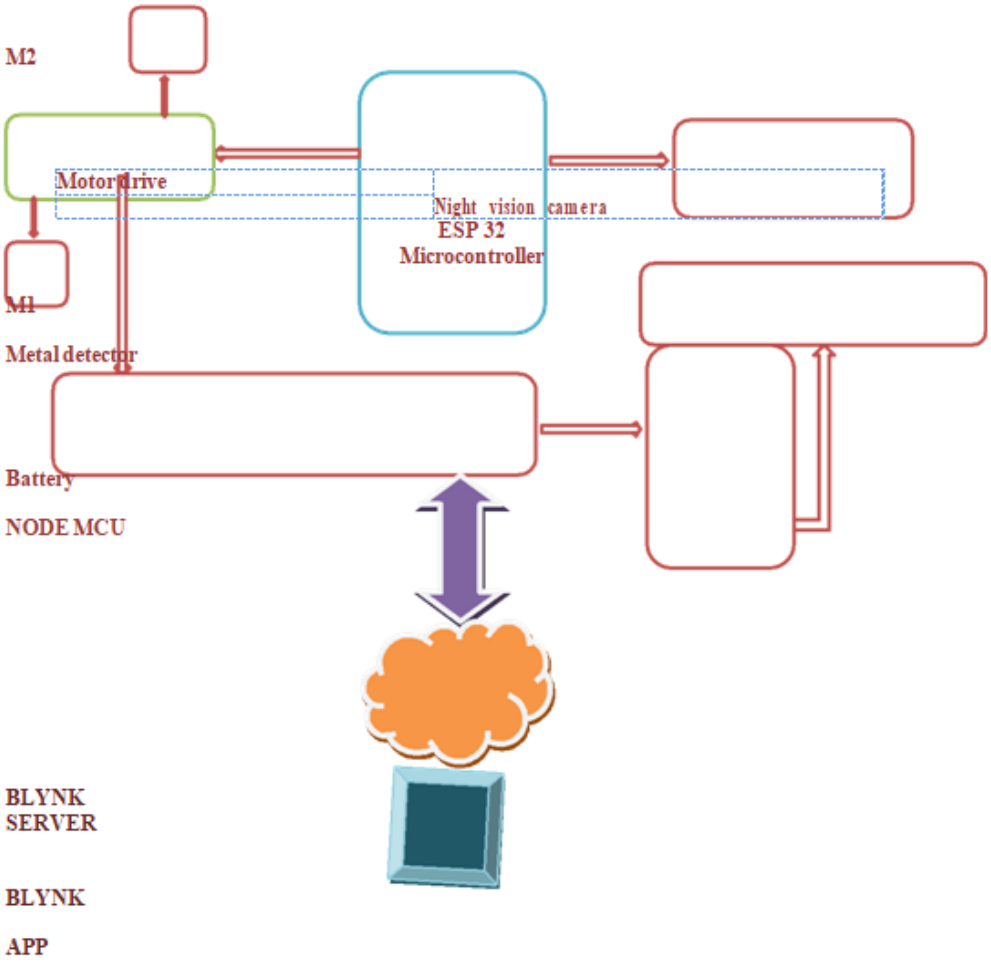
1.2 DC motor

A DC motor is any of a class of rotary electrical motors that converts direct current (DC) electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in part of the motor.

1.3 Motor driver

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC.Dual H-bridge Motor Driver integrated circuit (IC).The l293d can drive small and quiet big motors as well

1.4 Battery



A lithium-ion battery or Li-ion battery (abbreviated as LIB) is a type of rechargeable battery in which lithium ions move from the negative electrode to the positive electrode during discharge and back when charging. Liion batteries use an intercalated lithium compound as one electrode material, compared to the metallic lithium used in a non rechargeable lithium battery.
The electrolyte, which allows for ionic movement, and the two electrodes are the constituent components of a lithium-ion battery cell.

1.5 Metal detector

Metal detectors can detect nearly all metallic objects. That means anything that contains elements like gold, silver, iron, nickel, copper, aluminum, tin and lead or mixtures and combinations like bronze and brass. Metal detectors cannot detect non-metal items such as wood, plastic, stones and bone. Some metal detectors are able to discriminate which means that they can differentiate between various types of metal.

1.6 Night vision camera

IR or night vision cameras use infrared light to illuminate images in the dark. We can't see it, but infrared light is actually all around us. IR cameras detect these invisible infrared wavelengths, enabling the camera to see in the dark.

2.1 Blynk app

Blynk is designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, visualize it and do many other cool things There are three major components in the platform: Blynk App - allows to you create amazing interfaces for your projects using various widgets we provide.

Blynk Server - responsible for all the communications between the Smartphone and hardware. You can use our Blynk Cloud or run your private Blynk server locally. Its opensource could easily handle thousands of devices and can even be launched on a Raspberry Pi.
Blynk Libraries - for all the popular hardware platforms - enable communication with the server and process all the incoming and out coming commands. Easy to integrate and add new functionality using virtual pins

2.2 Arduino IDE

The Arduino IDE is an open-source software, which is used to write and upload code to the Arduino boards. The IDE application is suitable for different operating systems such as Windows, Mac OS X, and Linux. It supports the programming languages C and C++. Here, IDE stands for Integrated Development Environment. The program or code written in the Arduino IDE is often called as sketching. We need to connect the Genuine and Arduino board with the IDE to upload the sketch written in the Arduino IDE software. The sketch is saved with the extension '.ion.

Procedure:

- The robot has microcontroller ESP 32 which has inbuild wifi system.
- When we turn on the network the microcontroller automatically connected with the receiver section and start working.
- The receiver section has 5 buttons v0,v1,v2,v3 and v4 i.e. forward ,backward ,left, right and stop respectively .The robot start working according to the key pressed .
- The night vision camera is connected with the microcontroller ESP 32 and sends live video to the local host.
- Metal detector is connected with the microcontroller NODE MCU ESP 8266, buzzer and battery. When the metal detector contacts with the metal the buzzer gives the signal.

Block Diagram:-

Results and Discussion

After configuring all the parts, assembling as required and configuring Software finally we obtained SURVILLENCE ROBOT which is shown below it has performed the task of detecting metal and give the signal as well as the night vision camera gives the live video to the local host . The metal detector senses the metal with the range between 15cm , we can also increases the range.

(Front view)

(Upper view)

Conclusion

The primary need for our paper would be accuracy. We have been able to view the things accurately that are currently happening in the surrounding area. Our design has not caused any sort of disturbances..

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IMPROVEMENT OF MECHANICAL PROPERTIES OF CERAMIC MATRIX COMPOSITES: REVIEW

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ABSTRACT
Ceramic composites are used in various applications such as for components of turbines, combustion chambers, in hot gas ducts, automotive parts, bearing components etc., because of their extraordinary properties of heat, shock, corrosion and wear resistance. In addition to the above properties, ceramic composites exhibit high strength and modulus at elevated temperatures. Inspite of these excellent properties and wide range of applications of ceramic composites, they suffer from the drawback of having poor toughness and brittleness, which leads to the catastrophic failure of the components. For this reason, the applications of these composites are limited at higher temperatures. This necessitates the improvement of the toughness and decrease of the brittleness of the ceramic matrix composites. In this regard, there is a necessity to understand the various manufacturing processes, mechanical behavior, strengthening mechanisms of the ceramic matrix composites so that we can extend their applications in the structures. Hence, an attempt is made to review the literature on various manufacturing processes, characterization of the various thermo physical properties, strengthening mechanisms particularly, towards the increase of the toughness and decreasingof the brittleness in the ceramic composites.

Keywords: Ceramic matrix composites, toughness, catastrophic failure, characterization, strengthening mechanisms

INTRODUCTION

Conventional ceramics fracture quickly under mechanical loads, because of very less crack resistance. In order to avoid this problem, with the conventional ceramics and to augment the crack resistance, particles are embedded or reinforced into the matrix which impart newproperties to the ceramics which are not possessed by monolithic ceramics. This lead to the development of Ceramic matrix composites (CMCs). Initially, they were used in limited applications like ceramic cutting tools, but afterwards, with the integration of multi strand fibers, resulted in the enhancement of the properties like crack resistance, thermal shock resistance, elongation and thus resulted in developing of several novel applications. Reinforcements augment the fracture toughness of the combined material. Reinforcements used in the ceramic matrix composites can be continuous or discontinuous fibers. Reinforcement materials comprise of carbon, glass, oxides and non- oxides. Sometimes, filler materials are also added to intensify the characteristics of CMC's to augment certain propertieslike thermal conductivity, electrical properties, hardness etc., The ultimate aim of the reinforcement is to attain holistic improvement in the toughness of the brittle matrix. This workfocusses on the comprehensive review of literature pertaining to the properties, manufacturing, characterization and applications of ceramic matrix composites. More orientation is towards the improvement of toughness in the fiber reinforced CMC's.

LITERATURE REVIEW

Ceramic matrix composites (CMC) comprise of ceramic whiskers or fibres ingrained inside a ceramic matrix. They envelop a diverse group of inorganic substances which are generally of non-metallic and are commonly They are mostly available in the monolithic form. Their applications are in the manufacturing of bricks, pottery, heat exchangers, burner components, tiles etc. Second category of ceramics comprise of high- performance ceramics. They are of subjected to chemical processing. They comprise of titanium, zirconium, silicon, aluminium, nitrides, oxides, and carbides of aluminium.

PROPERTIES

Ceramic Matrix Composites (CMC) are highly attractive because of good stiffness, hardness, hot hardness, compressive strength and low density. They offer high resistance to thermal shocks, creep, temperature, corrosion and wear. They do not fail under tensile as well as compressive loads quickly. But, they are poor in toughness, bulk tensile strength and are susceptible to thermal cracking. Naslain and Pomeroy [1] CMC's are usually represented as inverse composites. This is because of their unique property of having lower failure strain of matrix compared to that of the fibers. This is a reverse phenomenon which occurs in polymers of MMC's. Fiber coats are provided as interfaces in order to prevent the primitive failure of the fibers. Few works carried out to enhance the mechanical behavior of the CMC's were furnished below: Rice [2] proposed different models and mechanisms of CMC's and compared them with the existing ones and described the mechanisms for apprehending the mechanisms pertaining to toughening of CMC's like toughening by transformation, deflection to crack propagation and micro-cracking. He proposed that crack branching aspects play a vital role in toughening of fiber composites.

Casas et al. [3] developed a model for analyzing creep oxidation. He studied the effect of the glassy phases emanating by virtue of oxidation in Sic matrices obtained using micro mechanical model. He analyzed the influence of the oxidation and interfacial sliding stress in the presence of glass in terms of delay factor. This model predicted the creep for using strain time curves at a particular temperature and for wide range of pressures. William and Curtin [4] assessed the pullout work and UTS of CMC's. They have tested considering uniaxial tension as a function of the underlying material behavior with the presumption that the fibers fail autonomously. This results in the redistribution of the load and thus results in the fiber fracture. The consecutive disintegration of every fiber in the multi fiber composite resembles to that of an individual fiber ingrained in a similar huge-collapsed-strain matrix and proposed a theory which provided an elucidation of rupture-mirror gauging of drawn-out fiber capacities. Based on this, key capacity and Weibull modulus of the fibers were assessed normally.

Chen et al. [5] analyzed the augmentation in rupture toughness of matrix composites reinforced with carbon nanotube (CNT). They carried out analysis based on theory of shear-lag and rupture mechanics. They combined the model of shear-lag and rupture mechanics. They proposed thatthe stronger the interfaces between CNT and matrix, the weaker the rupture toughness. They alsostated that the optimal chemical bonding density at the interfacial is responsible for the mode of failure during the process of CNT pull-out to failure. There exists a critical strength at the interface, beneath which the CNT will be stretched out, and the rupture toughness can beconstructively augmented by enhancing the length at the interface in case of composites withhard matrix. However, the rupture toughness intensification by virtue of reinforcement with CNTs rapidly sets off to saturation due to an enhancement in length of CNT in case of soft matrix composite.

Aigbodion et al. [6] focused on the influence of particles of alloy of Aluminum Silicon on the microstructure as well as features of Tin Tailings of CMC/s developed using technique of powder metallurgy with various percentages of weights. They concluded that the reinforcement by Al-Si alloy enhanced the linear shrinkage, capacity as well as impact energy by virtue of reduction in density, porosity as well as hardness. This augmentation in capacity as well as impact energy resulted in the definite dispersion and strong bonding between the hard ceramic matrix and the soft metal phase. Zhang [7] performed experiments on the tribological behavior ofCMCs, with an objective to improve the mechanical features of CMCs by ingraining supplementary components into the base material.

METHODS OF MANUFACTURING

Various methods of manufacturing Fiber reinforced ceramics are: conventional ceramic consolidation, prepreg form and porous preform infiltration. Conventional ceramic consolidation is classified into cold pressing and

sintering. Prepreg form comprises of slurry impregnation and hot pressing. Porous preform infiltration comprises of various techniques like melt, sol gel, polymer and pyrolysis, reactive liquid infiltrations, nitridation, reaction bonding and chemical vapour infiltration. Kaya et al. [8] developed a model analyze the performance of a low cost as well as trust worthy CMC fabrication, which comprises of coated woven ceramic fibers of particulate oxide of the size of Nano- meter by the method of electrophoretic deposition (EPD). This process is preceded by ingraining of fiber coating in the ceramic matrix and warm pressing at higher temperatures to obtain the "green" component ready for pressure less sintering.

They concluded that the NdPO4 interface having porosity of ten percentage and fiber loading by 40% by volume have better thermo-mechanical characteristics in terms of capacity and damage- tolerant behavior when they are in the form of multilayers. Andy et al. [9] analyzed mechanical properties related to inter laminar shear features, cumulative failure as well as deviation of crack in CMC's using FEA. They show cased the importance of FESA to assess the properties of CMCs. Fantozzi et al. [10] analyzed creep models to assess the behavior of creep of CMCs pertaining to the microstructural features using grain boundaries and sliding models. Theyproposed that the behavior of creep in CMCs rely on various factors like flow in matrix, volume concentration, viscosity of the inter granular glassy phase, grain size of the matrix, content in the reinforcement, the analogous morphology as well as architecture and the interface, the reinforcement and the matrix. Kim et al. [11] prepared composites with Boron nitride (BN) matrix. They used different ceramic fibers as reinforcing materials and low- viscosity, borazine oligomer. This process yielded in a firm BN matrix, when heated to high temperatures using Nextel 440, sumica, FP, Nicalon.

They manufactured ceramic fibers-FP, Nextel 440, Sumica, and Nicalon. Proportions in the fibers was obtained by heating at moderate temperature in the presence of air and proposed that the Nicalon IBN and Sumica/BN composites exhibited excellent flexural strengths as well as modulus. Composites having FP/BN as well as Nextel/BN displayed brittle characteristics. Carbon coated which acts a buffer for Nicalon fiber enhanced the capacity, comprising of fiber stretching within the matrix of Boron Nitride. Other than Nicalon, all the composites exhibited less dielectric constant as well as loss. Valerie et al. [12] prepared glass ceramic matrix composites reinforced with continuous Unidirectional carbon-fibers for dry contact applications. They described the fracture behavior of the composites using Transmission electron microscopy. They concluded that the mechanical behavior of composites reinforced with carbon-fiber rely upon the carbon fibers utilized and the warm-pressing environment of the bond in the matrix, which control the fracture strength in the composites to a great extent.

Maurice [13] focused his studies on using precursor as silicon carbon nitride matrix for manufacturing ceramic matrix composites. He focused mostly on using bi-directional Sic Nicalon fabrics as reinforcing material and organic and SiC as Precursor. He stated that the flexural capacity of the composites prepared is only fifty percent of that of the classical composites. Porosity and low bonding strength resulted in the degrading of the mechanical properties. Caputo et al. [14] prepared CMC's using Chemical vapor infiltration to accelerate the fabrication of CMC's reinforced with ceramic fiber. They proposed that simultaneous utilization of thermal gradient and gas flow accomplished the reduction of infiltration time. A specimen maintained 57% of its maximum strength at a strain of approximately at three percent, the specimen didn't break but deformed significantly.

CHARACTERIZATION OF CMC'S

Oriol et al. [15] has analyzed both conventional as well as non-traditional machining of CMCs with a focus to critically assess the effect of different machining processes. They concluded that none of the machining processes suit for CMC's for achieving the final product. Ballet et al. [16]conducted experiments to assess the dispersal of strain in fiber in osumilie SIC FGCM's. Effect of numerous parameters, like laser power was analyzed using laser Raman microprobe (LRM). They proposed that Raman spectroscopy can be applied on composite materials possessing opaque matrix like carbon/carbon, Sic/Sic or metal matrix composites. Bent and

Ramesh [17] estimated the toughness of CMC's reinforced with a unidirectional fiber experimentally and compared different composites using Shear Lag Model. They proposed that for most of the applications, focus should be on maximizing the toughness should be rather than the pull-out energy absorption. John and Karl [18] analyzed the mechanical as well as thermal features of CMC's using notched Charpy method by subjecting the specimens to temperatures of approximately 10000C. They concluded that exceptional toughness and high temperature creep rates are possible in CMC's because of its impact strength and is greater compared to the hot pressed Si3N4. Mah et al. [19] tested Lithium alumina silicate glass-ceramic-matrix composites by reinforcing them with Sic fibers at 9000C and 1000°C using UTM for flexural and tensile strengths.

They found that there is thermomechanical degradation while testing in oxidizing atmospheres. Partial pressure of oxygen is found to be responsible for this degradation. They have also stated that P0Z103Pa composites failed because of the brittle nature. Single crack propagation was the reason for the failure. Choy et al. [20] analyzed the mechanical behavior of several glass– ceramic composites with a focus towards axial as well as off- axial characteristics. They stated that the formation of a fiber/matrix interfacial reaction layer resulted in the brittle nature in composites with cross-ply reinforced with carbon fiber and borosilicate glass. They also stated that the off-axial features of cross-ply laminates were strongly relying up on the volume concentration of the fibers. Composites comprising comparatively lower fiber volume concentration, exhibited greater inter laminar strengths than those with that of the higher fiber volume concentrations. Larger variations in mechanical properties are also found because of the link between heterogeneous micro structures.

APPLICATIONS

Lino et al. [21] studied the applications of metal and CMC's in Aerospace Engineering. They concluded that even though, there are numerous applications, but still, they have to fully exploited. In order to adequately predict the structural behavior, and control the performance features of interest in advanced structural applications, and to accelerate the feasible accomplishment of novel CMCs as well as MMCs, there is a necessity for possessing reliable modelling as well as simulation tools. Binner et al. [22] analyzed the applications of Ultra-high temperature CMC's in aerospace, Defence, energy, medical and transport sectors because of their excellent mechanical as well as physical properties. They found that they have certain properties similar to single-phase monolithic components which make them advantageous in structural applications. Inspite of the above advantages, they are limited in applications because of their low rupture toughness, which makes them highly vulnerable to thermal shock, which is ahindrance to their utilization in heat shielding systems on guiding heads and propulsion units.

John and Frank [23] in their studies revealed that despite of the fibrous look on their ruptured surfaces, global load sharing is not found in the CMC's. They found that the volume dependencyis very small when comparison is carried with respect to the strength criteria of two configurations by Monte Carlo Simulations. Conversely areas of large stress concentration, like those which are found usually ahead of the notches or flaws in manufacturing are anticipated to withstand greater stress levels of collapse by virtue of comparatively smaller volumes that were exposed to the surge in the stress. Porwal et al [24] analyzed the behavior of GCMC's, based on their synthesis, densification and characterization. They concluded that graphene can be quickly demarked from the one that is happening in CMCs consisting CNTs. Sintering assisted by Uniaxial-pressure process emanated in prioritized alignment of graphene in the ceramic matrix, emanating in highly anisotropic features. Flakes present in graphene augmented various characteristics of GCMCs. They also reported that works related to the effect of the size distribution of graphene flakes on the properties of GCMC's were rarely discussed and more focus has to be laid to improve the manufacturing processes and methods to improve the properties of ceramic matrix composites.

CONCLUSIONS

This review is intended to provide an over view of CMC's to researchers who are developing CMC's for various applications. From this article, one may get familiarization about properties, characterization, different

processes of fabrication and its associated problems and applicationsof CMC's. In particular, the focus is laid on the improvement of fracture toughness of the brittle matrix. The takeaways from this review are as stated below: Ceramic matrix composites exhibit superior resistance to wear, strength at high temperature and chemical stability. Because of this reason, they are used in widely used in various applications owing to their excellent and typical behavior at critical temperatures. Despite of their excellent properties, they are susceptible to fail under creep, chemical degradation, stress induced chemical processes at elevated temperatures. These problems are to be resolved for developing them for the structural applications. Moreover, CMC's owing to brittle nature, are prone to catastrophic failure. Various reasons attributed to this type of failure are: Failure due to internal or external flaws and thermal shocks. Another reason for failure of CMC's is thermal mismatch between the components. In order to avoid the catastrophic failure in CMC's, fibers are added. Fiber pullout, micro cracking, improper bonding between fiber and matrix, phase transformation are the mechanisms which increase the toughness of the CMC's. Finally, to overcome the barriers like high production costs, lack of strength and toughness, difficulty of making complicated shapes, for large scale applications, sintering or sintering associated with hot pressing are the possible alternative solutions.

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AN ANALYTICAL STUDY ON PHYTOCHEMICAL AND HEPATOPROTECTIVE OF SOLANUM XANTHOCARPUM

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Abstract
In India, Solanum xanthocarpum is known by a number of other names in several different languages. For its several pharmacological qualities, including antiasthmatic, hepatoprotective, cardiovascular, hypoglycemic, and antiulcer effects, the plant is thoroughly researched. There is scientific support for the traditional usage of S. xanthocarpum fruit to treat diabetes mellitus. To support the traditional use of this plant, preliminary hepatoprotective testing of an aqueous extract of the fruits of S. xanthocarpum on CCl4-induced liver toxicity was conducted. The findings showed an improvement in all haematological parameters, indicating excellent protection. According to reports, the fruits contain a number of steroidal alkaloids, including solasonine, solacarpine, solanacarpidine, and solamargine, as well as caffeic acid, coumarins like aesculetin and aesculin, steroids such carpesterol, diosgenin, campesterol, and daucosterol. The exact molecular mass for the Sx7 was found to be 414.7. Based on this the proposed molecular formula of the compounds could be tentatively: $C_{29}H_{50}O$. From ^{13}CNMR and ^{1}HNMR the number of C and H were found to be near to the formula $C_{29}H_{50}O$. The structure Sx7 to be the b–Sitosterol. The effect various doses of SXE were studied on serum marker enzymes and total bilirubin in CCl_4 intoxicated animal. Hepatic injury induced by CCl_4 caused significant changes in marker enzymes as AST by 268.94%, ALT by 383.68%, ALP by 134.72% and total bilirubin by 309.21% compared to control group. The percentage protection in marker enzyme of treated group at 100, 200 mg/kg as AST 29.11 ($P<0.01$), 51.22 ($P<0.001$), ALT 25.01 ($P<0.05$), 54.66 ($P<0.001$), ALP 28.50 ($P<0.01$), 43.24 ($P<0.001$) and total bilirubin 25.08 ($P<0.01$), 62.37 ($P<0.001$) compared to CCl_4 group.
Key words : Solanum xanthocarpum , Solasodine, Hepatoprotective, Toxicity

Introduction

Common names for Solanum xanthocarpum include Indian night shade and yellow-berried night shadow. It is a thorny, bright green, perennial plant that grows up to 2-3 metres tall, usually in arid areas such along highways and wastelands. It is widely distributed throughout India. Kantkari (Sanskrit), Kateri (Hindi), Bhoringni (Gujarati), Kantankattiri (Tamil), Kantkariccunta (Malayalam), Vakudu (Telugu), and Nelagulle (Kannad) are some of the other names for Solanum xanthocarpum that are used in India.1,2. In wastelands, it is spontaneously spread by seed. Asia, Ceylon, and Malaya are the primary distribution hubs for Solanum xanthocarpum. S. xanthocarpum is a significant medicinal plant that has been used for a variety of medical purposes recently. An alkaloid of S. xanthocarpum called solasodine has antispermatogenic properties.

Different parts of this plant have been used traditionally for curing various ailments such as fever, cough, asthma and diabetes in Indian traditional medicines. The hot aqueous extract of dried fruits is used for treating cough, fever and heart diseases. The plant is extensively studied for the various pharmacological activities like antiasthmatic, hepatoprotective, cardiovascular, hypoglycemic, antiulcer and other properties. Scientific evidence in favor of the traditional use of the fruits of S. xanthocarpum for the treatment of diabetes mellitus has

been reported[3]. The total extracts and steroidal saponins of S. xanthocarpum, have been reported to exhibit potent antistress-adaptogenic effects[4].

Solanum xanthocarpum is widely recognized in Ayurvedic system of Indian medicine for treatment of respiratory problems. It has been reported as immune modulatory agent. Preliminary immune modulatory screening indicated the protective effect of the aqueous extract of fruits of Solanum xanthocarpum against Cyclophosphamide induced immune suppression in mice. The study affirmed that aqueous extract of the fruits of Solanum xanthocarpum is effective immune modulatory agent. The extract potentiated the non-specific hepato protective response by increasing the haematological parameter and neutrophil adhesion test, which may attributed to different phytoconstituents. Hence, to isolate the phytoconstituent it was subjected to fractionation and characterizations of isolated compounds.

To prove traditional claim of this plant preliminary hepatoprotective evaluation of aqueous extract of fruits of S. xanthocarpum on CCl_4 induced hepatic toxicity was carried out and the results indicated good protection by showing increase in all the hematological parameters. In continuation of the work, it was proposed to isolate active hepatoprotective agents from the extract. The fruits are reported to contain several steroidal alkaloids like solanacarpine, solanacarpidine, solancarpine, solasodine, solasonine and solamargine[6]. Other constituents like caffeic acid coumarins like aesculetin and aesculin, steroids carpesterol, diosgenin, campesterol, daucosterol and triterpenes like cycloartanol and cycloartenol are also reported from the fruits[5,6].

In this paper, we report the isolation and characterization of bioactive principles namely β- sitosterol and stigmasterol from aqueous extracts of fruits of S. xanthocarpum.

The fruits are reported to contain several steroidal alkaloids like solanacarpine, solanacarpidine, solancarpine, solasonine, solamargine and other constituents like caffeic acid, coumarins like aesculetin and aesculin, steroids carpesterol, diosgenin, campesterol, daucosterol and triterpenes like cycloartanol and cycloartenol were reported from the fruits[6]. The antispasmodic, antitumor, cardiotonic, hypotensive, antianaphylactic, arbuda tumour, Antiurolithiatic and natriuretic activities were also reported[7]. There has been only one research report on hepatoprotective effect against paracetamol in an animal model is available. However, its effectiveness in protection against acute liver injury caused by carbon tetrachloride (CCl_4) had not been previously established[8]. Therefore, present study was designed to evaluate the effect of S. xanthocarpum fruit extract (SXE) against carbon tetrachloride induced acute liver injury in experimental animals.

MATERIALS AND METHOD

Plant material- Fruits of the plant, S. xanthocarpum were collected from Shahganj, Jaunpur (U.P.) and authenticated from Dr. R.A. Singh Department of Botany Kuteer P.G. College, Chakkey, Jaunpur (U.P.). The sample was shade dried and powdered to 200 mace.

The powdered plant a material (900 g) was macerated with petroleum ether, the marc was exhaustively extracted with of 50 % ethanol for three days. The extract was separated by filtration and concentrated on rotavapour (Buchi,USA) and then dried in lyophilizer (Labconco,USA) under reduced pressure. The yield obtained was 198.40 g of solid residue (yield 22.04% w/w). Preliminary qualitative phytochemical screening of SXE has given the positive testes for flavonoids, steroidal alkaloids, triterpenes, flavanoids, quercitrin and apigenin glycosides[9].

Chromatographic Separation:

TLC: The alcoholic extract of fruits was subjected to thin layer chromatography using silica gel H as stationary phase and petroleum ether: methanol (1:1) and petroleum ether: chloroform: methanol (5:2:1) as mobile phase. The chromatograms when developed yielded seven and eight spots respectively that showed zones for steroidal nucleus with Liebermann– Buchard visualizing reagent.

Isolation: Column chromatography of fruit aqueous extract (10g) was conducted using silica gel (Mesh 100-200) by wet packing method. The column was run using petroleum ether, ethyl acetate, methanol and water successive by gradient elution technique. TLC was used to monitor the eluates. A total of 200 eluates were collected. Similar fractions were pooled together to yield fifteen fractions. Eluates G worked upon to yield **Sx7**.
The Rf values and colours of the bands obtained were recorded. It shows major spots at visible light Rf 0.03 (light green), 0.06(green), 0.28, 0.34, 0.41, 0.51, 0.59, 0.88 (all spots yellow/light yellow), 0.92 (light black), 0.96 (yellow); at 254nm Rf 0.06, 0.92 (all spots black) and at 366nm Rf 0.01, 0.04, 0.07, 0.13, 0.26, 0.31,0.39,0.48,0.57 (all spots red), 0.66 (light red), 0.71 (red),
0.82 (purple), 0.85 (red), 0.89 (red), 0.93(light red). After spray the plate shows major spots at visible light Rf 0.06, 0.92 (Faint green), 0.96 (light brown); at 366nm Rf 0.02, 0.05(pink), 0.06(faint violet), 0.08(pink),0.10(light blue), 0.31,0.39,0.48, 0.58(light red),0.61(faint white),0.72(light red),0.82(light blue), 0.84(light red),0.89(red),0.93(white).
Sx7 yielded single spots when subjected to TLC using several solvent systems including petroleum ether: ethyl acetate (70:30), petroleum ether: methylene chloride (50:20) and Petroleum ether: Chloroform: Methanol (60:30:10) and it showed it to be homogenous compound[10].
Sx7 a white amorphous powder (8.3mg) with a melting point (139^{o}C) was subjected to thin layer chromatography using various solvent systems such as petroleum ether: chloroform: methanol (5:3:1), methylene chloride: petroleum ether (50:50) indicated it to be homogenous compound. **Sx7** was further subjected to IR, ^{1}HNMR, ^{13}CNMR and Mass Spectroscopy to ascertain the chemical structure[11].
The structures were simulated using ACD/NMR program to obtain the chemical shifts of both proton and carbon. Phytochemical analysis (Salkowski‟s test and Lieberman-Burchard test) of compound confirms its steroidal nature.
Spectroscopic Characterization: Different spectroscopic methods were used to elucidate the structure of isolated compounds. Among the spectroscopic techniques IR, ^{1}H- NMR, ^{13}C- NMR and LCMS were carried out. The infra red spectrum was recorded on FTIR (model Shimadzu 8700), ^{1}H- NMR and ^{13}C- NMR spectra were recorded using $CDCl_3$ as solvent on Bruker Advance II 400 NMR spectrometer and LCMS spectra were recorded at high resolution on a mass spectrometer (model Shimadzu) at Sophisticated Instrumentation centre and the data are given in m/z values.
Albino rats weighing (150-170 g) and Swiss albino mice (25-30 g) of either sex were procured from CDRI, Lucknow. They were kept in departmental animal house in well cross ventilated room at (22±2) ºC and relative humidity 44%-56 %, light and dark cycles of 12 h, for 1 week before and during the experiments. Animals were provided with standard rodent pellet diet (Amrut, India) and the food was withdrawn 18-24 h before the experiment though water was given ad libitum. All studies were performed in accordance with the guide for the care and use of laboratory animals, as adopted and promulgated by the Institutional Animal Care Committee, CPCSEA, India. Acute toxicity study was performed according to Organisation for Economic Co-operation and Development guidelines No. 423. Albino rat of either sex were divided into six groups with six animals each. SXE was administered orally as a single dose to albino rat at different dose levels of 250, 500, 1000, 1500 and 2000 mg/kg b.w. Animals were observed periodically for the symptoms of toxicity and death within 24 h and then daily for 14 days.
The albino rats were divided into six groups, each group had six animals. Group I (control) animals were administered a single daily dose of carboxymethyl cellulose (1 mL of 1%, w/v, p.o. body weight). Group II received carbon tetrachloride (1 mL/kg body weight, i.p. 1:1 v/v mixture of CCI_4 and liquid paraffin) alone while group III, IV and V received orally 100, 200 and 400 mg/kg body weight of SXE in (1 %, w/v, CMC) respectively along with carbon tetrachloride as in group II. Group VI received silymarin, the known hepatoprotective compound (Sigma Chemicals Company, USA), at a dose of 100 mg/kg, p.o., along with carbon

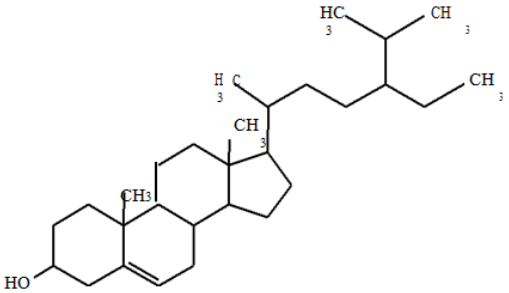
tetrachloride. The SXE was given daily while carbon tetrachloride was given for every 72 h for 14 days. Animals were sacrificed 48 h after the last dose of the drug. The liver samples were dissected and blood was collected. The collected blood was allowed to clot and serum was separated at 2500 rpm for 15 min and the biochemical parameters like serum enzymes: aspartate aminotransferase[12] (AST, U/L), serum glutamate pyruvate transaminase (ALT, U/L), serum alkaline phosphatase (ALP, U/L) and total bilirubin (mg/dL) were assayed using assay kits[13-14].

The values were represented as mean ±S.E.M. for six rats. Analysis of variance (ANOVA) test was followed by individual comparison by Newman-Keuls test using Prism Pad software (version 3.0) for the determination of level of significance. The values of $P<0.05$ was considered statistically significant.

RESULT AND DISCUSSION

Characterization of Sx7: The exact molecular mass for the Sx7 was found to be 414.7. Based on this the proposed molecular formula of the compounds could be tentatively: $C_{29}H_{50}O$. From ^{13}CNMR and ^{1}HNMR the number of C and H were found to be near to the formula $C_{29}H_{50}O$. Since, the compounds give positive test for steroids. Based upon the functional group analysis it was found that the nature of oxygen was hydroxyl, also supported by IR spectroscopy. This implies presence of one double bond in the structure. So, the steroids with other functional groups were rejected. Also on considering the nature of oxygen as hydroxyl and presence of one double bond, the general formula for the compounds was C_nH_{2n-6}. Therefore, they must be tetracyclic compounds. Based on the melting point and other related data (IR, NMR and Mass) the structure of the isolated compounds Sx7 was proposed as (**fig. 1**);

Fig.-1 : Sx7



The compound **Sx7** is a white amorphous powder, m.p. 137°C. IR absorptions bands appeared at 3549.99 cm^{-1} (OH), 2935.73 cm^{-1} (CH_2), 2867.38 cm^{-1} (CH), 1637.63 cm^{-1} (C=C), 1063.34cm^{-1} (C-O). Mass spectra of this compound suggested that its molecular mass is 414 (M.F. $C_{29}H_{50}O$) having characteristic fragments observed at m/z: 414, 396, 381, 329, 303, 289, 273, 255, 231, 213, 199, 173, 159, 119, 95, 81, 69. NMR spectrum of this compound resembled data published in previous studies. This compound is having six methyl, eleven methylene and three quaternary carbons with a hydroxyl group. The carbons of alkenes conjugated are at 140.78 ppm (C5) and 121.72 ppm (C6) which was confirmed from the ^{13}CNMR. The above IR, ^{1}HNMR, ^{13}CNMR, LCMS spectal data and a comparison of the ^{13}CNMR signal with those described in the literatures showed the structure of **Sx7** to be the β-Sitosterol.

Compound Sx7 showing positive tests for steroids and alcohols were isolated. The **Sx7** is white amorphous powder like substance with melting point 137°C. On subjection to IR spectroscopic analysis, the observed absorption frequencies resemble the absorption frequencies observed for β- sitosterol[15]. The proton NMR showed the proton environment resembles the protons of β- sitosterol. The ^{13}C- NMR has shown recognizable signals of β sitosterol and Stigmasterol. The weak molecular ions were given at m/z 414. The molecular weight and fragmentation pattern indicate that the isolated compounds are β- sitosterol.

The above I.R., ^{1}HNMR, ^{13}C-NMR and LCMS spectral data and their comparison with those described in the literatures showed the structure of isolated compounds are to be the β-sitosterol.

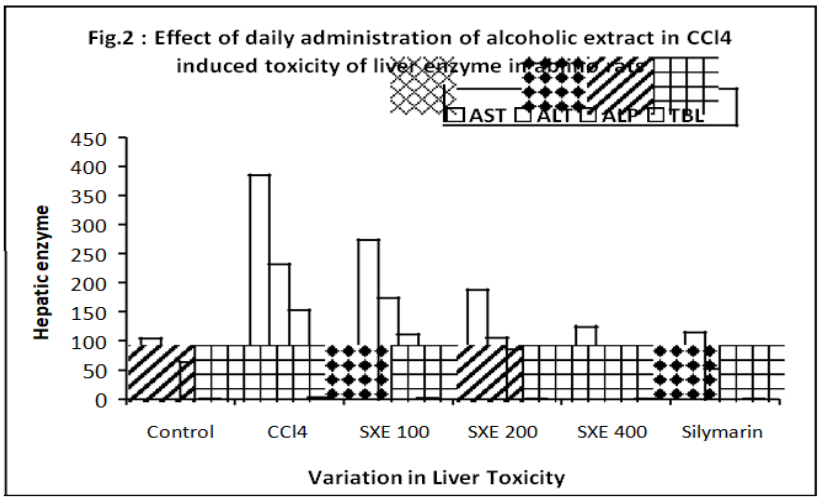
Solanum xanthocarpum produces no mortality at 2000 mg/kg. Therefore, one-tenth of the maximum no mortality dose of extract were selected as therapeutic middle dose (200 mg/kg) and just double as well as half dose of it as highest (400 mg/kg) and lowest dose (100 mg/kg) respectively, in this study.

The effect various doses of SXE were studied on serum marker enzymes and total bilirubin in CCl_4 intoxicated animal. Hepatic injury induced by CCl_4 caused significant changes in marker enzymes as AST by 268.94%, ALT by 383.68%, ALP by 134.72% and total bilirubin by 309.21% compared to control group[16]. The percentage protection in marker enzyme of treated group at 100, 200 mg/kg as AST 29.11 ($P<0.01$), 51.22 ($P<0.001$), ALT 25.01 ($P<0.05$), 54.66 ($P<0.001$), ALP 28.50 ($P<0.01$), 43.24 ($P<0.001$) and total bilirubin 25.08 ($P<0.01$), 62.37 ($P<0.001$) compared to CCl_4 group while maximum percentage protection in marker enzyme at the dose of 400 mg/kg and silymarin (100 mg/kg) as AST 67.71 ($P<0.001$), 70.36 ($P<0.001$), ALT 75.66 ($P<0.001$), 77.40 ($P<0.001$), ALP 54.52 ($P<0.001$), 59.80 ($P<0.001$) and total bilirubin 72.34 ($P< 0.001$), 73.31 ($P<0.001$) which is almost comparable to the group treated with silymarin, a potent hepatoprotective drug used as reference standard (Table-1).

Table-1: Effect of SXE on serum AST(U/L), ALT (U/L) AND Total bilirubin level (mg/dL) against CCl_4 induced liver toxicity in rats

Groups	**AST**	**ALT**	**ALP**	**TBL**
Control	104.26±18.13	47.81±8.22	63.13±6.18	0.76±0.13
CCl_4	384.66±36.21	231.25±24.87	152.24±14.23	3.09±0.32
SXE 100	272.65±23.62b	173.41±18.24a	111.16±10.96	2.19±0.13
SXE 200	187.63±19.87c	104.83±14.46c	85.13±7.86	1.16±0.16
SXE 400	124.17±16.54c	56.27±9.33c	70.56±6.45	0.84±0.13
Silymarin	113.99±12.43c	52.24±6.72c	70.43±6.95	0.82±0.11

In the present investigation, SXE was evaluated for the hepatoprotective activity using CCl_4 induced hepatotoxicity in rat[17,18]. The hepatotoxicity induced by CCl_4 is due to its metabolite CCl_3 a free radical that alkalates cellular protein and other macromolecules with a simultaneous attack on polyunsaturated fatty acids, in the presence of oxygen, to produce lipid peroxides, leading to liver damage. Hepatocellular necrosis leads to elevation of the serum marker enzymes, which are released from the liver into blood[19].



The present study revealed a significant increase in the activities of AST, ALT, ALP and serum bilirubin levels on exposure to CCl_2, indicating considerable hepatocellular injury[20]. Administration of SXE at different doses level (100, 200 and 400 mg/kg) attenuated the increased levels of the serum enzymes, produced by CCl_4 and caused a subsequent recovery towards normalization comparable to the control groups animals. The hepatoprotective effect of the SXE was further accomplished by the histopathological examinations. SXE at different dose levels offers hapatoprotection, but 400 mg/kg is more effective than all other lower doses.

In CCl_4 induced hepatotoxicity, the balance between ROS production and these antioxidant defences may be lost, „oxidative stress" results, which through a series of events deregulates the cellular functions leading to hepatic necrosis[21]. The reduced activities of SOD and catalase observed point out the hepatic damage in the rats administered with CCl_4 but the treated with 100, 200 and 400 mg/kg of SXE groups showed significant increase in the level of these enzymes, which indicates the antioxidant activity of the Solanum xanthocarpum.

Conclusion

Alcoholic extract of Solanum xanthocarpum Compound Sx7 was isolated and showed positive results for alcohol and steroids. The Sx7 has a melting point of 137oC and is a white, amorphous powder-like material. The detected absorption frequencies approximate the absorption frequencies seen for -sitosterol when subjected to IR spectroscopic investigation. The results of the current investigation showed that exposure to CCl2 significantly increased the activities of AST, ALT, ALP, and serum bilirubin levels, indicating substantial hepatocellular damage. SXE was administered at three different dose levels (100, 200, and 400 mg/kg), and these doses reduced the elevated blood enzyme levels brought on by CCl4, leading to a recovery towards normality that was equivalent to the animals in the control group.

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MODIFICATION OF TRADITIONAL SUN DRYING TECHNIQUE USEDE FOR ALL AGRICULTURAL COMMODITIES

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ABSTRACT
The conventional method of sun drying, which is used for all agricultural products, was modified by solar drying. Solar dryers were first employed to dry non-agricultural goods, but their applications eventually expanded to include drying agricultural goods. Only big agricultural sectors in developing nations have been proven to be economically feasible for the high temperature dryers employed in industrialised nations, while small and medium-sized businesses typically cannot afford them because to their high cost and process unpredictability. In order to lessen the significant post-harvest losses, the advent of low-cost, locally made solar dryers offers a possible option. The potential to make high-quality items that can be sold seems to be an opportunity to help the farmers' financial position. Taking into account the low income of the rural population in developing countries, the relatively high initial investment for solar dryers still remains a barrier to a wide application. However, if it is manufactured by locally available material such as wood, glass etc., it will be economically affordable by the farmers.
Keywords- Green Energy, food drying,

LITERATURE REVIEW

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BASIC CONCEPT DESIGN

The main objective of this project is to determine the power from a renewable energy source which is the solar. Another objective of this project is to practice and apply the engineering concepts. But there are more objectives, which are:

- Design and construct a solar dryer which is going to decrease the pollution.
- Reduce the cost and energy.
- Learn the advantages and disadvantages of dryer.
- 5 Compare between theoretical and experimental study.

Solar Dryer can be only used during day time when adequate amount of solar energy is present.

- Lack of skilled personnel for operation and maintenance.
- Less efficiency as compared with modern type of dryers.
- A backup heating system is necessary for products require continuous drying.

Apart from weather conditions the drying behavior of agricultural crops during drying depends on the: Product, Size and shape, Initial moisture content, Final moisture content, Bulk density, Thickness of the layer, Turning intervals, Temperature of grain, Temperature, humidity of air in contact with the grain, Velocity of air in contact with the grain

MACHINE TOOLS & EQUIPMENTS:

We must require different machines for different operations like. Jigsaw, Glue gun, Sheet cutter, Soldering iron, Hand drill. And also some equipment like Measuring Tools , Marking Tools, Hand Tools etc.

Table 1: Components required for project:

Plywood	24 sq. feet
Transparent sheet	06 sq. feet
MS sheet metal	02 sq. feet
Wire mesh	20 sq. feet
Solar panel	01 no.
DC fan	01 no.
Temperature sensor	01 no.
Plumbing fittings	As per requirement
Electrical accessories	As per requirement
Fasteners etc.	As per requirement

Model Specification:

Overall height: 30 inches
Overall width: 18 inches
Overall length: 38 inches

COMPONENTS OF PROJECT MODEL

Solar panel:

Fig: Solar Panel

The solar panel is having the short-circuit current of 5.8 Amp, the open-circuit voltage of 48.3 V and rated power at 445 Watt/m2 solar radiation, all measured under STC. It has a dimension of 198.6 x 100.1 x 3.5 cm and weighs 22.5 Kilograms.

Temperature sensor:

Fig: Temperature Sensor

This temperature sensor has a range of 0-150 C, accuracy <o, 1 C +NTC spread over 0 to 70 C. maximum resistance of 3 ohm and require 12v and 3.5 mAmp of power to operate.

DC Fan

Fig: DC Fan

This Brushless DC Cooling Fan is operating at 12V with a dimension of 90 x 90 mm. It is very quiet and moves approximately at 65 CFM. It has a Dimensions of 90 x 90 x 25mm, Voltage of 12V, Speed of 2400RPM, Air flow of 65 CFM, Current of 0.10A, Cable Length:: 21cm, Sleeve type bearing.

Wire mesh:

Fig: Wire Mesh

The wire mesh is stainless steel ISO 9001:2000 certified mesh. It has weave wire mesh type having 0.01-25mm aperture. Air can easily pass through it and dries the food with ease.

DESIGN PROCESS-

- Layout of complete model
- Making of structure
- Installation of wire mesh
- Cover up with transparent sheet
- Installation of solar panel
- Assembly of plumbing fittings
- Assembly of electrical circuit
- Final check up and testing

Different types of SOLAR DRYER design:

Fig: Different types of Solar Dryer

RESOURCE PLAN

The cabinet is a large wooden or metal box and the product is located in trays or shelves inside a drying cabinet. If the chamber is transparent, the dryer is named as integral-type or direct solar dryer. If the chamber is opaque, the dryer is named as distributed- type or indirect solar dryer. Mixed-mode dryers combine the features of the integral (direct) type and the distributed (indirect) type solar dryers. The combined action of solar radiation incident directly on the product to be dried and hot air provides the necessary heat required for the drying process. In most cases, the air is warmed during its flow through a low pressure drop solar collector and passes through air ducts into the drying chamber and over drying trays containing the crops. The moist air is then discharged through air vents or a chimney at the top of the chamber. It should be insulated properly to minimise heat losses and made durable (within economically justifiable limits). Construction from metal sheets or water resistant cladding, e.g. paint or resin, is recommended.

Heated air flows through the stack of trays until the entire product is dry. As the hot air enters through the bottom tray, this tray will dry first. The last tray to dry is the one at the top of the chamber.

The advantages of this system are:

1. Simple in construction.
2. Low labour costs.
3. Simply load and then unload.
4. The product need not be exposed to the direct rays of the sun which reduces the loss of colour and vitamins.
5. Heat storage systems can be applied.

The disadvantages are:

1. A tendency to over-dry the lower trays.
2. Low efficiency, in terms of fuel consumption, in the later stages of drying when most of the trays got dried.

WORKING

The objective of a solar dryer is to provide ample amount of heat i.e. more than ambient heat under given humidity. It increases the vapour pressure of the moisture confined within the product and decreases the relative humidity of the drying air so that the moisture carrying capacity of the air can be increased. Air is drawn through the dryer by natural convection or sometimes by a fan. It is heated as it passes through the collector and then partially cooled as it catches moisture from the material. The material is heated both by the air and sometimes directly by the sun. Warm air can hold more moisture than cold air to maintain relative humidity, so the amount of moisture removed depends on the temperature to which it is heated in the collector as well as the absolute humidity of the air when it entered the collector. The moisture absorption capacity of air is affected by its initial humidity and by the temperature to which it is subsequently heated.

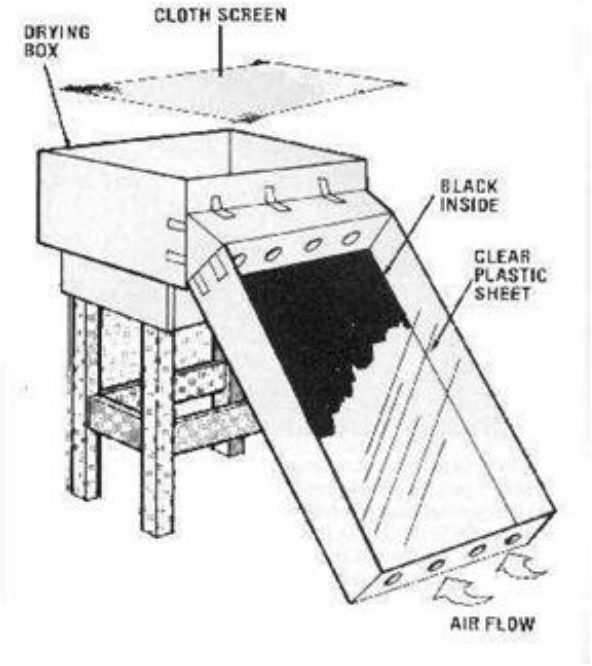

Fig: Schematic diagram of Solar Dryer

Fig: Actual Model

CONCLUSION

Solar Dryer is an eco-friendly technology which can address ozone depletion and global warming problem as it uses safe. The performance of solar dryers is significantly dependent on the weather conditions. Both the heat required for removing the moisture as well as the electricity necessary for driving the fans are generated in the most cases by solar energy only. In addition to the pre-treatment of the product, the weather conditions have the

biggest influence on the capacity of product that can be dried within a certain time period. The drying time is short under sunny conditions and accordingly extended during adverse weather conditions. The difference in drying capacity between dry and rainy season has to be taken into consideration for the calculation of the yearly capacity of the dryer.

The utilization of solar energy as the only energy source is recommended for small-scale dryers where the risk of spoilage of big quantities of crops due to bad weather is low. If large-scale solar dryers are used for commercial purposes it is strongly recommended to equip the dryer with a back-up heater to bridge periods with bad weather. A huge advantage of solar dryers is the fact that different types of fruits and vegetables can be dried. The quality of products dried in this way is excellent, due to the fact that the food is not in direct sunlight (cabinet or in-house dryer), and due to a shorter drying process-up to a one third of the time in comparison to traditional sun drying.

The drying operation must not be considered as merely the removal of moisture since there are many quality factors that can be adversely affected by incorrect selection of drying conditions and equipment. Some desirable properties of dried products are:

- Low and uniform moisture content
- Minimal proportion of broken and damaged grains
- Low susceptibility to subsequent breakage
- High viability
- Low mould counts
- High nutritive value
- Consumer acceptability of appearance and organoleptic properties.

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A NOVEL IMPLEMENTATION AND FABRICATION OF TRAVELLING THREAD MILL BICYCLE

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ABSTRACT
It is essential to exercise to maintain excellent health. In this experiment, we investigate the health benefits of outdoor treadmill activity. The treadmill cycle, which offers a simple, effective aerobic workout, is one of the most popular forms of indoor and outdoor exercise equipment. The design and construction of the travelling treadmill cycle is the subject of this project. We employ the same technique for shorter distances by using treadmills as workout equipment for running or walking in one location rather than for generating electricity. Through the use of the treadmill idea, the machine is propelled by the energy supplied by the user. This machine can be helpful for travelling to short distances as well as used for exercise to the peoples. Using this machine, allotting a separate time for their exercise is not needed. The same action performed on the treadmill is used in this machine for the movement of the machine awe (the operator), walks forward, the machine moves forward.

INTRODUCTION
A treadmill is a machine used mostly for stationary walking or running. The user must run or walk at a speed that corresponds to the speed of the belt as it goes in the rear. The belt travels at a pace similar to that of walking or jogging. The less complex, lighter, and more affordable models only move when walkers press the belt with their feet. They passively oppose motion. The latter are referred to as manual elliptical. The treadmill cycle's wheels are connected to the conveyor belt in a proper way so that when the user walks, the machine moves ahead, and vice versa.

LITERATURE REVIEW
Here in treadmill grade (5 percent/3 min). The constant treadmill speed requires only initial adaptation Present modern day world, there are two main issues which are causing trouble for mankind is the global warming which is caused by extensive use of combustibles and automobiles even for short distances also. Due to this there is an immense effect on environment and also depletion of fuel sources. The second concern is that lot of people are now majorly suffering from novice health issues. This is because lack of proper exercise. so i came up with the new engineering idea in modern transportation world and named as solar (or) manual powered health bicycle which can make people walk while they ride
Treadmill Bicycle treadmill bicycle can be used in place of regular bike at cheaper cost and without use of fuel. The treadmill bicycle will proof to be a future vehicle as no fuel is used for travelling through this and it is pollution free. The treadmill which is used for walking helps to keep us fit as exercise is also one of the important tasks for a person to be fit a d healthy for day to day life. Treadmill is cheaper than the normal bike which also makes it efficient and in this treadmill bicycle .

WORKING
The fabrication of the treadmill traveler is very advantageous because of its simple construction and easy working principle. To say in a one line, this machine follows the action of the user. That is, when the driver walks forward, the machine moves forward and when he walks backward, the machine moves backward. A treadmill setup is made so that the operator can walk on the belt. A handle is placed in the front for the controlling of the vehicle. The rollers above which the conveyor belt (treadmill belt), held in tension are coupled to the wheels of the machine, usually rear wheels. The rollers are connected by a suitable arrangement for efficient transmission of motion thus having minimal losses during the transmission of motion. The frame of the machine is designed in such a way that it is balanced and the operator doesn't put

any effort in balancing the machine. Now when the operator walks forward, the conveyor belt moves in one direction which makes the wheels of the machine to rotate so that the machine moves front. When he walks backwards, the motion direction of the belt is reversed and thus the vehicle moves backwards.

Bearings With Bearing Cap

The bearings are pressed smoothly to fit into the shafts because if hammered the bearing may develop cracks. Bearing is made up of steel material and bearing cap is mild steel. A ball bearing usually consists of four parts: an inner ring, an outer ring, the balls and the cage or separator. To increase thecontact area and permit larger loads to be carried, the balls run in curvilinear grooves in the rings. The radius of the groove is slightly larger than the radius of the ball, and a very slight amount of radial play must be provided

Frame

Frame stand is made up of steel coated material. The whole above mentioned parts are fixed in to this frame stand with a suitable arrangement.

Conveyor Belt

A conveyor belt is the carrying medium of a belt conveyor system often shortened to belt conveyor. A belt conveyor system is one of many types of conveyor systems. A belt conveyor system consists of two or more pulley.One or both of the pulleys are powered, moving the belt and the material on the belt forward. The poweredpulley is called the drive pulley while the unpowered pulley is called the idler pulley.

wheel is one of the main components of the bucket wheel excavator, which is one of the largest machines. Wheels, in conjunction with axles, allow heavy objects to be moved easily facilitating movement or transportation while supporting a load, or performing labour in machines. Common examples are found in transport applications. A wheel greatly reduces friction by facilitating motion by rolling together with the use of axles.

Rollers

The rollers are used for the rolling action of the conveyor belt. The roller is placed at the both ends of the machine and the conveyor belt passes over the rollers. The conveyor belt is held under tension so that the belt doesn't slip off the rollers suitable arrangement for transmitting the motion of the belt to the wheels which in turn makes the wheels top move.

Sprocket And Chain Drive

The name 'sprocket' applies usually to anywheel upon which radial projections retain a chain passing over it. It is different from a gearin that sprockets are never conjugated together directly, and differs from a pulley, in that sprockets which has teeth and pulleys aresmooth.

Shaft

WHEEL

A wheel is a circular component thatis intended to rotate on an axle bearing. The

A shaft is a rotating machine element, usually circular in cross section, which is used to transmit power from one part to another, or from a machine which produces power to a machine. The various members such as pulleys and gears are mounted on it.

ADVANTAGES

Simple in construction.

- The components used for the fabricationare simple and easily available.
- The cost of the system is less.
- No need of separate time for exercising.
- No need of skilled operators to operate thismachine.
- Less maintenance is needed.
- Easily portable.

APPLICATIONS

These types of machines can be widelyused in the fields such as,
Fitness and gym,
Those who are interested in eveningwalks.
Automobile application.
Two wheeler Application.
Light vehicles
Not suitable for travelling longerdistances.
More human effort is required in orderto drive the vehicle

CONCLUSION

Treadmill bicycle perform multi operation in minimum time. Treadmill bicycle is completely manual operated. Treadmill bicycle provide more exercise for human. Treadmill bicycle does not used any organic fuels so it is ecofriendly. Treadmill bicycle does not promote any type of pollution.This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding, planning, purchasing, assembling and machining while doing this project work. We feel that the project work is a good solution to bridge the gates between the institution and the industries

FUTURE SCOPE

We can implement it by driving the total equipment or machine with the help of renewable energy sources like solar energy.In future we can also implement it to reduce the equipment cost and also improve the efficiency.As we all know a manual treadmill does not consume any electricity, thus using treadmill and some arrangements of gears and chain drive, we make a treadmill bicycle.

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YOLOV3-BASED CONVOLUTIONAL MODEL FOR ACUTE TRANSPORT VEHICLE TRAFFIC DIVINATION

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ABSTRACT
Constant congestions of varying strength and duration inside the dense delivery networks are the most important factor in sustainable transportation. This kind of congestion cannot be effectively managed by the modern Adaptive Traffic Signal Control. Mechanisms built on the foundation of deep learning have demonstrated their value in relying on adjective effects to improve forecasts of traffic length. The identification and prioritisation of harmful aspects with the goal of making human existence simpler have long been the focus of deep learning models in a variety of utility domains. Many solutions are being widely employed to address the real-time issues brought on by visitor congestion. This look at demonstrates the functionality of DL fashions to triumph over the site visitors congestion via way of means of reallypermitting the automobiles via a sign relying at the duration of automobiles. Our proposed approach integrates a numeral of approaches, supposed to enhance thecooperativeness of the discover operation. In this work, we expand the utility to alter the site visitors via way of means of liberating higher sign at preferred time intervals.
Keywords: Traffic, YOLOv3, Deep Learning.

INTRODUCTION

resolution of several extremely difficult and challenging real-world issues during the past ten years. Nearly all of the real-world domain names, including healthcare, autonomous vehicles (AV), business applications, and image processing, were represented in the software programmed areas. In contrast to traditional algorithms, which adhere to programming commands mostly based on wish statements like if-else, deep learning algorithms (DL) often base their learning on a trial-and-error method. Governments in every area are expressing their interest in integrating AI into their structures, with one of the greatest applications of DL being the simplification of human issues. Various fashions have full-size applicability in operating with the situations of real-time. There are masses of research accomplished for regulating net web page web website online traffic the use of deep learning strategies which contain photographsegmentation, item detection, etc.., Vehicle net web page web website online traffic evaluation pastimes to matter the sort of vehicles at the road, gift withinside the photograph. This data is then recorded to supply the report. Such structures are drastically used for surveillance and contemporary-day net net web page visitors manage structures. Various photograph-primarily based totally completely absolutely techniques have furthermore been implemented, a number of them include: Using Edge Detection, Blob Tracker Detection, Background Subtraction, Expectation-Maximization Algorithm. Many of those techniques were hired withinside the beyond and were a fulfillment to a quantity in figuring out the automobile net web page web website online traffic density [1]. Though the above-stated strategies have carried out real progress, those that paintings completely hobby at the detection of shifting vehicles only. This isn't always realistic as there can also additionally stand up numerous scenarios, which contain net web page web website online traffic jams and signs in which the vehicles are in a static characteristic over a duration of time. In such cases, the above-stated algorithms will no longer encounter the vehicles [2]. Also, in a crowded environment, there takes area shadows and reflections which is probably inaccurately expected through the winning fashions. Therefore, to cope with the above issues, we suggest a convolution neural network (CNN) primarily based totally completely entire set of guidelines referred to as YOLO for use withinside the automobile net net web page web website online traffic evaluation structures. This set of guidelines can encounter static vehicles and furthermore forget about about the shadows and reflections. As a quit result, it produces a very correct and fast detection

that may be implemented in an internet site web website online traffic evaluation device. In particular, the have a take a observe is focused on stay net web page web website online traffic regulating close to an internet site web website online traffic signal, and they have a take a observe is likewise focused at the lowering the ready time relying on automobile counts and early response. These structures may be very beneficial in desire-making to cope with the winning situation to manual early interventions to control those net web page web website online traffic suggestions very effectively. This has a take a observe pastimes to offer a higher device which may be capable of launch the net web page web website online trafficrelying on the hassle of vehicles. This project desires to develop net software program with the intention to manage the "Traffic Congestion". Python-Flask is used because of thetruth the the the the front give up that is used to craft the man or woman interface. MySQL is used because of the truth the once more gives up and is used to craft the database and maintain the particulars. Anybody with a touch of pc information can method and address the software program software with ease; as a result, it can be termed individual friendly.

Motivation

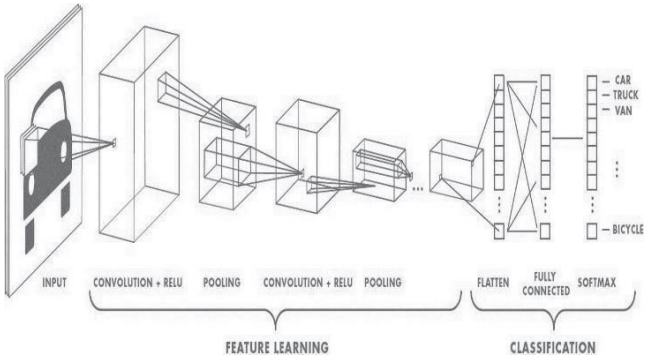
To absolutely recognize the seriousness of the traffic congestion problem, we want to examine the conventional visitors control approach from the beginning. Mainly the useof conventional routes, one desires to make visitors observations to estimate or offer clearance to the lane.

Composed of diverse vehicles. The conventional approach is then up to date thru the faraway manage machine to offer the best sign to the lane. It can be up to date later the use of system mastering algorithms to resolve this problem. These strategies will now no longer work, due to the fact human beings withinside the transportation hub might also additionally by no means be capable of approach. Therefore, a deep learning version is brought in similar studies to resolvethose problems.

FUNDAMENTALS

CNN

In deep learning, a convolutional neural network (CNN or ConvNet) also can be a deep neural network this is extra normally used to research visible images. Also called space- invariant or bias-invariant artificial neural networks (SIANN), they aid the burden distribution structure of the convolution kernel that adjustments the enter attributes and presents translation equal answers.

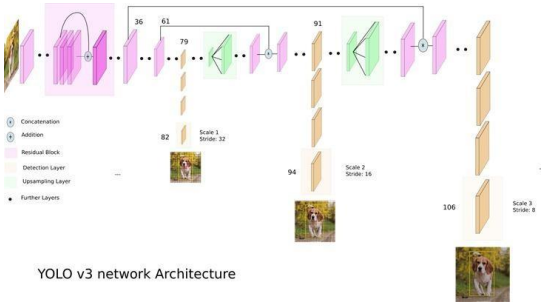


CNN is a regularized model of the multilayer perceptron. Generally, the multi-layer perceptron method is a completely linked community; H. Each neuron in a single layer is attached to all or components or any or any neuron withinside the subsequent layer. The usual sorts of regularization or prevention of overfitting are: penalty parameters throughout training (consisting of weight loss) ordisconnection (lack of connection, loss, etc.) CNN pursues a particular regularization approach: hierarchical styles andmeeting withinside the facts Patterns accelerate complexity and easier styles engraved at the filter. Therefore, CNN is at the bottom degree in phrases of connectivity and complexity. The name "Convolutional Neural Network" suggests that the community makes use of a mathematical procedure known as convolution. Convolutional community is a unique kind of neural community that makes use of at the least convolution among its layers in place of trendy mathematical processes.

YOLOV3

You Just Look Once (YOLO) is one of the quickest item reputation algorithms. Although now no longer the maximum correct item detection algorithm, it's miles a superb desire whilst you want real-time detection

without dropping an excessive amount of accuracy. YoloV3 may be part of item reputation, which may be a generation associated with laptop imaginative and prescient and photograph processing, used to apprehend times of semantic gadgets in a positive class (consisting of people, buildings, or cars) in virtual snapshots and videos. The in-intensity studies fields of item reputation consist of face reputation and pedestrian reputation. Object reputation has programs in lots of regions of laptop imaginative and prescient, together with photograph seek and video surveillance. Each item class has its very own particular characteristics, which assist to categorise the class; for example, all circles are round. Object class reputation makes use of those unique functions. For example, while searching out a circle, you're searching out an item placed inside a positive distance or a positive size (ie withinside the middle). Similarly, whilst you discover a square, you want gadgets that might be vertical on the corners and feature an equal aspect length. The equal approach is used to face reputation. Eyes, nose, and lips are generally found, and functions consisting of pores and skin color, and interpupillary distance are regularly found. YOLO v3 uses a darknet variant, which withinside the starting had a fifty-3-layer network professional on ImageNet. For the recognition task, fifty-3 greater layers are stacked on the stack, which gives us YOLO v3's certainly convolutional 106-layer number one shape. This is normally the reason why YOLO v3 is slower than YOLO v2. This is what the YOLO shape looks as if today.



YOLO v3 network Architecture

Deep Learning for Object Detection

In general, object detection may be a computer vision challenge that includes figuring out the presence, location, and sort of one or extra anticipated gadgets at some point of a given take a look at the image. This is a complicated challenge with 3 fundamental processes, particularly visible perception, positioning, and classification. In the beyond few years, the deep learning era has been implemented to many car detection problems and has proven promising outcomes in standardized statistics set checking out and laptop imaginative and prescient problems. Different strategies use deep studying strategies for item popularity. Ren Shaoqing and everybody proposed a method, particularly quicker RCNN, to enhance the studying price and popularity price of the famous speedy RCNN. The approach includes modules, particularly the location inspiration community, which makes use of a convolutional neural community to signify a location and the styles of gadgets to be taken into consideration withinside the location, and a quick RCNN to extract the attributes of the proposed location and refine the label bounding container. ... The quickest RCNN proved to be powerful for item popularity and received the primary location withinside the item popularity and popularity competitions of ILSVRC2015 and MSCOCO2015. Joseph Redmon and everybody proposed a set of rules referred to as Just Look Once (YOLO) for item popularity. It is stated that the set of rules is a great deal quicker than wonderful RCNN and presents real-time item popularity. The creator in the end stepped forward the overall performance of the version and named it YOLO v2 and YOLO v 3. Another famous item detection version withinside the enterprise is the single- channel multi-container detector (SSD). By removing the want for local product networks, the rate of RCNN detection is stepped forward

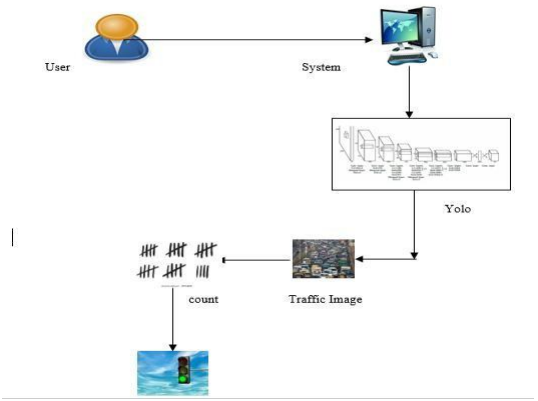
PROPOSED APPROACH

The technique proposed in this text recommends the usage of an extra correct deep learning version than current models to recognize traffic predictions through speedy calculating the wide variety of cars.

Methods

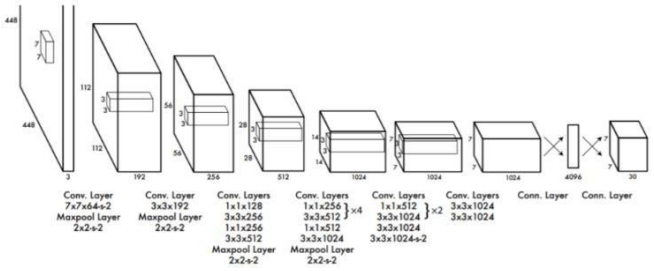
The proposed paintings have applied the usage of a convolutional version, that's used to recognize site visitor's evaluation in one-of-a-kind areas. Yolov3 is used because of the entrance of the complete

architecture, which could
correctly discover and calculate cars. As the wide variety of cars increases, the accuracy will now no longer alternate anddeliver correct results.



Data Sets
The data set is images captured in four different locations with real-time video clips from CCTV cameras. The images in the data set will be in JPG format.

YOLOV3 PRETRAINED MODEL
You only look at once (YOLO), the handiest convolutional neural community this is exclusive from the preceding detector. When comparing the whole YOLOv1 community structure with 24 folding layers, the body item is usedbecause of the regression hassle of spatially isolating boundary frames and their associated instructions The chance comes immediately from the complete photo and a pair of absolutely linked layers as proven in Figure three below. In our project, we use YOLOv3 rather than YOLOv1 as our item popularity model.



Vehicle Count
This Counting technique is primarily based totally at the marking of the location bounding container of the automobile and consequently at the digital reference line. This technique assumes that the automobile is transferring ina single direction. In order to count, every automobile recognized all through the popularity section might be assigned a completely unique tag and tracked. Until thedigital line is reached. In the path of this work, we used 5 unique class labels, specifically bicycles, cars, motorcycles, buses, and trucks, which can be all categorized as automobile items and used withinside the score system. Then take a look at whether or not the placement of every automobile exceeds the horizontal reference line (ref) at the y-axis, as proven in Figure 4 (b). It is using at the road, upload them up. In this case, it's miles assumed that the y2 coordinate fee> the ref coordinate fee intersects the reference line. Reduce records analysis.

Results
The pre-educated YoloV3 version makes use of visitors pix as enter primarily based totally on its architecture. Use the bounding field on every photograph to expect the quantity of visitors. In the effects section we talk about the how yolo will are looking ahead to the visitors density and we talk about thegeneral overall performance evaluation of yolo. Figure: Prediction of Vehicle Count Prediction of Traffic Density

OBSERVATIONS

The YoloV3 will detect the car be counted number with the aid of using making use of the Convolutional Neural Network(CNN) to every layer withinside the remark the yolov3 will predict the photo with the aid of using dividing the photo into grids the yolov3 will practice a convolutional neural network (CNN) to are expecting the detection bounds.

Observation-1:-

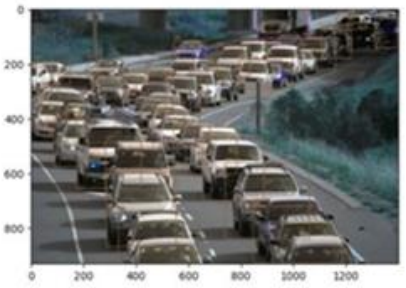


Fig. shows the analysis of vehicle count

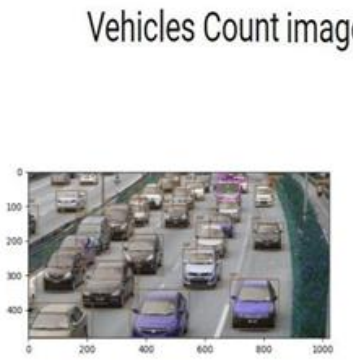
Observation-2 :

Fig : shows the Analysis of vehicle count

Observation-3:

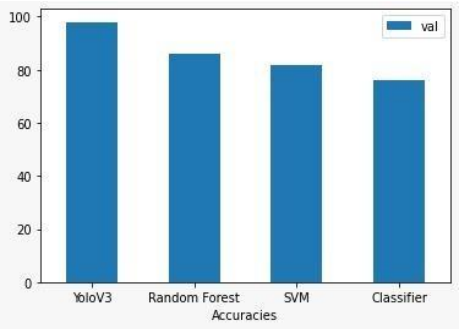
Fig : shows the Analysis of vehicle count

Observation-4:



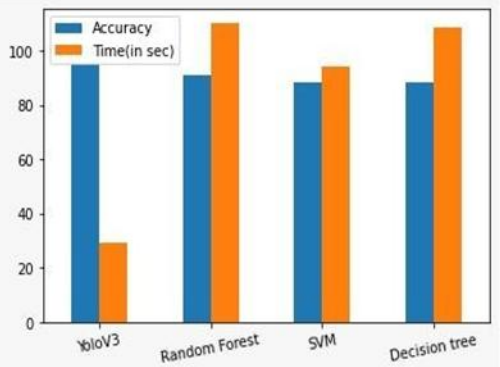
Final Result

In this work based on all observations we predicting the highest count vehicles and release the green signal to clear the traffic density



Bar graph: - Comparing the YoloV3 Accuracy withExisting Machine Learning Algorithms.

Computing The Accuracy of Various Models A forward pass of a whole photograph through the community is extra luxurious than extracting a characteristicvector of an photograph patch and passing it thru an SVM. Nevertheless, YOLO is extra than 20x quicker than the SVM+HOG and at the least as correct. The detection threshold may be set to any confidence level. In Existing Algorithms which includes SVM, Random Forest, Decision Tree, Classifiers will take extra time to are expecting the site visitors density and it those doesn't offercorrect consequences as compared to YoloV3 model



Bar graph: Speed and Accuracy Comparison

CONCLUSION

In this application, we've got successfully created a device that controls site visitors indicators manually. This is evolved in a user-friendly environment the use of Flask through Python programming. The device is possible to accumulate photos from the consumer to clean indicators for the lanes which have maximum be counted a number of motors. Here we're the use of yolov3 set of rules for counting the motors which offers the very best accuracy in comparison to SVM,

Random Forest and Decision tree and this software presents up to date information with the aid of using counting the motors. This paper addresses the answers of the troubles thatis took place in present algorithms whilst predicting the site visitors density. By the improvement of a car counting whilst in comparison to present algorithms the YoloV3 doesn't require education for predicting the site visitors density and the accuracy doesn't range whilst the custom information units are used and this version is used for real- time site visitors tracking device to expect excessive site visitors density additionally decreases the ready time on the site visitors centers This version is used to conquer the overfitting and underfitting troubles which turned into took place withinside the present algorithms and this version doesn't devour resources.

FUTURE WORKS

Where we work with Real-time stay photos on the site visitors indicators withinside the destiny work, additionally we're making plans to apply stay CCTV pictures movies to generate immediately car be counted number to expect site visitors density and we would really like to feature the time allocation for clearing the traffic lanes with the aid of using the use of a number of the algorithms and we additionally making plans to locate emergency motors including Ambulance, Government motors a few of the site visitors and supply the concern to launch inexperienced sign with the aid of using the use of a number of the algorithms. We also are making these devices work without human involvement with the aid of using the use of AI Technology

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MODELLING AND FINITE ELEMENT ANALYSIS OF COMPOSITE PRESSURE VESSEL

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ABSTRACT

Pressure vessel chambers have wide capacities in warm and thermal energy stations, cycle and substance enterprises, in house and sea profundities, and liquid stockpile strategies in ventures. Spot on plan follow is admissible strain for weld power communicated as weld proficiency. Proficiency is illustrated as the proportion of longitudinal (pivotal) power of a welded joint to the longitudinal power of line or tank shell.

In this proposal, the strain vessel is planned by the weld productivity and dissected for its solidarity using limited component examination application ANSYS. Numerical relationships will most likely be respected for the plan of tension vessel whose plan boundaries are designated through an association as per the ideal weld productivity. Displaying will be refined in CATIA. Investigation will be done in ANSYS on the strain vessel with various composite materials. In this task, static investigation is to decide the pressure, misshapening and strain. Exhaustion investigation is to decide the life, harm and wellbeing variable of the tension vessel utilizing EN 32 Steel, Carbon fiber and E-glass fiber materials.Heat examination is to decide the temperature dissemination and hotness move rate per unit space of the tension vessel utilizing EN 32 Steel, Carbon fiber and E-glass fiber materials. Straight layer investigation is to decide the pressure, misshapening and resist various layers stacking like 3, 6, 9 and 12 layers.

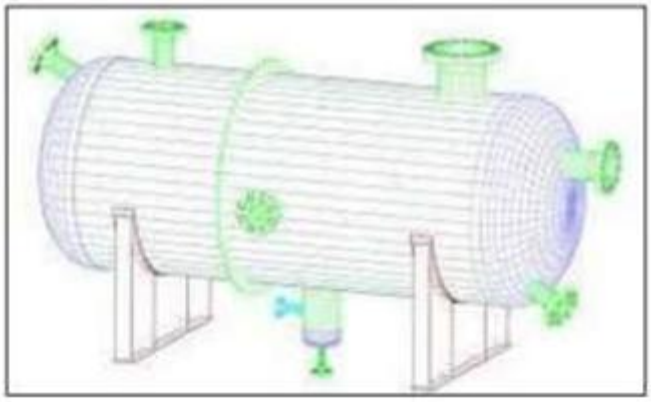
INTRODUCTION TO PRESSURE VESSELS

A pressure vessel is defined as a container with a pressure differential between inside and outside. Damage of a pressure vessel has a potential to cause extensive physical injury and property damage so leak-proof design and manufacturing is important . Shape of pressure vessel may be spherical, cylindrical or cone shape. Spherical pressure vessel has more strength than other shape but its manufacturing is very complicated . Material used for tough. Its elongation is not less than 14% and its impact toughness is not less than 27J. Metallic pressure vessels are having more strength but due to their high weight to strength ratio and corrosive properties they are least preferred in aerospace as well as oil and gas industries. These industries are in need of pressure vessels which will have low weight to strength ratio without affecting the strength. Fiber reinforcement plastic composite material is best suitable alternative for metallic pressure vessel due to its low weight to strength ratio and non-corrosive property

DESIGN PAREMETERS:

The design of stable strain vessel entails,

(a) Design of Vessel thickness
(b) Design of Dished ends thickness.
(c) Calculation of Hydrostatic experiment strain
(d) Calculation of Bursting pressure



LITERATURE SURVEY

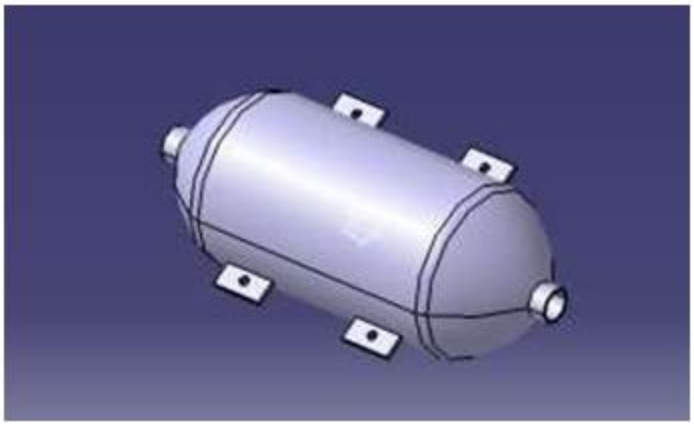
Zhi-Min Li et al. [2015] studied buckling and postbuckling of anisotropic laminated cylindrical shells under combined external pressure and axial compression in thermal environments. The buckling and postbuckling analysis for an anisotropic laminated thin cylindrical shell of finite length subjected to combined loading of external pressure and axial compression using the boundary layer theory is presented. Postbuckling response of perfect and imperfect, anisotropic laminated cylindrical
shells with respect to the material and geometric properties and load-proportional parameters under different sets of thermal environmental conditions arenumerically illustrated. The analytical model developed can be used as a versatile and accurate toolto study the buckling and postbuckling behaviour of composite structures.

A.M. Kamal et al. [2016] investigated analytical and finite element modelling of pressure vessels for seawater reverse osmosis desalination plants. A pressure vessel (PV) which contains the membrane elements of seawater reverse osmosis (SWRO) desalination has been modelled using analytical solution and finite element modelling (FEM) to optimize the PV design parameters. Two types of PV materials have been compared namely; stainless steel and fiber reinforced composite materials. Von-Mises yield criterion and Tsai-Wu failure criterion are used for the design of stainless steel and composite PVs respectively. Eglass/epoxy and carbon/epoxy composite materials are considered in this work. In addition, hybrid composite materials are introduced for layers through the vessel thickness. The results have shown that the composite PVs have lighter weight than the stainless steel PVs. The carbon/epoxyPVs introduce the optimum weight savings but interms of the total PVs cost, the hybrid composite PVscan be used.

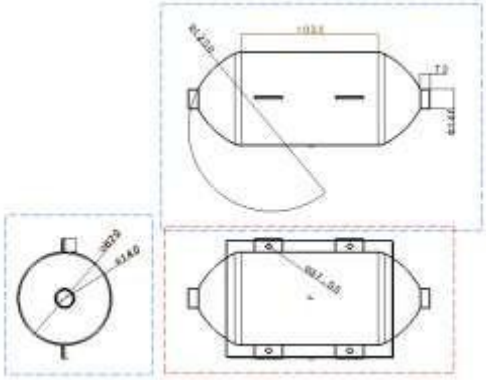
MODELING AND ANALYSIS

in the course of the historical past of our industrialsociety, many innovations have been patented and whole new technologies have advanced. Probably theone progress that has impacted
manufacturing more swiftly and drastically than any previous technological know-how is the digital pc. Desktops are getting used increasingly for both design and detailing of engineering accessories within the drawing office. Pc-aided design (CAD) is outlined as the application of computer systems and photographs software to support or increase the product design from conceptualization to documentation. CAD is most mainly associated with using an interactive computer portraits method, known as a CAD process. Pc-aided design systems are robust tools and within the mechanical design and geometric modeling of products and add-ons.

3D model OF pressure VESSEL



2D MODEL OF PRESSURE VESSEL



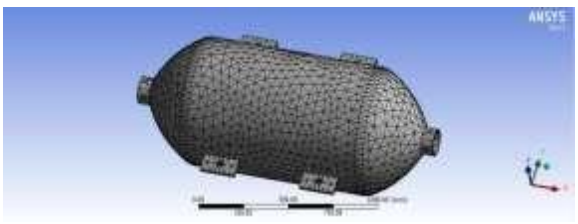
FINITE ELEMENT METHOD

Finite detail procedure (FEM) is also known as as Finite detail evaluation (FEA). Finite aspect procedure is a common analysis manner for resolving and substituting complex issues with the aid of less complicated ones, acquiring approximate solutions Finite detail method being a flexible tool is utilized in quite a lot of industries to remedy several functional engineering problems. In finite element method it's possible to generate the relative results.

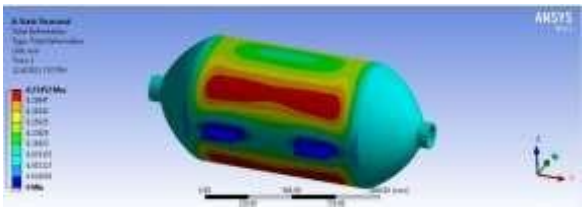
STATIC ANALYSIS OF PRESSURE VESSEL

Imported model

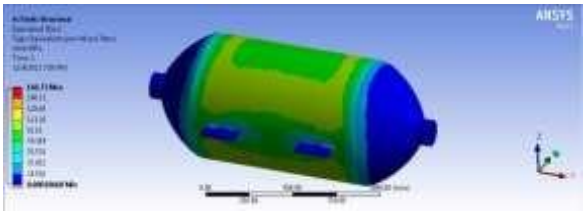
Meshed model



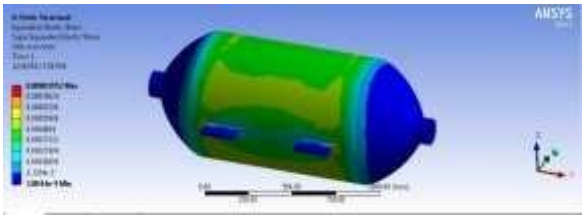
MATERIAL- E-GLASS FIBERTOTAL DEFORMATION



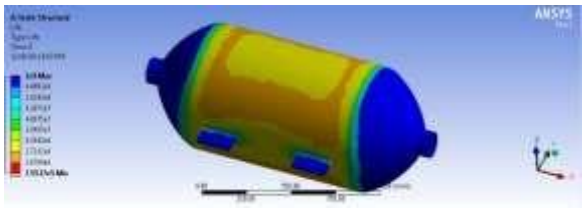
EQUIVALENT STRESS



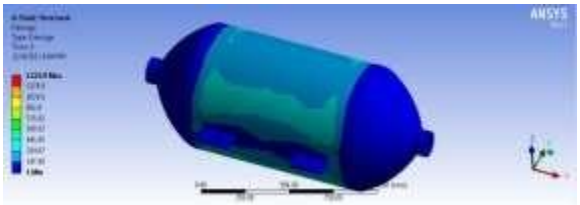
EQUVALENT STRAIN



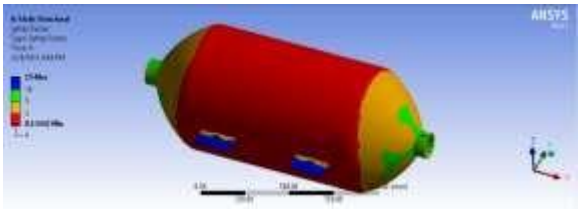
FATIUGE ANALYSIS OF PRESSURE VESSELLIFE



DAMAGE

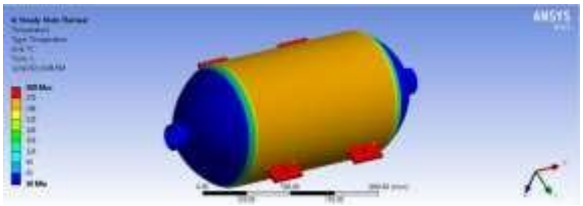


SAFTEY FACTOR

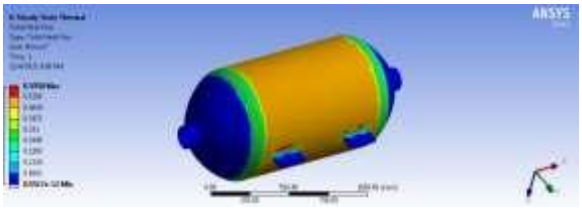


THERMAL ANALYSIS OF PRESSUREVESSEL

MATERIAL- E-GLASS FIBER TEMPERATURE DISTRIBUTION



HEAT FLUX

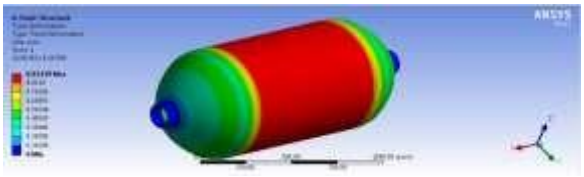


LINEAR LAYER ANALYSIS OF PRESSUREVESSEL

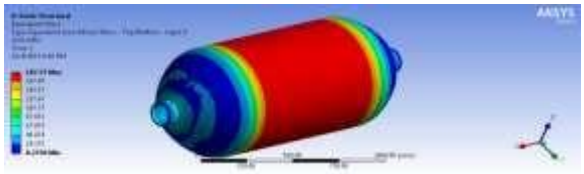
CASE: 1 3 LAYERS

Layer	Material	Thickness (mm)	Angle (°)
(+Z)			
3	EN 32 STEEL	5	90
2	CARBON FIBER	5	0
1	E GLASS FIBER	5	-90
(-Z)			

TOTAL DEFORMATION



EQUIVALENT STRESS



RESULTS AND DISCUSSION

Static analysis results table

Material	Deformation(mm)	Stress (N/mm^2)	Strain
EN 32 steel	0.23452	166.73	0.00083952
Carbonfiber	0.57623	139.64	0.0020695
E glassfiber	0.49539	134.21	0.0017375

Fatigue analysis results

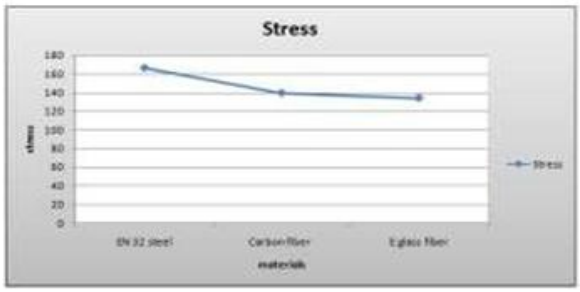
Material	Life	Damage	Safety factor
EN 32 steel	$1.67e^6$	1323.9	0.13442
Carbon fiber	$2.52e^6$	834.72	0.16051
E glassfiber	$2.77e^6$	752.99	0.16699

Thermal analysis results

Material	Temperature distribution(^oC)		Heat flux(w/m^2)
	Min	Max	
EN 32 steel	29.886	300	0.51658
Carbon fiber	30.00	300	0.5958
E glass fiber	30.002	300	0.86702

Linear layer analysis results

Layer stacking	Deformation (mm)	Stress (N/mm^2)	Strain
3 layers	0.1688	100.52	0.00049313
6 layers	0.14806	88.568	0.00043465
9layers	0.14047	84.069	0.00041268
12 layers	1.3439	80.576	0.0003955



Graph between Static analysis Stress and Materials Static analysis results were shown in Table 5.1 andFigure 5.1. In point of Stress minimization results, E-Glass fiber has major contribution followed by EN32Steel and Carbon fiber. Deformation is low at EN32Steel followed by E-Glass fiber and Carbon fiber.

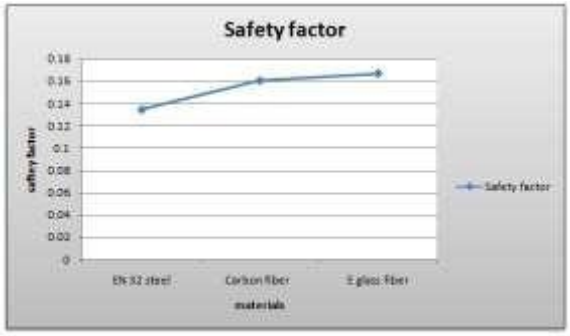


Figure : Graph between Fatigue analysis Safety factorand Materials
Safety factor is good at E-glass fiber material as seenin below figure

Figure : Graph between Linear layer analysis Stress
and Materials
So it can be concluded that the E-Glass fiber material is better material and 12 layers stacking is more efficient for pressure vessel

CONCLUSION

Structural, linear layer, thermal and fatigue analysis will be done in ANSYS on the pressure vessel with different materials and layer stacking.

By observing the static analysis the stress values are decreased at E-glass fiber when compared other two materials (EN 32 steel and carbon fiber).In fatigue analysis shows life of he pressure vessel at E-glass fiber.

By observing the thermal analysis results the heatdissipation is more for E glass material compare with steel and carbon materials.

By observing the linear layer analysis results, the stress values less at 12 layers stacking pressure vessel model when compared to conventional model.

So it can be concluded the E glass fiber material is better material for pressure vessel and layer stacking model.

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DETAILED EXAMINATION OF SPECIAL ANTIBIOTIC DRUGS AND THEIR PHARMACEUTICAL CURE

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Abstract
According to the current investigation, it has been found that the estimate is affected by even a little amount of easily oxidizable substances such thio-urea, ascorbic acid, hydrazine, and alcohols. Because the chemical and reagent react in this situation, a greater recovery is attained. In order to prevent the existence of such chemicals, If included in pharmaceutical formulations, excipients such as starch, calcium carbonate, sodium carbonate, cellulose, magnesium trisilicate, tricalcium phosphate, and gum acacia do not affect estimate.
Background: When antibiotics were initially discovered, they were dubbed "wonder medications" because they are chemicals derived from a mould or bacterium that can kill germs and treat bacterial illnesses. Penicillin was the first antibiotic. Ampicillin, amoxicillin, and benzylpenicillin are three penicillin-related antibiotics that are often used today to treat a range of illnesses. These antibiotics have been in use for a very long period. Modern antibiotics come in a variety of forms, but only developed nations may obtain them without a doctor's prescription.
Materials and Methods: An aliquot containing 5mg of the sample was taken in a l00mL stoppered conical flask and 5mL of 0.02NNCS reagent, prepared in hydrochloric acid and 5mL of 4N hydrochloric acid was added to it. The reaction mixture was shaken thoroughly and allowed to react for 15minutes at room temperature (25-300C). After the reaction is over 5mL of 5% potassium iodide was added to it. Contents were shaken thoroughly and allowed to react for a minute. The unconsumed NCS was determined iodometrically. A blank experiment was also run under identical conditions using all the reagents except the sample.
Key Word: antibiotics, drugs, pharmaceutical treatments

Introduction

Antibiotic drugs are chemical substances derivable from a mold or bacterium that can kill microorganisms and cure bacterial infections; "when antibiotics were first discovered they were called wonder drugs" The first antibiotic was penicillin. Such penicillin-related antibiotics as ampicillin, amoxicillin and benzylpenicilllin are widely used today to treat a variety of infections – these antibiotics have been used around for a long time. There are several different types of modern antibiotics and they are only available with a doctor’s prescription in industrialized countries.
Antibiotics are used to treat infections caused by bacteria. Bacteria are microscopic organisms, some of which may cause illness. The word bacterium is the plural of bacterium. Such illnesses as syphilis, tuberculosis, salmonella, and some forms of meningitisare caused by bacteria. Some bacteria are harmless, while others are good for us. Before bacteria can multiply and cause symptoms, the body's immune system can usually destroy them. We have special white blood cells that attack harmful bacteria. Even if symptoms do occur, our immune system can usually cope and fight off the infection. There are occasions, however, when it is all too much and some help is needed from antibiotics.
Antibiotic resistance is a serious and growing phenomenon in contemporary medicine and has emerged as one of the pre-eminent public health concerns of the 21st century; particularly as it pertains to pathogenic organisms

(the term is especially relevant to organisms which cause disease in humans). In the simplest cases, drug resistant organisms may have acquired resistance to first-line antibiotics, thereby necessitating the use of second-line agents. Typically, a first-line agent is selected on the basis of several factors including safety, availability and cost; a second-line agent is usually broader in spectrum, has a less favourable risk-benefit profile and is more expensive or, in dire circumstances, be locally unavailable. In the case of some MDR pathogens, resistance to second and even third-line antibiotics is thus sequentially acquired; a case quintessentially illustrated by Staphylococcus aureus in some nosocomial settings. Some pathogens, such as Pseudomonas aeruginosa, also possess a high level of intrinsic resistance.

It may take the form of a spontaneous or induced genetic mutation or the acquisition of resistance genes from other bacterial species by horizontal gene transfer via conjugation, transduction, or transformation. Many antibiotic resistance genes reside on transmissible plasmids, facilitating their transfer. Exposure to an antibiotic naturally selects for the survival of the organisms with the genes for resistance. In this way, a gene for antibiotic resistance may readily spread through an ecosystem of bacteria. Antibiotic-resistance plasmids frequently contain genes conferring resistance to several different antibiotics. This is not the case for Mycobacterium tuberculosis, the bacteria that causes Tuberculosis, since evidence is lacking for whether these bacteria have plasmids. Also M. tuberculosis lack the opportunity to interact with other bacteria in order to share plasmids.

Survey of literature reveals that N-chlorosuccinimide (NCS) in acidic medium has been used for quantitative estimation of some antimalarials (Quinine, Amodiaquine, Santoquine, Cloroquine etc.) diuretics e.g. frusemide, chlorothiazide, and other organic compounds like phenols, carboxylic acids etc. Till now it has not been used for the determination of antibiotic drugs like lamivudine, stavudine, Zidovudine, aciclovir and Amikacin. This initiated me to undertake the present study. Available pharmaceutical preparations of afore said drugs were also analyzed by proposed method. Effects of various variables such as temperature, acid concentration, reagent concentration and reaction time were studied. Simple and convenient method has been described for the micro scale determination of mentioned drugs in pure forn and in their pharmaceutical preparations. In every case standard deviation (SD), relative standard deviation (RSD) or coeflicient of variation (CV) and percentage error has been calculated.

For testing the quantitative validity of reaction, lamivudine was taken as the test sample. Different amounts of sample l-5mg were allowed to react with varying concentrations of N-chlorosuccinimide (NCS) at room temperature (25-300C) for different reaction time. The unconsumed NCS was back titrated iodometrically. A blank experiment Was also run under identical conditions using all the reagents except the sample. The difference in the volumes of sodium thiosulphate consumed for blank and actual experiments was used to calculate the amount of the sample present in a particular experiment. The Stoichiometry of the reaction was established for each drug sample and a possible course of reaction was also suggested. On the basis of reaction conditions developed for lamivudine, the determination of other compounds in pure form and in their pharmaceutical preparation were done

II. Material and Methods

An aliquot containing 5mg of the sample was taken in a l00mL stoppered conical flask and 5mL of 0.02NNCS reagent, prepared in hydrochloric acid and 5mL of 4N hydrochloric acid was added to it. The reaction mixture was shaken thoroughly and allowed to react for 15minutes at room temperature (25-300C). After the reaction is over 5mL of 5% potassium iodide was added to it. Contents were shaken thoroughly and allowed to react for a minute. The unconsumed NCS was determined iodometrically. A blank experiment was also run under identical conditions using all the reagents except the sample. The amount of NCS consumed for the sample was calculated with the difference in the volumes of sodium thiosulphate solution for blank and the actual experiments. The recovery of the sample was calculated with the amount of NCS consumed for the sample. For

every sample percentage error, standard deviation and relative standard deviation were calculated.To evaluate the authenticity of the method recovery experiments were also carried out by standard drug addition method. For such experiments a known amount of the pure drug taken and varying amounts of the pharmaceutical preparations of that compound are added and the total amount of the sample was find out with titration and calculations.

III. Resultand Discussion

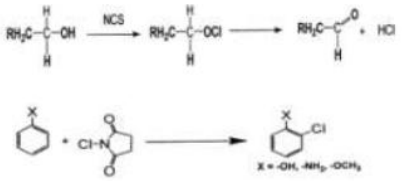
Stochiometric ratios of NCS reagent and antibiotic drugs such as lamivudine (1:1), stavudine (1:2), zidovudine (1:2), aciclovir (1:1) and amikacin sulphate (1:3) in pure form and in their pharmaceutical preparations has been mentioned. This ratio remains constant even under varying reaction conditions i.e., change in reaction time, concentration of reagent and reaction temperature etc. As described in the study of variations of the reaction, a particular reaction time was needed for completion of the reaction and for concordant and accurate results. It varies from one compound to another. At a reaction time lesser than the described, inaccurate results are obtained because of incomplete reaction. The increase in reaction time does not change percentage recovery of the sample because the reaction is completed at a recommended reaction time.

The use of hydrochloric acid as a proper reaction medium has also been studied. Hydrochloric acid gives quantitative and stochiometric results with lamivudine. The same results were obtained in the case of other samples. Reaction was also canied out in the absence of hydrochloric acid. In this case, it was found that the reaction is slow and the percentage error is very high. So it was observed that a proper reaction medium is very necessary for the accurate results. After variation in the concentration of volume of hydrochloric acid, it was observed that the use of 5mL of 4N hydrochloric acid was necessary for suitable reaction medium. NCS is the main active agent, which reacts with antibiotic drugs. As indicated that 5mL of 0.02NNCS was sufficient for all the samples for accurate results. Reaction was also carried out at lower and higher concentration at variable volumes of NCS. In this case, it was observed that the concentration and volume other than the prescribed under reaction conditions gives lesser recovery because of insufficient reagent. Higher concentration and volume do not give any improvement over the results. Therefore, prescribed concentration and volume of the NCS reagent was used. The effect of temperature has also been studied. It was observed that results improve with increase in reaction time. The best recovery was obtained at room temperature (25-30^{0}C). An increase in the reaction temperature above 25-30^{0}C gives inaccurate results. It happens due to the decomposition of reagent at higher temperature. At a lower temperature upto5^{0}C it was observed that the reaction is very slow and needs more reaction time. It gives higher percentage error.

Possible course of reaction

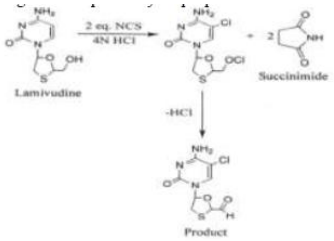
On the basis of oxidation pattern of these compounds and literature available following course of reaction may be suggested for the reactions of NCS with each antibiotic drugs. As described in of first chapter the oxidation of primary and secondary alcohols with NCS reagent gives rise to carbonyl group.

Similarly, if there is an activating group in benzene ring the chlorination takes place at proper position.

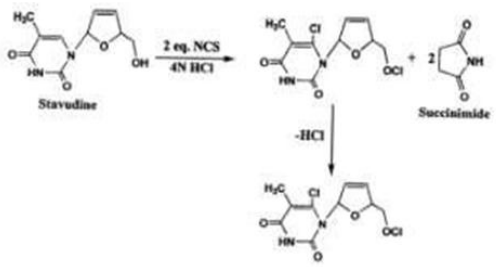


On the same basis it can be postulated that all antibiotic drugs, depending on their structure get oxidized or and chlorinated to given corresponding product.

Lamivudine is a pyrimidine analogue antibiotic having a five membered heterocyclic ring attached at position-1 through nitrogen of pyrimidine nucleus. The five membered heterocyclic ring contains a primary alcoholic group in side chain at position-2. According to the nature of NCS the primary alcoholic group may get oxidized to keto group. In the pyrimidine ring the only active position is at C-5, which gets chlorinated. On the basis of these assumptions following reaction path may be proposed.

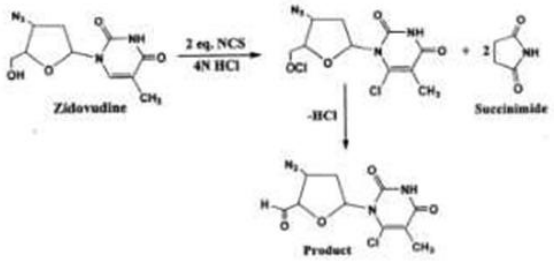


Stavudine is having a substituted furan ring attached at N to the pyrimidine nucleus. Furan ring has got a aliphatic side chain attached at position-5. Side chain at furan ring has a primary hydroxyl group, which may get oxidized to an aldehyde group. In the pyrimidine nucleus the only vacant and active position is at C-5. The molecule consumes two moles of NCS reagent therefore it can be postulated the C-5 get chlorinated and primary alcoholic group of furan side chain get oxidizes to carbonyl group. On this basis a possible path of reaction may be suggested as below:



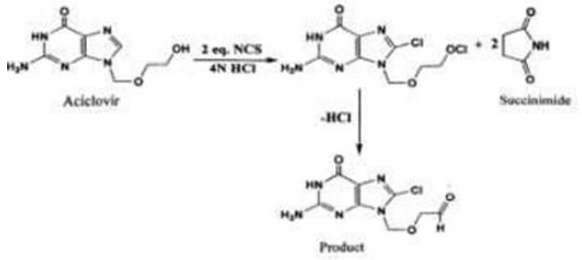
Zidovudine is also a pyrimidine derivative. It contains substituted furan ring at N-l which is further substituted by an azide group at C-4 and an aliphatic side chain at C-5. The azide group is resistant to NCS reaction while primary hydroxy group gets oxidized to an aldehyde group. Pyrimidine ring is also highly substituted by two keto group and a methyl group, the other available and active position is C-6 because it is near methyl group, which is an electron donating group.

The compound consumes two moles of NCS to complete the reaction. On the basis of above assumption it can be thought that the hydroxyl group gets converted to carbonyl group and pyrimidine ring gets chlorinated at C-6 position. On this basis a possible course of reaction may be given as below:

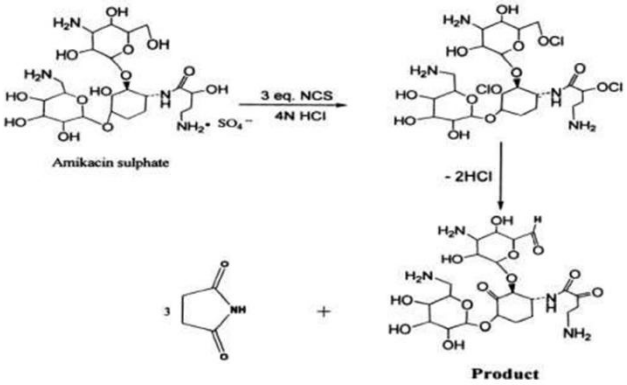


Aciclovir is an analogous of purine base. It contains an oxide linkage which ends with a primary alcoholic group. The aciclovir molecule consumes two moles of NCS reagent out of which one molecule oxidizes primary -OH group present in side chain in to an aldehyde group while second mole of NCS reagent may give chlorinated product. In whole of the molecule only available active position is C-7. There is only possibility that

the chlorine atom attaches to that position. On this basis it can be assumed that the reaction product is formed in the following way:



Amilcacin sulphate is an amino substituted carbohydrate derivative collectively called as amino sugars. It contains two amino substituted carbohydrate rings and a six membered cyclohexane ring bound though oxide link with both glycoside rings. Hexane ring has an amino substituted aliphatic side chain ending with primary amine group, contains a keto group and secondary alcoholic group. Amikacin consumes three moles of NCS reagent. The structure of compound is very complex and there are many positions which may affected by NCS reagent. Yet some less hindered hydroxyl group may be oxidized like a primary hydroxy group of ring B, Secondary hydroxyl group at ring A and a secondary hydroxy group in side chain at ring A in to keto group. On the basis of available literature a possible course of reaction is postulated as below:



In any one of the reaction products predicted for above compound no authentic proof has been given. I have not been able to located intermediate and the final reaction product. All the reaction are hypothetical based on stoichiometry and the reactions of the reagent.

Conclusion

According to the current investigation, it has been found that the estimate is affected by even a little amount of easily oxidizable substances such thio-urea, ascorbic acid, hydrazine, and alcohols. Because the chemical and reagent react in this situation, a greater recovery is attained. This prevented the presence of such chemicals. If included in pharmaceutical formulations, excipients such as starch, calcium carbonate, sodium carbonate, cellulose, magnesium trisilicate, tricalcium phosphate, and gum acacia do not affect estimate.

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ILLUSTRATION ON VALIDATED INTEGER INTERVAL TRANSPORTATION PROBLEM USING MIXED CONSTRAINTS

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Abstract
In other words, GPP will tend to resemble the original GPP, but this won't occur until an infinite amount of time has passed. As a result, evolution cannot theoretically come to an end before the end of time. Therefore, in terms of species diversification and evolution before infinite time, and (2) categorically refute the existence of a Nash equilibrium. But after an infinite amount of time, each new species brings an ecosystem closer to the posited Nash equilibrium.
Keywords: Interval numbers, Interval Transportation problem, ranking methods

I. Introduction

The distribution of a single product produced in diverse locations and transported from separate supply sources to different destinations of demand is the subject of the transportation issue, a linear programming problem. The fuzzy transportation problem's goal is to reduce the overall cost of transportation. The data of supply, demand, and goal functions like cost, duration, etc. are constructed in various intervals for an interval transportation issue. Many academics have put up various interval transportation issues. The integer interval transportation issue in its crude form was resolved by A. Akilbasha et al. [1] using the split-and-separate approach. Using a novel approach, P. Pandian et al. [8] were able to solve completely interval integer transportation issues in the best possible way. A. Akilbasha et al.[7] solved the transportation problem with mixed constraints in Rough Environment by using rough slice sum method.G.Ramesh et al. [10] proposed a method for solving interval linear programming problem without converting it to a classical linear programming problem.Juman et al., [5] proposed a heuristic technique for solving transportation problems with interval numbers. Das et al. [3] solved interval transportation problems using the right bound and the midpoint of the interval. Sengupta et al.[12] developed a method to solve interval transportation problems by considering the midpoint and width of the interval in the objective function. Safi et al [11] solved a fixed charge transportation problem by converting the interval fuzzy constraints into multiobjective fuzzy constraints. Pandian et al.,[7] applied the separation method for solving fully interval integer transportation problems. Purushothkumar et al [9] developed a diagonal optimal algorithm to solve interval integer transportation problems.

II. Preliminaries

Definition: 2.1

Let $a = [a_L, a_R] = \{x \in \Re, a_L \le x \le a_R \& a_L, a_R \in \Re\}$ be an interval on the real line $\Re$. If $a = a_L = a_R = a$ then a

=[a,a]=a is a real number. The midpoint and half width of an interval number a = [a_L, a_R] is definedas m (a)=$\frac{aL+aR}{2}$ and w(a)= $\frac{aR-aL}{2}$ Now the interval number a can be expressed as a = <m (a), w (a)>.

Ranking of interval numbers:

Sengupta et al [12] proposed a simple and efficient index by comparing any two intervals on IR through decision maker's satisfaction.

Definition: 2.2

Let≤ be an extended order relation between the interval numbers a = [a_L,a_R] , b = [b_L,b_R] in IR, then for m(a) < m(b) we construct a premise $a < b$ which means that a inferior to b .

An acceptability function A : IR x IR → [0,1] is defined as

$$A_{\leq}(\bar{a},\bar{b}) = A(\bar{a} \leq \bar{b}) = \frac{m(\bar{b}) - m(\bar{a})}{w(\bar{b}) + w(\bar{a})}, \text{ where } w(\bar{b}) + w(\bar{a}) \neq 0$$

A $_{\leq}$ be interpreted as the grade of acceptability of the first interval number to be inferior to the second interval number. For any two interval numbers a and b in IR either A($a \leq b$) ≥ 0 (or) A($b \geq a$)≥ 0 (or) A($a \leq b$)=0 (or) A($b \geq a$) = 0 (or) A($a \leq b$) + A($b \geq a$) =0.A($a \leq b$)=0 and A($b \geq a$) = 0 then we say that interval numbers a and b are equivalent and it is denoted as $a \approx b$.

Also ifA ($a \leq b$) ≥ 0, then $a \leq b$ and if A ($b \geq a$)≥0 then $b \leq a$.

Definition: 2.3

Ming et al [6] have proposed a new fuzzy arithmetic based on both location index and fuzziness index function. The location index number is taken in the ordinary arithmetic. Whereas the fuzziness index functions follows lattice concept.

Let us define for any two intervals a = [a_L, a_R] , b = [b_L,b_R] in IR and for * ∈ { +,-,.,÷}the arithmetic operations on $\bar{a}$ and $\bar{b}$ defined as follows.

Addition:

$$\tilde{a} + \tilde{b} = < m(\tilde{a}), w(\tilde{a}) > + < m(\tilde{b}), w(\tilde{b}) > = < m(\tilde{a}) + m(\tilde{b}), \max\{w(\tilde{a}), w(\tilde{b})\} >$$

Subtraction:

$$\tilde{a} - \tilde{b} = < m(\tilde{a}), w(\tilde{a}) > - < m(\tilde{b}), w(\tilde{b}) > = < m(\tilde{a}) - m(\tilde{b}), \max\{w(\tilde{a}), w(\tilde{b})\} >$$

Multiplication:

$$\tilde{a} \times \tilde{b} = < m(\tilde{a}), w(\tilde{a}) > \times < m(\tilde{b}), w(\tilde{b}) > = < m(\tilde{a}) \times m(\tilde{b}), \max\{w(\tilde{a}), w(\tilde{b})\} >$$

Division:

$$\tilde{a} \div \tilde{b} = < m(\tilde{a}), w(\tilde{a}) > \div < m(\tilde{b}), w(\tilde{b}) > = < m(\tilde{a}) \div m(\tilde{b}), \max\{w(\tilde{a}), w(\tilde{b})\} >$$

Provided m ($\bar{b}$)≠ 0.

III. Proposed Algorithm

The alternate algorithm proposed involves the following steps to solve IBTP.

Step 1: Write down the interval transportation problem in tabular form.

Step 2: Express all the interval parameters in terms of midpoint and half-width interval values.

Step 3: Check whether the problem is balanced or not. Otherwise, balance it by adding a dummy row/column.

Step 4: Select the first row (source) and verify which column (destination) minimum unit has cost. Write that source under column 1 and the corresponding destination under column 2. Continue this process for each source. However, if any source has more than the same minimum value in the different destinations then write all these destinations under column 2.

Step 5: Select those rows under column-1 which have a unique destination. In that row find minimum cost and allocate the value. Next delete that row/column where supply/demand exhausted. However, if destinations are not unique then follow step 7

Step 6: If the destination under column-2 is not unique then select those sources where destinations are identical. Next find the difference between the minimum and next minimum unit cost for all those sources where destinations are identical.

Step 7: Check the source which has a maximum difference. For that source allocate a minimum of supply or demand to the corresponding destination. Delete the corresponding row/column where supply/demand got exhausted.

Remark 1: For two or more than two sources, if the maximum difference happens to be the same then, in that case, find the difference between the minimum and next to next minimum unit cost for those sources and selects the source having a maximum difference. A minimum of supply and demand should be allocated to that cell. Next delete that row/column where supply/demand exhausted.

Step 8: Repeat steps 5 and 6 for the remaining sources and destinations till (m+n-1) cells are allocated.

Step 9: Total cost is calculated as the sum of the product of cost and corresponding allocated value of supply/ demand.

IV. Numerical Examples

Example 4.1

Consider a balanced interval integer transportation problem discussed by P. Pandian et al [8]

	D_1	D_2	D_3	D_4	supply
S_1	[3,5]	[2,6]	[2,4]	[1,5]	[7,9]
S2	[4,6]	[7,9]	[7,10]	[9,11]	[17,21]
S_3	[4,8]	[1,3]	[3,6]	[1,2]	[16,18]
demand	[10,12]	[2,4]	[13,15]	[15,17]	[40,48]

Solution:

Let us define all the interval parameters as a =[a_L,a_R] in terms of midpoint and width a =< m(a),w(a)> .Now the given interval transportation problem is as follows

	D_1	**D_2**	**D_3**	**D_4**	**supply**
S_1	<4,1>	<4,2>	<3,1>	<3,2>	**<8,1>**
S_2	<5,1>,	<8,1>	<8.5,1.5>	<10,1>	**<19,2>**
S3	<6,2>	<2,1>	<4.5,1.5>	<1.5,0.5>	**<17,1>**
demand	**<11,1>**	**<3,1>**	**<14,1>**	**<16,1>**	**<44,4>**

Applying proposed method we have

	D1	**D2**	**D3**	**D4**	**supply**
S_1	<4,1>	<4,2>	**(8,1** <3,1>	<3,2>	**<8,1>**
S_2	**(11,1** <5,1>	**(2,1)** <8,1>	**(6,1)** <8.5,1.5>	<10,1>	**<19,2>**
S_3	<6,2>	**(1,1)** <2,1>	<4.5,1.5>	**(16,1)** <1.5,0.5>	**<17,1>**
demand	**<11,1>**	**<3,1>**	**<14,1>**	**<16,1>**	**<44,4>**

The optimum interval transportation cost is

=(8,1) <3,1> + (11,1) <5,1> +(2,1) <8,1>+(6,1) <8.5,1.5>+(1,1) <2,1> +(16,1) <1.5,0.5>
= <172, 1.5>
=[170.5, 173.5]
It is to be noted that our solution is very much sharper than the solution obtained by Pandian et al. [8]

Fig 1
Comparison Table: 1

Methods	**Interval value**	**Mid width value**
Zero suffix method[9]	[92,335]	<213.5,121.5>
Zero point method[8]	[119,232]	<175.5,56.5>
VAM,MODI method	[118,232]	<175,57>
Proposed method	[170.5,173.5]	<170.5,173.5>

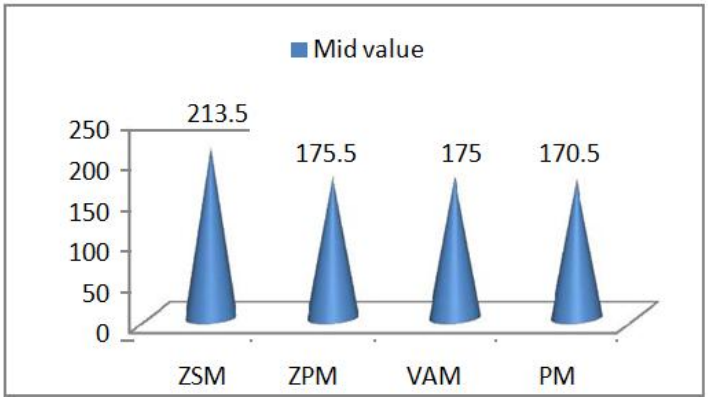

Fig:1

Example 4.2: Consider an unbalanced interval integer transportation problem given by [4]					
	D_1	D_2	D_3	D_4	supply
S1	[1,4]	[1,6]	[4,12]	[5,11]	[1,12]
S_2	[0,4]	[1,4]	[5,8]	[0,3]	[0,3]
S_3	[3,8]	[5,12]	[12,19]	[7,12]	[5,16]
demand	[5,10]	[1,10]	[1,6]	[1,4]	

Solution:
Let us define all the interval parameters as $\bar{a} = [a_L, a_R]$ in terms of midpoint and width $\bar{a} =< m(\bar{a}), w(\bar{a}) >$. Now the given interval transportation problem is as follows

	D_1	**D_2**	**D_3**	**D_4**	**D_5**	**supply**
S_1	<2.5,1.5>	<3.5,2.5>	<8,4>	<8,3>	<0,0>	**<6.5,5.5>**
S_2	<2,2>,	<2.5,1.5>	<6.5,1.5>	<1.5,1.5>	<0,0>	**<1.5,1.5>**
S3	<5.5,2.5>	<8.5,3.5>	<15.5,3.5>	<9.5,2.5>	<0,0>	**<10.5,5.5>**
S_4	<0,0>	<0,0>	<0,0>	<0,0>	<0,0>	**<0.5,0>**

demand	**<7.5,2.5>**	**<5.5,4.5>**	**<3.5,2.5>**	**<2.5,1.5>**	**<0,1.5>**	**<19,12.5>**

Applying proposed method we have

	D_1	D_2	D_3	D_4	D_5	supply
S_1	<2.5,1.5>	**(5.5,4.5)** <3.5,2.5>	**(1,5.5)** <8,4>	<8,3>	<0,0>	**<6.5,5.5>**
S2	<2,2>,	<2.5,1.5>	<6.5,1.5>	**(1.5,1.5)** <1.5,1.5>	<0,0>	**<1.5,1.5>**
S3	**(7.5,2.5)** <5.5,2.5>	<8.5,3.5>	**(2,5.5)** <15.5,3.5>	**(1,1.5)** <9.5,2.5>	**(0,1.5)** <0,0>	**<10.5,5.5>**
S_4	<0,0>	<0,0>	**(0.5,0)** <0,0>	<0,0>	<0,0>	**<0.5,0>**
demand	**<7.5,2.5>**	**<5.5,4.5>**	**<3.5,2.5>**	**<2.5,1.5>**	**<0,1.5>**	**<19,12.5>**

The optimum interval transportation cost is

=(5.5,4.5)<3.5,2.5>+(1,5.5)<8,4>+(1.5,1.5)<1.5,1.5>+(7.5,2.5)<5.5,2.5>+(2,5.5)<15.5,3.5>+(1,1.5)<9.5,2.5>+(0,1.5)<0,0>+(0.5,0)<0,0>

= < 111.25, 5.5>

= [105.75, 116.75]

It is to be noted that our solution is very much sharper than the solution obtained by VAM method.

Comparison Table: 2

Methods	**Interval value**	**Mid, width value**
VAM,MODI method	[16,254]	<135,119>
Proposed method	[105.75, 116.75]	<111.25, 5.5>

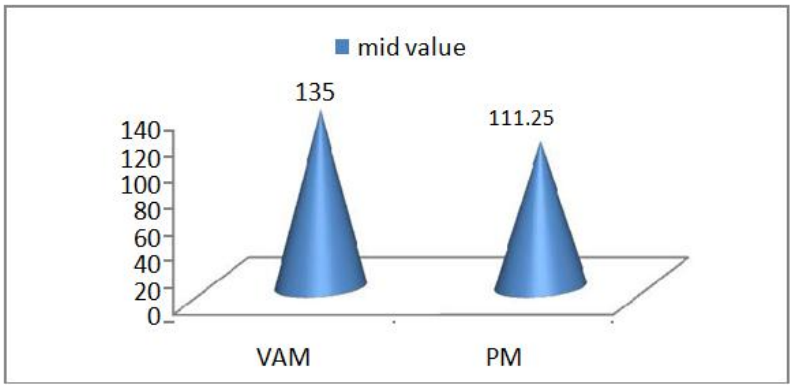

Fig 2

Conclusion

Considered is the transportation issue with mixed constraints when all of the parameters are intervals of integers. To solve the totally integer interval transportation issue without converting it to the classical transportation problem and reduce the overall cost, a different approach is suggested. The approach mentioned above is a straightforward, methodical process. Compared to other approaches, this one offers an ideal answer that is crisper.

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