



ISSN No. : 2321-9653

IJRASET

**International Journal for Research in Applied
Science & Engineering Technology**

IJRASET is indexed with Crossref for DOI-DOI : 10.22214

Website : www.ijraset.com, E-mail : ijraset@gmail.com

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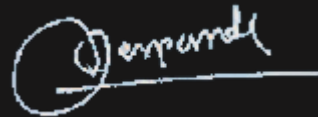
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www.ijaem.net

A Peer Reviewed Journal

International journal of Advances in Engineering
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ISSN: 2395-5252

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Publication Head

FAAS (FUNCTION AS A SERVICE)

Pooja Masram*¹, Anas Khan*², Abdul Razzaque*³

*^{1,2}Dept. Of Computer Science Engineering, Anjuman College Of Engineering & Technology
Nagpur, Maharashtra, India.

*³Prof., Dept. Of Computer Science Engineering, Anjuman College Of Engineering And Technology,
Nagpur, Maharashtra, India.

ABSTRACT

In this paper, we offer an evaluation of characteristic as a carrier (FaaS) infrastructures. Within the beyond few years, FaaS has won substantial popularity and have become a cross-to desire for deploying cloud packages and micro-offerings. FaaS with its specific 'pay as you move' pricing version and key overall performance blessings over other cloud offerings, gives an clean and intuitive programming version to construct cloud applications. , a developer makes a speciality of writing the code of the software while infrastructure control is left to the cloud issuer who is liable for the underlying sources, safety, isolation, and scaling of the software. FaaS is an crucial, emerging class of cloud computing, which calls for that software program programs are designed and deployed the use of distributed, particularly-decoupled carrier-based architectures, one instance of that's the microservices architecture paradigm. FaaS is associated with on-call for capability and lets in developers to construct applications without the overhead associated with server control. As such, FaaS is a sort of serverless provisioning model in which a provider dynamically manages and allocates device resources, with the developers deploying supply code right into a manufacturing surroundings. This research affords an evaluation of scalability, price, execution instances, integration support, and the limitations associated with FaaS offerings provided by using several companies: AWS Lambda, Google Cloud functions, and Azure capabilities. We talk the consequences of the findings for software builders.

Keywords: Online Compiler, Cloud Computing, Load Balancing Functions-As-A-Service, Infrastructures, Server Less, Cloud Computing, Scalability, Constraints, AWS Lambda, Microsoft Azure, Google Cloud Functions.

I. INTRODUCTION

Cloud Computing is a computer program that includes a large number of computers connected to a network such as the Internet, such as a help computer. [1] The International Telecommunication Union (ITU) defines 'cloud service' 'as a service delivered and used on demand at any time, on any access network, using any connected devices using cloud computing technology.' Cloud Service is further divided into Cloud Software as a service (SaaS), Communications as a Service (CaaS), Cloud Platform as a service (PaaS), cloud infrastructure as a service (IaaS) and Network as a service (NaaS). In this paper, we propose Online Compiler as Software as a Service (SaaS). Compiler converts source code from advanced language to low-level, machine language. This is mainly done to create usable files that can be used to run the program and its instructions.

Function-as-a-Service (FaaS) has emerged as a brand new paradigm that makes the cloud-based utility development model easy and trouble-loose. In the FaaS version, an software developer focuses on writing code and producing new capabilities without traumatic about infrastructure control, that is left to the cloud company.. Many cloud-computing companies, which includes Google, AWS, and Azure, among others, offer FaaS offerings. AWS Lambda, Google Cloud capabilities, and Azure features are the various most commonly used FaaS offerings in enterprise these days [3]. Each vendor gives a unique set of competencies with their FaaS infrastructure implementations, from language runtime help and reminiscence usage to the ability to execute features at regional facet cache locations in response to events generated through content shipping networks [4]. When considering FaaS as part of a structures architecture, it's miles vital to pick the answer that works fine for the device below attention. Because of this, its miles crucial that factors surrounding FaaS infrastructures which have an impact on this selection are discussed and investigated.

As developers, we regularly be concerned over the quantity of time spent purchasing resources, putting in environments, and appearing all the different responsibilities that prevent us from doing what we adore maximum: growing! even as cloud-computing technology have helped to deal with this problem through making it clean to acquire sources such as servers, computing power, and storage, the problem of putting in

these complicated utility hosts still plagues us. To in addition compound the problem, keeping these servers can be quite high-priced in terms of money and time. Fortunately, technology frequently rises to satisfy the wishes of its users, and so we've our featured server less structure.

On this paper, factors on the way to be analyzed encompass execution instances, reminiscence configurations, talents to scale, pricing and price of FaaS services, the constraints of FaaS infrastructures, and how nicely included seller FaaS infrastructures are, no longer simplest with their own platforms, however how they may be included with 1/3 birthday celebration offerings. This is a crucial component as vendor lock-in is a major barrier to the adoption of cloud computing due to the dearth of standardization [2].

II. METHODOLOGY

Project Objective

Cloud computing version is for allowing convenient in addition to a network get right of entry to a shared pool of configurable computing resources. On this net world all the matters are online. Here we use a web compiler. This project's primary aim is, we can effortlessly write application, assemble and debug it in online. In this task, we've 3 online compilers particularly, online C/C++, JAVA and Perl compiler. Distinctive programming languages are being compiled using cloud computing, which is transportable and reduces the garage space, on-line java, c/c++, Perl compiler the usage of cloud computing, which offers most handy device to assemble code and put off the mistakes. These 3 compilers provide on-line compiler service, so no need to put in separate compiler on every pc. By using these kind of software we will conduct online practical examination.

Proposed System

The web compiler provides carrier for compiling packages written in both C, C++, Java, etc. The user need not have a compiler hooked up in his machine. He has to simply submit the program to the user interface provided by way of typing the code in the textual content box supplied. The person gets the output after compilation. If compilation isn't always successful, the mistakes are shown else the output is given.

A. USER INTERFACE

The person Interface Tier consists of the consumer interface and the database that is applied the usage of Microsoft square Server. The consumer interface is a web application hosted at the liS Server which affords the consumer an interface to put up their applications. The user can publish with the aid of typing the code inside the location furnished

B. CONTROLLER

The Controller Tier manages the interactions among consumer Interface and Compilation. The Compiler control Centre is the critical component.

C. COMPILATION

The compilation includes "n" quantity of compiler servers which can be used to collect and execute the applications. Each compiler server tests its CPU usage and available RAM earlier than accepting a program to compile it, run it and generate the output. If the CPU usage and available RAM are above a pre-defined threshold fee then it rejects the program. On a success compilation and execution of a application, the generated output is sent again to an Output Server within the Controller

III. MODELING AND ANALYSIS

FaaS Existing Architecture -

FaaS and serverless are generally synonymous with each other because of its capability to listen and act upon the activities of different serverless services .however FaaS is a subset of serverless [5], which is living in the compute category. Via information the variety of categories and the services that lie inside we will better confirm the excellent company for the customers' architectural desires. The core classes that relate to architecture that are consistent across all 3 companies are the subsequent, compute, storage, information shops and integration. The primary cause of this studies is to look how FaaS integrates with other serverless services. For the sake of brevity, different compute services are not noted because the center consciousness of this research is FaaS.

Garage offers regular item-degree facts garage across all 3 carriers [7, 6, 8]. But AWS additionally gives EFS; an NFS document machine carrier that can be effortlessly included with on-premises or cloud sources [7].

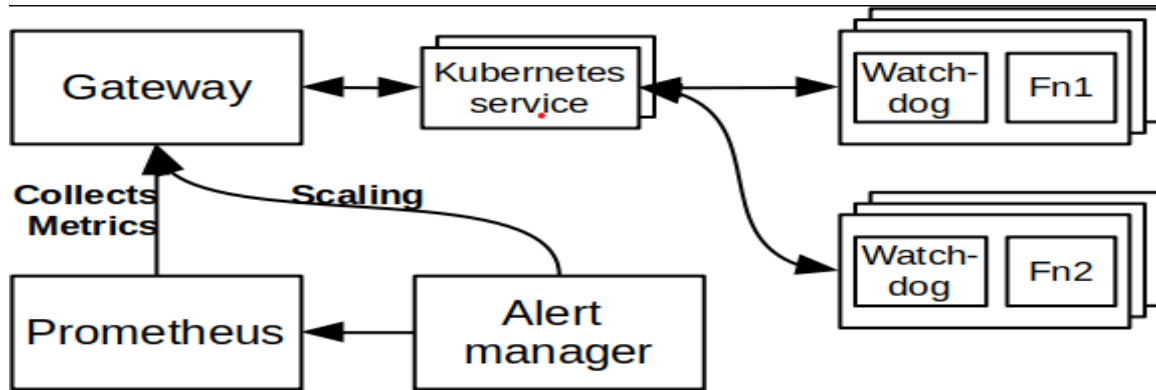


Figure 1

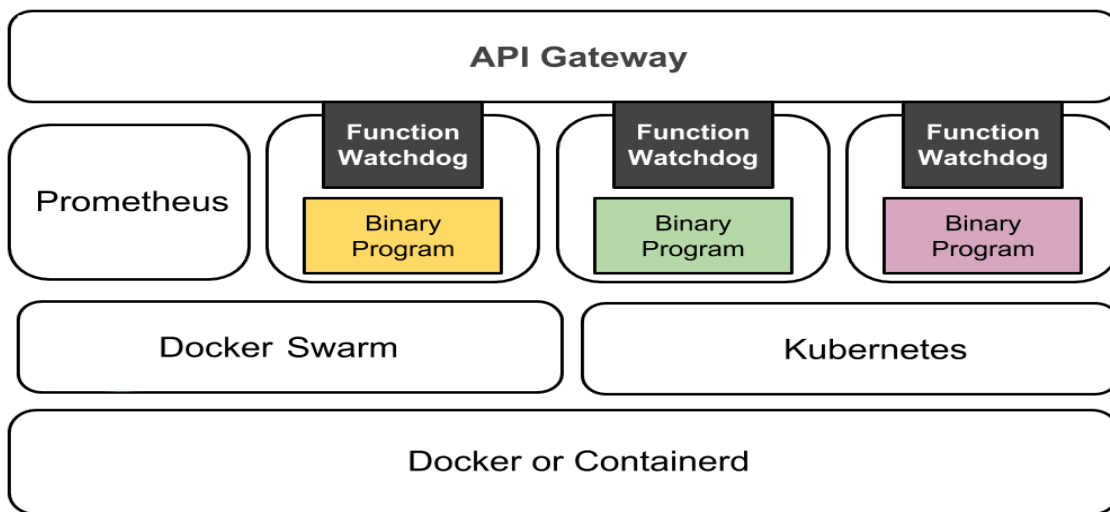


Figure 2

System Requirement

Hardware Requirements-

- 32-bit Intel® Pentium® 4 or compatible processor running at 2 GHz or greater
- 512 MB RAM
- Disk space: 30gb at least

Software Requirements-

- Any Linux based Operating system
- Arkede
- Docker,
- Kubernetes
- OpenFaaS
- FaaS-cli
- Java, C#, Python, Node.js, and Go, installed in system.

IV. CONCLUSION

Function-as-a-Service (FaaS) is an emerging serverless cloud computing hardware provisioning model that lets in builders to basically be absolutely abstracted from hardware issues. 3 separate FaaS companies have been analyzed (AWS Lambda, Google Cloud features and Microsoft Azure functions) and we found that there's a complicated cocktail of factors that developers should keep in mind while choosing a FaaS issuer, we advocate that careful attention receive to the different factors, a lot of which are mentioned the main motive for developing the challenge is to offer a centralized compiling scheme. Additionally, it'll act as a centralized repository for all of the codes written. The other essential gain that this gadget will have over the others is that it will make the users gadget light-weight i.e. there may be no need to hold separate compilers on the consumer

side. Also, the technique of protection and distribution of dynamic usernames and passwords could be greatly simplified. Additionally, authentication and customized challenge distribution will be made possible. A compiler, that is the heart of any computing machine, transforms supply code from a higher degree language to a lower, device level language. That is in particular achieved so that you can create executable les which could then be run so one can execute this system and its commands. Compared to the modern-day scenario wherein every compilers required to be set up on every machine one by one this will get rid of the want to install compilers separately. So we can check our code at the centralized server. Some other gain of such venture is that every time the compiler package deal is to be upgraded it can be finished easily without again putting in it on each and each system.

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Study on Applications of Convolutional Neural Networks

Taiyaba Ansari¹, Pallavi Singh², Faiza Abid³, Abdul Razzaque⁴

UG Scholar, Department of Computer Science and Engineering^{1,2,3}

Assistant Professor, Department of Computer Science and Engineering⁴

Anjuman College of Engineering and Technology Sadar, Nagpur, Maharashtra, India

taiyaba9370@gmail.com¹, pallavisingh30316@gmail.com², faizamabid@gmail.com³, abrazzaque@gmail.com⁴

Abstract: *As of now, profound learning is generally utilized in an expansive scope of fields. A convolutional brain organizations (CNN) is turning into the star of profound learning as it gives the best and most exact outcomes while breaking true issues. In this work, a short depiction of the utilizations of CNNs in two regions will be introduced: First, in PC vision, by and large, or at least, scene marking, face acknowledgment, activity acknowledgment, and picture arrangement; Second, in normal language handling, that is to say, the fields of discourse acknowledgment and text characterization.*

Keywords: Convolutional neural network, Natural language, Computer vision, Deep learning.

I. INTRODUCTION

The convolutional neural network (CNN) is an engineering for profound gaining taken from the visual framework structure. It was found by Hubel and Wiesel in 1962 during their work on the feline's essential visual cortex. The phones in the cortex are touchy to little sub-locales of the visual field called responsive fields (Hubel and Wiesel, 1962). The convolutional brain organization (CNN) is an engineering for profound gaining taken from the visual framework structure. It was found by Hubel and Wiesel in 1962 during their work on the feline's essential visual cortex. The phones in the cortex are delicate to little sub- locales of the visual field called responsive fields (Hubel and Wiesel, 1962).

Recognizing light in the open fields is finished by these cells. Fukushima, 1980, proposed Neocognitron, roused from crafted by Hubel and Wiesel, which is the earliest model that had a PC simulatability. This Neocognitron is considered the model of CNNs, and it was grounded on the neurons' progressive association for the transformation of a picture. The layout of CNNs was established by LeCun et al., 1990, and LeCun et al., 1998, by developing a fake brain network with a multi-facet called LeNet-5. This fake brain network was utilized to perform transcribed digit grouping and it was teachable by the back propagation calculation (Hecht-Nielsen, 1988). Preparing with this calculation made it practical to perceive designs from crude pixels. In spite of the fact that LeNet-5 enjoys many benefits, it was ineffective when utilized in taking care of perplexing issues like video order.

The design of the CNNs is unique in relation to the customary multi-facet perceptron (MLP). This is to ensure a specific level of shift and twisting in variance (LeCun and Bengio, 1995). To do as such, three plan thoughts are consolidated, which are, nearby responsive fields, normal loads, and spatial and fleeting sub sampling.

A few plans of CNNs have been expressed in the presentation; in any case, in their fundamental parts, they are practically the same. In Figure 1, the design of a CNN is shown (LeCun et al., 1990).

CNNs comprise of various teachable multi-facet levels (LeCun et al., 1990). Highlight maps are sets of exhibits that address, for each level, the info and result (LeCun et al., 1998). Tolerating the information is a hidden picture, each part guide will be a two-layered show that holds a disguising channel of the inputted picture, for accounts it is a three-layered bundle and it is a one-layered bunch for sound information. From each area in the information, elements will be traded and introduced as a result in the result level.

For the most part, every level contains the accompanying: First, a non-linearity layer. Second, a channel bank layer lastly, an element pooling layer. After a few convolution and pooling layers, single or numerous completely associated layers will be available.

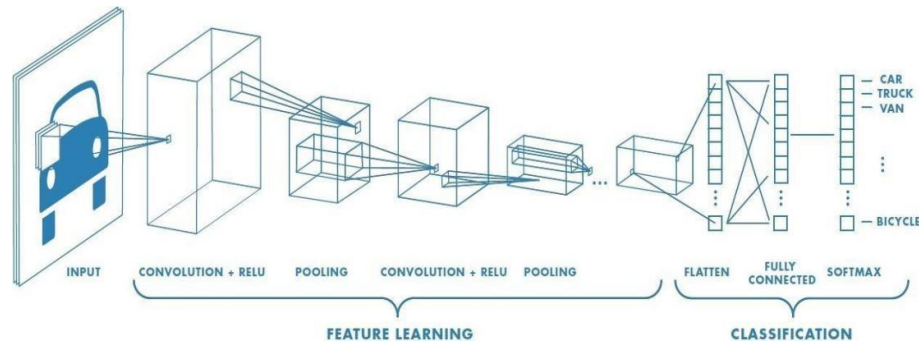


Figure 1: CNN architecture (Jordan J.Bird and Diego R.Faria et al)

II. APPLICATIONS OF CNNs

In this paper, two of the principle utilization's of CNNs will be talked about. These applications are normal language handling and PC vision.

2.1 Fish Species Classification Using Convolutional Neural Network

Fish species acknowledgment is a multi-class arrangement issue and is a convincing exploration field of AI and computer view. The underlying advance taken by the framework focuses on eliminating the clamor in the dataset. Utilization of Image Handling before the preparation step assists with eliminating the submerged deterrents, soil and non-fish bodies in the pictures. The subsequent advance purposes Deep Learning approach by execution of Convolutional Neural Networks(CNN) for the grouping of the Fish Species. To come by the best outcomes for highlight ID and preparing of the CNN, it is critical to give input picture with upgraded highlights as preparing test. The Second step of the method is the execution of a Convolutional Neural Network(CNN) for characterization of Fish species. The info layer of the organization takes the 100x100x3 unique RGB picture stacked with the 100x100x1 picture which is the result of the pre-handling stage, in this way making the contribution of 100x100x4, the completely associated layer where we get the prepared yield and the halfway secret layers. The network has a progression of convolutional and pooling layers.

The proposed technique for the order of fish species gives an exactness of 96.29% which is exceptionally high analyzed with the other current executed strategies utilized for this application. Henceforth the proposed approach can positively be utilized for constant applications as the calculation time is 0.00183 seconds per outline. The methodology couldn't accomplish 100 percent accuracy as unambiguous pictures couldn't be mentioned unequivocally considering the impact of foundation whine and other water bodies. We intend to ad lib our calculation further by carrying out Image Enhancement methods to counter for the lost elements in the pictures.

2.2 Fauna Image Classification using Convolutional Neural Network

Image classification is one of the ordinary and basic endeavors in PC vision, and it has drawn in a huge load of thought late years. Data move as pictures is maybe the most accommodating kind of presenting information for clients. Pictures sent in can have establishment upheaval, bending, obstacle, etc Sound reduce picture quality and can incite mixed up interpretation of significant information. Rowdy pictures are difficult to stall both naturally and by individuals. Capable and strong seeing of wild animals in their customary surroundings is key to enlighten conservation and the leaders decisions as for untamed life species, movement plans, normal environmental factors affirmation, and is possible, recuperation and assembling sorts of same animals. Dealing with an enormous volume of pictures and accounts got from camera traps truly is inconceivably exorbitant, drawn-out and monotonous. This presents a basic obstruction to experts and researchers to isolate ordinary life an open environment. Discusses VGG16 applications for Plant Image Classification nearby Data Augmentation and Transfer Learning, where it utilizes move learning and convolutional mind relationship to portray the plant species.

This module loads getting ready, testing and endorsement dataset for testing the model. Planning data is the genuine dataset that we use to set up the model. Testing data is the case of data that is used to give a fair appraisal of the best keep

going model on the readiness dataset. Endorsement data is the model data that is used to give an impartial evaluation of a model on the readiness data while tuning model hyper parameters. The evaluation ends up being more uneven on the endorsement dataset is combined into the model plan. The readiness network really noticed 13412 train pictures which had a spot with 6 animal classes. The testing network really noticed 1846 train pictures which had a spot with 6 animal classes.

The proposed strategy for order of fauna pictures utilizing convolutional neural network gives a precision of 91.84%. It tends to the execution of convolutional neural network with Leaky ReLU for fauna picture order. The effectiveness of different enactment capacities and convolutional neural network designs were thought about, and we observed ReLU actuation work and VGG16 model to be generally precise and proper for picture grouping. The neural network is prepared to group picture of a creature and assist with recognizing creature class. We have prepared our neural network so that it would be able train new creature class by just taking care of the neural network with least 1000 named pictures for preparing dataset and in excess of 300 named pictures for confirmation dataset. Closing, the proposed fauna picture request using convolutional brain association can be used extensively for fauna picture gathering which will help researchers and researchers to extra audit as well as further foster living space, regular and end plans.

2.3 Transfer Learning for Image Classification Using CNN

Move Learning is a Machine Learning strategy by which a model is prepared and made for one assignment and is then re-utilized on a second related task. It alludes to the circumstance by which what has been discovered in one setting is taken advantage of to get to the next level streamlining in some other setting. Move Learning is generally applied when there is a new dataset more modest than the first dataset used to prepare the pre-prepared model. This paper proposes a framework which utilizes a model (Inception-v3) in which was first prepared on a base dataset (Image Net), and is presently being reused to learn highlights (or move them), to be prepared on a new dataset (CIFAR-10 and Caltech Faces). With respects to the underlying preparation, Transfer Learning permits us to begin with the learned highlights on the Image Net dataset and change these elements and maybe the design of the model to suit the new dataset/task as opposed to beginning the learning system on the information without any preparation with arbitrary weight in statement. TensorFlow is utilized to work with Move Learning of the CNN pre- prepared model. We concentrate on the geography of the CNN engineering to track down a reasonable model, allowing picture order through Transfer Learning. While testing and changing the organization geography (for example boundaries) too as dataset trademark to assist with figuring out which factors influence grouping exactness, however with restricted computational power and time.

The point of this study was to view as a model reasonable for Transfer Learning, having the option to accomplish decent exactness scores inside a short space of time and with restricted computational efficiency. The review tended to various parts of Machine Learning and clarified the chiefs behind the Convolutional Neural Network design. We had the option to observe a reasonable design that permits picture order through Move Learning, this came as Inception-v3. A progression of tests were directed to decide the ease of use of such a procedure and whether it very well may be applied to various arrangements of information. Thus, we could demonstrate the convenience of Transfer Learning as the outcomes from the tests demonstrated retraining the Inception-v3 model on the CIFAR-10 dataset brought about better outcomes contrasted with that expressed in the past best in class works, by which creators in didn't utilize Transfer Learning and on second thought utilized a CNN prepared on the equivalent dataset (CIFAR-10) without any plan. The CIFAR-10 retrained model proposed inside this paper accomplished a by and large precision of 70.1%, contrasted with the 38% accomplished and expressed in.

Furthermore, the proposed framework had a 100 percent pass rate as each picture tried was given the right grouping, however there was variety in exactness/certainty scores. Besides, given the starter results acquired from the initial two tests we could check that number of ages and amount of pictures in a dataset had an immediate boost on the exactness accomplished. All things considered, the nature of the pictures was likewise recognized as a component, given the Cal tech Face dataset had undeniably less pictures contrasted with the CIFAR-10 dataset, it actually figured out how to accomplish sensible outcomes which were comparative.

III. CONCLUSION

As displayed in this work, CNN offers exactness when contrasted and other standard methodologies. Moreover, it improves the exhibition as a result of the unique highlights it has like shared loads and nearby network. In applications

connected with computer vision and normal language handling, CNN has demonstrated its predominance as it decreases the standard issues. Convolutional Neural Networks vary to different types of Artificial Neural Network in that as opposed to zeroing in on the total of the issue space, information about the particular kind of info is taken advantage of. This thusly considers a lot more straightforward organization engineering to be set up. This paper has laid out the essential ideas of Convolutional Neural Networks, disclosing the layers expected to assemble one and specifying how best to structure the organization in most picture investigation.

Research in the field of picture investigation utilizing brain networks has to some degree eased back as of late. This is halfway because of the wrong conviction encompassing the degree of intricacy and information expected to start demonstrating these amazingly strong AI counting. The creators trust that this paper has here and there decreased this disarray, and made the field more open to fledglings.

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Animal Classification Using CNN with VGG-16 Architecture

Samiya Khan¹, Sanjana Singh², Sadaf Almas³, Prof. Abdul Razzaque⁴

UG Scholar, Department of Computer Science and Engineering^{1,2,3}

Assistant Professor, Department of Computer Science and Engineering⁴

Anjuman College of Engineering and Technology Sadar, Nagpur, Maharashtra, India

Abstract: Proficient and solid observing of wild animals right at their habitat is fundamental. This venture fosters a calculation to distinguish the animals in untamed life. Since there are enormous number of various animals physically recognizing them can be a troublesome task. This calculation orders animals in light of their pictures so we can screen them all the more effectively. Animal recognition and grouping can assist with forestalling creature vehicle mishaps, follow animal and forestall robbery. This can be accomplished by applying powerful profound learning algorithms. It shows that the proposed procedure positively affect arrangement exactness.

Keywords: Animal Classes, CNN, Decision Making, VGG-16.

I. INTRODUCTION

As of late, because of the hazardous development of advanced substance, programmed grouping of pictures has become one of the most basic difficulties in visual data ordering and recovery frameworks. PC vision is an interdisciplinary and subfield of man-made consciousness that intends to give comparable capacity of human to PC for understanding data from the pictures. A few exploration endeavors were made to defeat these issues, yet these techniques think about the low-level elements of picture natives. Zeroing in on low-level picture elements won't assist with handling the pictures. Picture arrangement is a major issue in PC vision for the many years. If there should be an occurrence of people the picture comprehension, and grouping is done exceptionally simple assignment, yet in the event of PCs it is pricey task. By and large, each picture is made out of set of pixels and every pixel is addressed with various qualities. Hence to store a picture the PC should require more spaces for store information. To order pictures, it should perform larger number of computations. For this it requires frameworks with higher arrangement and really registering power. Progressively to take choices basing on the information is preposterous in light of the fact that it requires some investment for playing out these numerous calculations to give result.

Picture order is a major issue in PC vision for the many years. In the event of people the picture comprehension, and characterization is done extremely simple task, yet if there should arise an occurrence of PCs it is over the top expensive undertaking. By and large, each picture is made out of set of pixels and every pixel is addressed with various qualities. Hence to store a picture the PC should require more spaces for store information. To arrange pictures, it should perform bigger number of estimations. For this it requires frameworks with higher arrangement and really processing power. Progressively to take choices basing on the information is preposterous in light of the fact that it requires some investment for playing out these numerous calculations to give result.

Presently, Deep learning algorithms are giving successful results in computer vision. The Convolutional Neural Network, an AI calculation is being utilized for the picture order. In [1], involves profound learning calculation for group the nature of wood board by utilizing separated surface data from the wood pictures. He additionally made the examination with AI design. CNN is a kind of feed-forward counterfeit neural organization that has been effectively applied to investigations visual pictures. It is motivated by the organic cycles and the neurons are associated as in animal visual cortex. In [2], has talked about programmed acknowledgment dairy cattle pictures utilizing CNN which assists with extricating the important trademark from the cows pictures and Support Vector Machine (SVM) methods is utilized for characterization of those pictures.

The freedom of human mediation in learning channels is great benefit of CNN. CNN is managed profound learning approach which requires huge marked information for training on the network. In the wake of training the model will get familiar with the loads and the exactness of the classifier is gotten to the next level. Then, at that point, a picture is given as information and the classifier shows to which class it has a place with. Google's self-driving vehicle is an original profound gaining project from Google organization is a model for the new advancement in the field of man-made reasoning. For this project the picture information is given as contribution from this present reality and the choices are made basing on the data acquired from the picture. Here the picture grouping is done, and the choices are taken basing on it. In the event that the picture has street the vehicle will go straight, in the event that there is any hindrance like tree or human, the vehicle is halted. Facial acknowledgment project from Facebook in which the photograph of the client is recognized by profound learning. The organization is trained over a few human faces and highlights from face like eyes, ears and nose are gained from the preparation of the organization. The classifier arranges the face in view of the highlights saw in the pictures. In [3], has talked about rearrangement of various types of animal and plant utilizing Unsupervised learning calculation. This rebuild system fundamentally centers the likeness in shape and design of the species shared across various classifications and contrast in the article parts. He likewise proposes the format model for catching the normal part and states of the item parts and Co-event connection of the article design.

II. RELATED WORK/ LITERATURE SURVEY

2.1 Convolutional Neural Network

The authors of this paper[4] suggests strategy for robotized submerged fish species order. Well known methodologies accentuation on characterization of fishes outside of water since submerged order conveys a few difficulties, for example, foundation smoothness, mutilation, object segregation, picture quality and impediment. The proposed technique recommended execution of eliminating the smoothness in the dataset. Execution of picture handling before the preparation step assists with killing the submerged snags, soil and non fish bodies from the pictures. The accompanying advance uses Deep Learning approach by execution of Convolutional Neural Network for fish species characterization. Correlation of ReLU, Soft Max and tanh initiation capacities was performed and ReLU initiation work was viewed as profoundly precise.

2.2 VGG16

The paper[5] examines VGG16 applications for Plant Image Classification alongside Data Augmentation and Transfer Learning, where it utilizes move learning and Convolutional neural organization to group the plant species. Leaf pictures are utilized rather than its bloom partners as its low-level elements like tone, shape, and so forth; and are ordinarily utilized in other plant acknowledgment models. This acts a significant hindrance is we utilize just leaf pictures as a sole element/boundary to arrange/perceive various types of plants. Information Expansion, dropout and move learning can successfully help in diminishing one of Convolutional neural network most computationally bulky issue – over fitting in little datasets. It utilizes a VGG net model which was prepared on Image Net informational collection. Age of more examples to assist with displaying train better is upheld by Data Augmentation. Existing preparing tests go through a few essential changes as well. Information increase guarantees that the model doesn't "see" a similar picture two times during training, in this way diminishing upward also the model is presented to numerous different parts of information. This, at last aides in summing up model better.

III. PROPOSED SYSTEM

Here, we present a system for the arrangement of fauna pictures, which will help biologist and researchers to additional review or potentially further develop territory, natural and eradication designs. Figure 1 shows the proposed plan of model for Fauna Image Order utilizing Convolutional Neural Network. The Aanimal-10 dataset[6] utilized for the grouping is taken from Kaggle. We are utilizing Convolutional Neural Network with Broken ReLU initiation capacity and VGG16 design for our model. The underlying advance focuses on formation of elements with VGG16 model. Utilization of Image Processing along with Loading, Testing, Training, and Validating the dataset before the preparation step makes a difference to eliminate the noise, obstructions, smoothness and dust from the pictures. The subsequent stage employments Convolutional Neural Network alongside Leaky ReLU to train the model to accurately and definitively group animals classes.

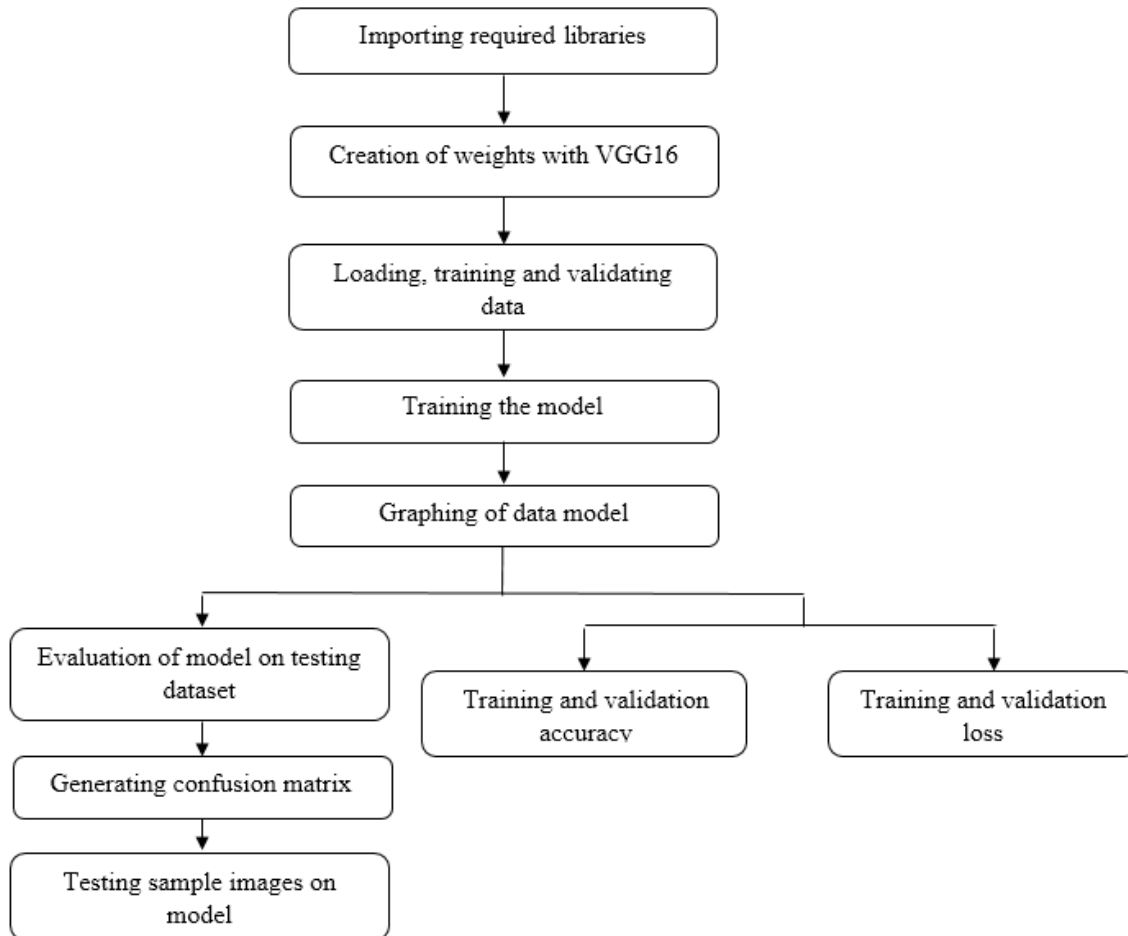


Figure 1: Design of proposed neural network

To stay away from the issue of Dying ReLU, where some ReLU neurons basically kick the bucket for all inputs and stay idle regardless info is provided, here no inclination streams and on the off chance that huge number of dead neurons are there in a neural organization its exhibition is impacted. To determine this issue, we utilize what is called Broken ReLU, where incline is changed left of $x=0$ and hence causing a release and expanding the scope of ReLU. Subsequent to training the model, we chart the model's training and validation exactness and loss to have bits of knowledge regarding how well the model is trained. Lesser the loss, more the exactness. The subsequent stage is to create confusion matrix to have precise insights concerning how accurately the model is trained and classifying, as we can't depend on the precision. Ultimately, we tried our model with test information and viewed it as precisely ordered. Underneath is the nitty gritty clarification of every modules executed.

3.1 Importing the Libraries

This module is utilized for bringing in the necessary libraries for the neural network model. We utilized different libraries, for example, Panda library is utilized for giving high execution, simple to-utilize information designs and data investigation, NumPy for numerical and legitimate procedure on clusters can be performed, Keras is intended to empower quick trial and error with profound neural organizations, it centers around being easy to understand, measured, and extensible, and some more.

3.2 Creation of Weights/Features with VGG16

A bottleneck record was made to urge the network to pack highlight portrayals to best fit in the accessible space, to get the best loss during while training. We classified the picture dataset into train, Validation and testing and stacked it in the model. We likewise stacked a pre-prepared VGG16 model. This module makes loads/highlights with VGG16 model to finetune the neural organization to perform well with the data. This module makes loads/highlights with VGG16 model to approve and test information. Information quality is essential to guarantee accuracy and dependability. The approve network effectively observed validated pictures which had a place with 6 animal classes in and the test network effectively observed test pictures which have a place with 6 animal classes.

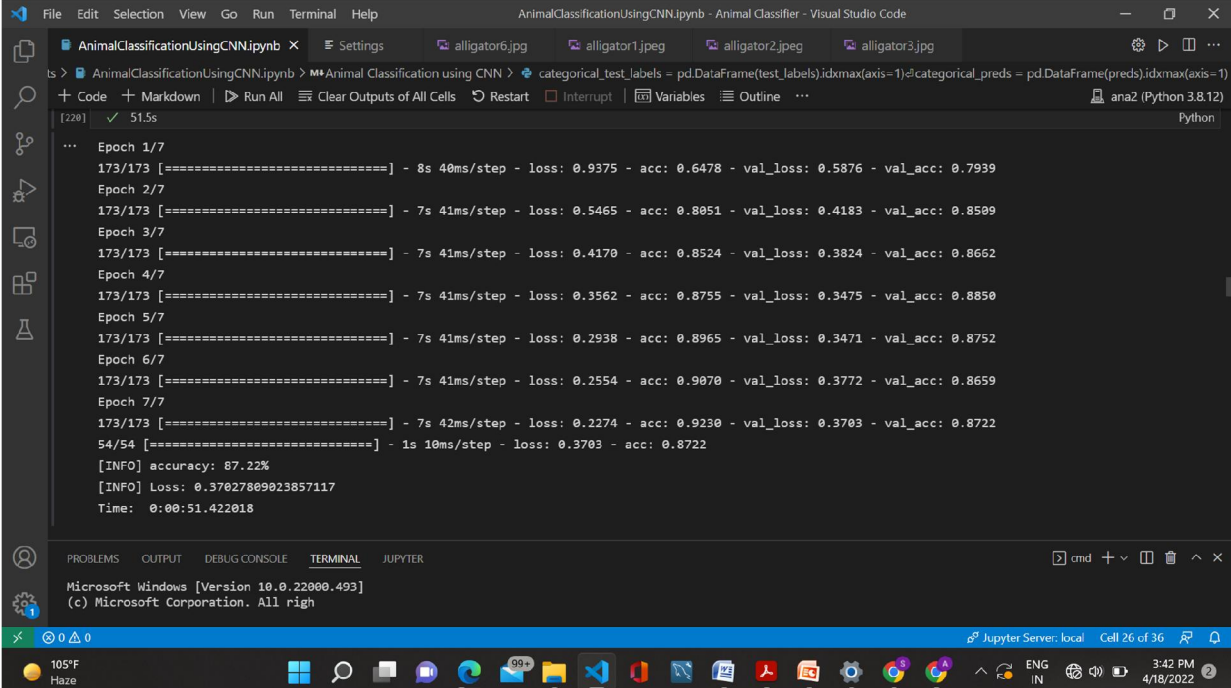
3.3 Loading Training, Validating, and Testing Data

This module loads training, testing and validate dataset for testing the model. Preparing information is the genuine dataset that we use to train the model. The neural organization model "notices" and "learns" on its own from the training information. Testing data is the example of information that is utilized to give a fair assessment of the best last model on the training dataset. validated information is the example information that is utilized to give a fair assessment of a model on the training information while tuning model hyper parameters.

The assessment becomes more one-sided on the validation dataset is consolidated into the model arrangement. The training network effectively validated train images. The testing network effectively got train pictures which contain 6 animal classes. The validation network effectively observed validated images from the trained 6 animal classes.

3.4 Training & Graphing the Accuracy and Loss

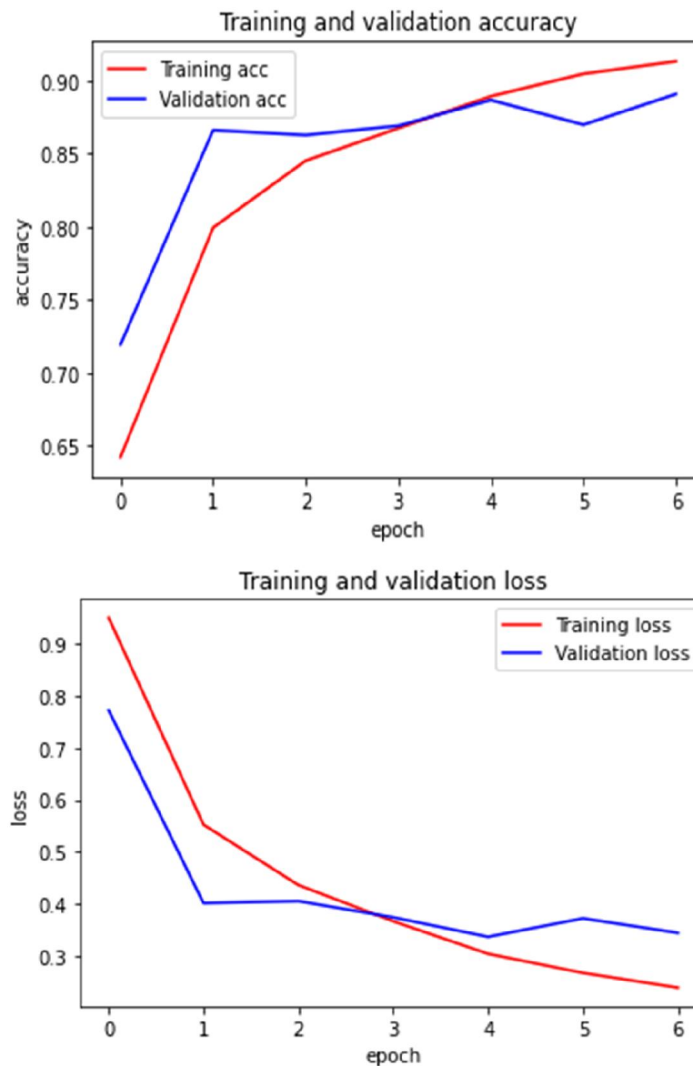
We are graphing the training and validation accuracy and loss for every age. During an epoch, the misfortune work is determined across each data item thing and it is ensured to give the quantitative loss measure at the given age and Indicating curve across cycles just gives the loss on a subset of the whole dataset. The model assess work tells how well the machine we just made can forecast against inconspicuous information. Model assessment states how well the machine we just made can anticipate against inconspicuous information. There are two incredible techniques to perceive how well our machine can foresee or group. One of them is the classified matrix and the other is confusion matrix.



```

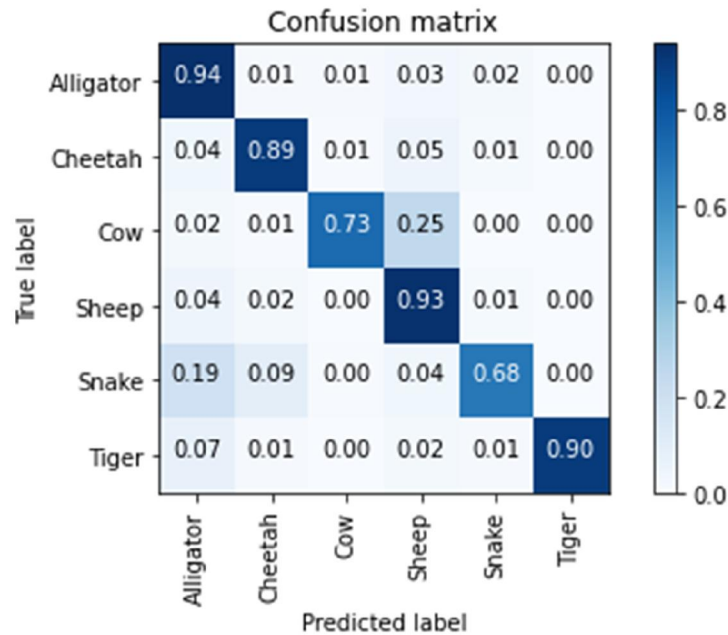
AnimalClassificationUsingCNN.ipynb - Animal Classifier - Visual Studio Code
File Edit Selection View Go Run Terminal Help
AnimalClassificationUsingCNN.ipynb x Settings alligator6.jpg alligator1.jpeg alligator2.jpeg alligator3.jpg
ls > AnimalClassificationUsingCNN.ipynb > M*Animal Classification using CNN > categorical_test_labels = pd.DataFrame(test_labels).idxmax(axis=1);categorical_preds = pd.DataFrame(preds).idxmax(axis=1)
+ Code + Markdown | Run All | Clear Outputs of All Cells | Restart | Interrupt | Variables | Outline ... ana2 (Python 3.8.12)
[220] ✓ 51.5s Python
...
Epoch 1/7
173/173 [=====] - 8s 40ms/step - loss: 0.9375 - acc: 0.6478 - val_loss: 0.5876 - val_acc: 0.7939
Epoch 2/7
173/173 [=====] - 7s 41ms/step - loss: 0.5465 - acc: 0.8051 - val_loss: 0.4183 - val_acc: 0.8509
Epoch 3/7
173/173 [=====] - 7s 41ms/step - loss: 0.4170 - acc: 0.8524 - val_loss: 0.3824 - val_acc: 0.8662
Epoch 4/7
173/173 [=====] - 7s 41ms/step - loss: 0.3562 - acc: 0.8755 - val_loss: 0.3475 - val_acc: 0.8850
Epoch 5/7
173/173 [=====] - 7s 41ms/step - loss: 0.2938 - acc: 0.8965 - val_loss: 0.3471 - val_acc: 0.8752
Epoch 6/7
173/173 [=====] - 7s 41ms/step - loss: 0.2554 - acc: 0.9070 - val_loss: 0.3772 - val_acc: 0.8659
Epoch 7/7
173/173 [=====] - 7s 42ms/step - loss: 0.2274 - acc: 0.9230 - val_loss: 0.3703 - val_acc: 0.8722
54/54 [=====] - 1s 10ms/step - loss: 0.3703 - acc: 0.8722
[INFO] accuracy: 87.22%
[INFO] Loss: 0.370278099023857117
Time: 0:00:51.422018
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER
Microsoft Windows [Version 10.0.22000.493]
(c) Microsoft Corporation. All rights reserved.
Jupyter Server: local Cell 26 of 36
105°F Haze 3:42 PM 4/18/2022

```



3.5 Generating Confusion Matrix

We performed confusion matrix as we can't depend on the accuracy. Confusion matrix is utilized to assess the nature level of the result of a classifier. Confusion matrix is an even perception of the model forecasts versus the ground-truth marks. Each line of confusion matrix addresses occurrences in an anticipated class and every section addresses the occasions in a genuine class. The inclining components address the quantity of points for which the anticipated name is equivalent to the genuine mark, while off-corner to corner components are those that are mislabeled by the classifier. The higher the askew upsides of the confusion matrix work the better, showing many right expectations. The NumPy exhibit we made before is put inside an information outline. confusion matrix works best on information outlines. The figures show the confusion matrix with and without standardization by class support size (number of components in each class). This sort of standardization can be fascinating if there should be an occurrence of class awkwardness to have a more visual translation of which class is being misclassified.



3.6 Testing Images on Model

At last, the last stage is the testing of the trained model on an example image to check whether the neural network is trained precisely and is working without mistake. The image is fed in the neural network model and the model precisely categorize the animal class. The def read_image work is telling our machine that it needs to stack the picture, change the size and turn it to an array. The def test_single_image work is utilizing transfer learning's forecast model and an iterative capacity to assist with anticipating the image appropriately. The path is where we characterize the image location and lastly the test_single_image cell block will print out the eventual outcome, contingent upon the forecast from the another cell block. Our neural network accurately distinguished different animal image with various classes, commotion, and so on and arranged it to the animal class with.

```

test_single_image(path)
[278] ✓ 3.5s

... [INFO] loading and preprocessing image...
ID: 0, Label: Alligator 0.0%
ID: 1, Label: Cheetah 0.0%
ID: 2, Label: Cow 0.0%
ID: 3, Label: Sheep 0.0%
ID: 4, Label: Snake 100.0%
ID: 5, Label: Tiger 0.0%

Final Decision:
ID: 5, Label: Snakes
  
```

```

test_single_image(path)
[249] ✓ 0.9s

... [INFO] loading and preprocessing image...
ID: 0, Label: Alligator 0.0%
ID: 1, Label: Cheetah 100.0%
ID: 2, Label: Cow 0.0%
ID: 3, Label: Sheep 0.0%
ID: 4, Label: Snake 0.0%
ID: 5, Label: Tiger 0.0%

Final Decision:
ID: 2. Label: Cheetah
  
```



```
[271] ✓ 0.6s
test_single_image(path)
[272] ✓ 4.2s
... [INFO] loading and preprocessing image...
ID: 0, Label: Alligator 0.32%
ID: 1, Label: Cheetah 0.0%
ID: 2, Label: Cow 99.67%
ID: 3, Label: Sheep 0.0%
ID: 4, Label: Snake 0.01%
ID: 5, Label: Tiger 0.0%

Final Decision:
ID: 3, Label: Cow
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER

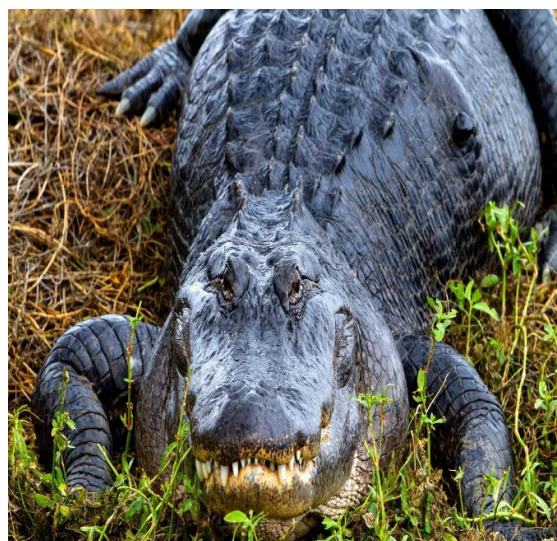
Microsoft Windows [Version 10.0.22000.493]
(c) Microsoft Corporation. All rights reserved.

```
[275] ✓ 0.1s
test_single_image(path)
[276] ✓ 10.3s
... [INFO] loading and preprocessing image...
ID: 0, Label: Alligator 84.02%
ID: 1, Label: Cheetah 0.0%
ID: 2, Label: Cow 1.22%
ID: 3, Label: Sheep 13.85%
ID: 4, Label: Snake 0.43%
ID: 5, Label: Tiger 0.47%

Final Decision:
ID: 1, Label: Alligator
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER

Microsoft Windows [Version 10.0.22000.493]
(c) Microsoft Corporation. All rights reserved.



IV. RESULT AND OBSERVATION

The proposed model was coded using Python language and tested in Visual Studio on a dataset that contain 12,984 images from 6 different animal species that belong to different animal classes/kingdom. The model could achieve accuracy of 87.22 for 6 animal classes. The neural network could successfully identify the animal image and classified it to the correct animal class. And some test images are also being classified to their respective classes with an accuracy of 100%. The model successfully detected test 1,675 images from 6 animal classes, 8,640 training images from 6 animal classes, and validated 2,669 images from 6 animal classes.

Animal	Number Of Images
Cheetah	1632
Cow	2272
Alligator	2207
sheep	2083
Tiger	1590
Total	12984

V. CONCLUSION

This model utilizes Convolutional Neural Network (CNN) algorithm to distinguish animal. The algorithm characterizes animals productively with a proper accuracy and furthermore the image of the classified animal is shown for a finer outcome. So it will be utilized for different purposes, for example, identifying wild animals going into human territory and to forestall natural life poaching and surprisingly human animal dispute.

VI. FUTURE WORK

Fostering a simple yet effective UI for the undertaking for simple use for scientist, photographers, computer researchers, the arrangement exactness, accuracy and decrease in mistakes /errors, training and testing time .The image categorization model can be enhance / upgrade in future, by including low-level elements, for example, shape and spatial area includes separated from upgrading the weights and learning pace of the neural organization. At the point when these enhancements are joined in the arrangement framework, it would help further work on the exhibition and be valuable for applications implied for the accurate grouping framework.

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Phishing Attack Detection using Machine Learning

**Prof. Ritesh Shrivasta, Gaurav Kumar Rajbhar, Aniket Krishna Suryavanshi,
Mohammad Yasir khan, Preshit Ravi Lute, Gokul Dinesh Panse, Mohammad Hasan Abbas**

Department of Computer Science
Anjuman College of Engineering and Technology, Nagpur, Maharashtra, India

Abstract: *Phishing is a fraudulent attempt to extract sensitive information from individuals or organisations, such as usernames, passwords, and credit card information, by impersonating a trustworthy organisation in a digital communication. Phishing attacks pose significant risks to users' privacy and security. The goal of this research is to provide an overview of various phishing attacks and techniques for protecting information. It also discusses Machine Learning-based categorization for phishing website data in the Machine Learning Object storage database. As we move closer to a better future to better technological advances each year, the danger of credit card information being compromised grows. Credit card fraud has risen dramatically in recent years. This includes details hacking, phishing, and other totally incorrect and illegal means to steal credit card data. In this construction and operation, we will use Machine Learning to implement the phishers URL phishing detection and prevention technique, which will provide real significance of the checked URL and fetched Email.*

Keywords: Phishing, Personal information, Machine Learning, Malicious links, Phishing Domain Characteristics, Algorithm, Machine Learning, SVM, Security

I. INTRODUCTION

Phishing is a broad term used to describe a group of people who scam people by sharing personal information such as customer name, password, lending card number, and so on, and who manipulate data for dissemination purposes. The first contact is made to a large group of people all at once, so anybody can be a victim. They will touch their victims via URLs, social networks, emails, and phone calls. The only goal of these people's attack is to send a counterfeit correspondence that appears to have emerged from the actual organisation, in the hope that a huge crowd will follow this same links provided by these contacts and reveal their personal details to the phishers. Phishing Automated detection methods are used to defraud outsiders of billions of dollars, and phishing technology exploits human behaviour as well as the rise of the internet to defraud millions of people worldwide [1]. By hiding behind a legitimate entity, social networks are used for deceptive, cultivated, and perceptive data from internet users.

The primary goal of online fraud technology is to fraudulently carry out financial on behalf of web users [2]. According to the anti-phishing workgroup (APWG), an NGO society (a non-profit group), the global phishers survey 2016 has already shown all phishing scams from 2012 to 2016. (Figure 2) [3]. The anti-phishing group of experts (APWG) also reported 180,768 phishers incidents detected in the first quarter of 2019 (January, February, and March) [4]. Various methodologies are currently being used to detect phishing sites and emails. Sajid Yousuf Bhat et al. [5] propose a method for "Spammer classification using ensemble techniques over structural social media network features." [5] determines whether a URL on a social media network with society features is spam or legitimate. Mouad Zouina et al. [6] propose "A Novel lightweight URL phishers detection using SVM as well as similarities index." Six features are used in [6] to detect phishing from URLs. The use of SVM and the similarity index is intended to improve the overall acknowledgement of the phishers detection system.

II. LITERATURE REVIEW

Several techniques for detecting phishing attacks have been published in the literature. This review presents an overview of investigative techniques for phishing attacks. In general, phishing detection methods are divided into two categories: user education and software-based anti-phishing techniques. There are three types of software-based techniques: ranking, heuristic-based, and visual similarity-based. List-based anti-phishing techniques keep a black-list, white-list, or a

combination of the two. A black-list of dubious domain names and IP addresses is maintained in the black-list-based anti-phishing approach. Although black-lists are frequently updated, most black-list-based approaches are inadequate to deal with zero-hour malicious emails. After 12 hours, 47 percent to 83 percent of phishing domains are updated in the blacklist. Google Private Browsing mode API, Domain controller black-lists, and predictive dark are some of the approaches that use black-lists. However, maintaining a blacklist necessitates a significant investment in assets for reporting and verifying suspicious links. Because vast numbers of phishing web sites are formed every day, it is difficult to keep the black-list up to date. Some anti-phishing solutions recommended by the literary works to protect users from phishing scams are listed below:

Google offers a safe browsing service that allows applications to verify URLs against a list of suspect domains that is updated regularly by Google. It is an exploratory API that works with Browsers Such as Google Chrome Firefox and is extremely simple to use.

Clients can use the Safe BrowsingLookupAPI to send suspicious URLs to the Safe Browsing service, which will determine whether the URL is valid or malicious. The client API sends URLs via GET or POST requests, which are checked against Google's malware and phishing lists. The following are some of the Private Browsing mode Lookup API's shortcomings: (i) No hashing is conducted before sending a URL, and (ii) the lookup server's response time is not limited.

A target list is a list of URLs that are suspicious or prohibited and must be blocked or rejected access to the network or system. This method is extremely simple to put into action. Its sole purpose is to deny any suspicious URLs network access. However, this method is insufficient to detect the large bulk of phishing incidents because new threats, such as zero-day attacks, emerge on a daily basis. This method is incapable of perceiving or preventing any new type of attack. It necessitates maintaining a detailed list of malicious sites and their reports, which consume a significant amount of system resources. Phishers may create URLs specifically to avoid detection besides tools that employ a blacklist system. Finally, this method fails to detect some kinds of attacks that are directed at a profitable organisation.

III. DRAW BACKS

Aburrous et al. proposed a smart system for detecting phishing websites in banking. They created a method that incorporates fuzzification with such machine learning algorithms to detect and classify phishing websites using 10-fold cross-validation. This model had a grouping accuracy of 86.38 percent. This model, however, has a high proportion of false positives. Basnet et al. proposed a heuristic-based strategy to group phishing URLs using only URL data. To detect phishing URLs, the authors used a binary classification approach that divided URLs into the phishing URLs as well as legitimate URLs. The results of experiments demonstrate that the suggested approach outperforms related work in detecting phishing URLs.

However, this method has only been evaluated on a data set of less than 300 rows. It might not work well on a huge database. Jain and Richariya devised a new technique for identifying spam scams that makes use of link-based features. To detect phishing attacks, a technology demonstrator web browser was used to process every incoming email. The prototype as well as their algorithm work together to keep the system user set informed of potential attacks and prevent people from clicking on malicious URLs.

IV. PROBLEM STATEMENT

In the SLR, 55 primary study articles were chosen, and 51 types of attacks/threats were recognised in these articles provide a complete explanation of the airstrikes identified by various researchers. The most severe dangers to the online banking system, according to the majority of research studies (16.98 percent), are trojans (all types) and malware (14.55 percent), related to social designing, pharming, phishing, weak passwords, port scanners, computer bugs, message sniffers, denial - of - service, as well as automated reply. Trojans. It has become one of the world's fastest-growing cybercriminal techniques, involving the theft of private details from unsuspecting users.

V. AIM AND OBJECTIVE

Because phishing attacks exploit user weaknesses, they are difficult to prevent, but it is critical to improve phishing detection techniques. Phishing is a scam framework that makes use of a mix of social engineering and advancement to

personal and sensitive data, such as passwords and open-end credit unfussy elements by impersonating the features of a trustworthy person or firm in electronic medium.

- To create an effective sensing tool for tracking and detecting malicious web pages.
- To identify phishing websites, a combined approach of building resource description structure models and classifying websites using deep - learning and group learning methods is used.

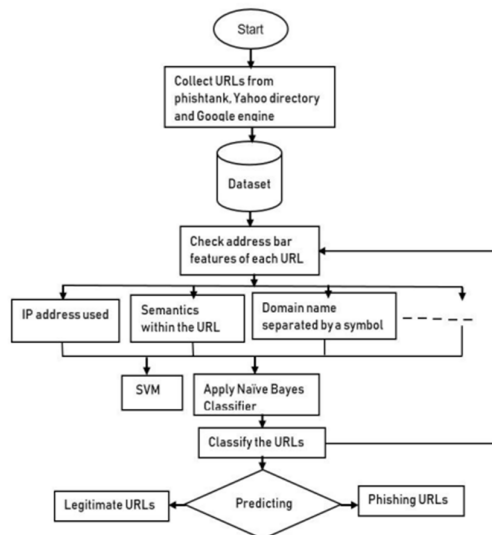
VI. PROPOSED SYSTEM

A single layer convolutional neural network is used to implement a dynamic technique for identifying phishing methods. In this paper, the values of six heuristics have been calculated using same algorithm and in the first step of the method. In the execution, a set of data of URLs is used, with a mix of 13 phishing and non-phishing URLs. The dataset was obtained from the UCI Repository. Machine Learning models with the lowest RMSE and output layers achieve high accuracy. The learning proportion is often used as a result parameter. When the accuracy of both methods was compared, the greatest accuracy was obtained in ANN PSO.

- TP (True Positive): phishing URLs detected in number.
- FN (False Negative): Incorrect URLs.
- TN (True Negative): correct Legitimate URLs being classified.
- FP (False Positive): Incorrect Phishing URLs which are classified.

Extraction of Features from Data Sets as well as URLs A huge number of data sets (36,874), debated in sub-1, were gathered and analyzed to make them appropriate for the requirement of this study. Many stages were involved in the processing, including web page feature extraction, data standardisation, and attribute weighting. These steps are critical in order for the classifiers to comprehend the data sets as well as appropriately categorise them into there own classes. To learn about new phishing trends, the classifier is given training to new phishing web pages. The results of this phase are fed into the next section of the suitable classifiers. We develop a hybrid machine learning techniques for effectively classifying phishing URLs based on the evidence provided for each URL. Phishing URLs are treated as a binary classification problem, with benign URLs falling into the negative category and phishing URLs falling into the positive category. To create our data sets, we gathered phishing as well as benign URLs from PhishTank, Yahoodirectory, and the Google engine. Following that, we extract many characteristics that have proven effective in predicting phishing Websites by classifying the sets of data into their respective classes using various publicly available resources. We use SVM as well as DecisionTree algorithms to build models from training data that include feature extractions as well as class labels.

VII. FLOW CHART



VIII. EXPERIMENTAL RESULTS

The first section focuses on data collection, data set processing, and URL feature extraction. We look at various heuristic features in URL structure, such as a generic social manipulation feature, a lexical highlight in the URL, numerous alphabets, as well as phishing target brand name. The feature vector is built with 13 major characteristics to prototype our classifiers. The second section evaluates our approach by classifying a data set that used a hybrid of classifiers. We carried out various experiments. The experiment results show that the proposed scheme achieves an average accuracy of 97.8 percent.

IX. OUTPUT

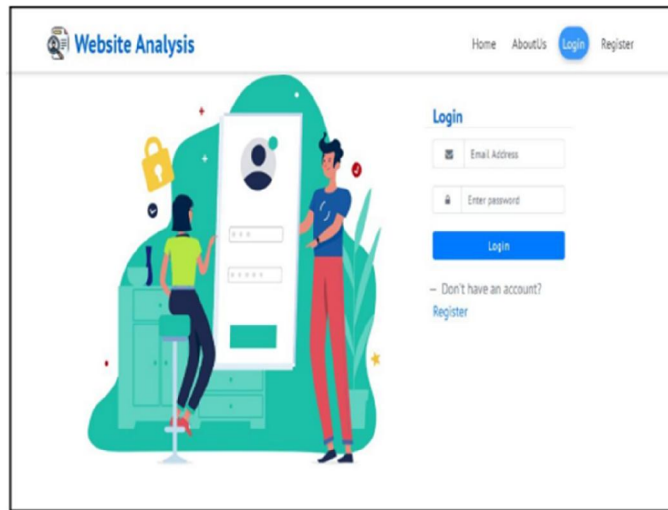


Fig Login Module

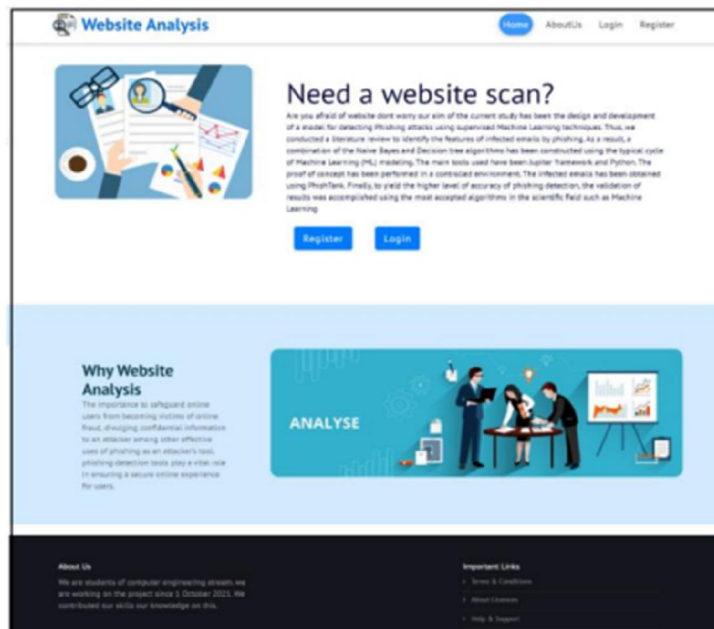


fig home page

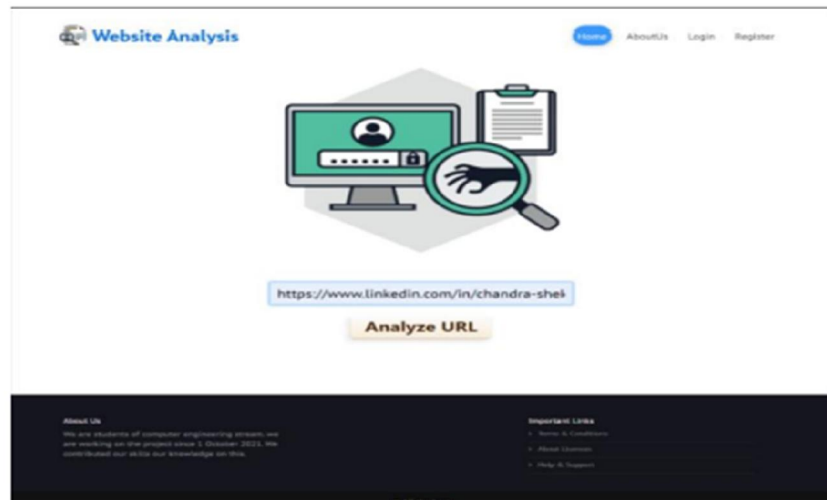


FIG URL Analyzing Page

X. CONCLUSION

The developed system can raise public awareness and security regarding email phishing attacks. Nowadays, the web is now one of the most popular and widely used platforms for phishing attacks. As a result, the developed system can protect its consumers from such attacks by determining which emails are secure and which are not. As a result, the implemented system serves as just an anti-phishing system. It will use a Deep Learning Algorithm for detecting whether an email has been phished as soon as possible, providing high accuracy while also trying to protect the end user from becoming a target of email phishing. Using different approaches together will improve the system's accuracy, resulting in an effective protection system. The disadvantage of this system is that it detects some minor false negative results. These disadvantages can be overcome by adding much richer features to nourish the machine learning algorithm, resulting in much higher accuracy.

XI. FUTURE SCOPE

The widely publicised Gmail phishing scam that happened earlier this year is each example of the new threat that affected a large number of users. Users have been sent an e - mail that appeared legitimate and guided them to a real Google page in this case. While most phishing scams direct users to malicious domains, this particular move simply tricked them into granting broad authorizations to a malicious application. Hackers could then see the victims' contacts, read one's emails, learn about their locations, and view files created in G Suite. The Gmail fake email attack demonstrates how sophisticated these methods have become – it was hard to detect and prevent. A key takeaway is that the invasion was able to overcome the psychological trust barrier. Users were duped into offering permissions to a third-party app even though they trusted it; they thought the app was a Google-approved service. A minor change in how the application web address was disguised successfully persuaded users that application was reliable.

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GIS SCIENCE JOURNAL

An UGC-CARE Approved Group II Journal

ISSN NO : 1869-9391 / Website : www.gisscience.net/

Email : editorgsjournal@gmail.com

Certificate of Publication

Paper ID : GSJ/6906

This is to certify that the paper titled
Forensic Face Sketch Construction

Authored by

Ritish G. Shrivastav

From

Anjuman College of Engineering and Technology, Nagpur.

Has been published in

GIS SCIENCE JOURNAL Volume 9, Issue 4 , April 2022.




M Palaniswami
Editor-in-chief
GISSCIENCE



FaaS (Function as a Service)

Injamam Ansari, Nihal Sangole, Areeb Ahmad

Dept. of Computer Science Engineering

Anjuman College of Engineering & Technology

Nagpur, Maharashtra, India

Prof. Abdul Razzaque, Dept. of Computer Science Engineering ,Anjuman College of Engineering and Technology
,Nagpur,Maharashtra,India

Abstract - In this paper, we provide an analysis of Function as a Service (FaaS) infrastructures. In the past few years, FaaS has gained significant popularity and became a go-to choice for deploying cloud applications and micro-services. FaaS with its unique 'pay as you go' pricing model and key performance benefits over other cloud services, offers an easy and intuitive programming model to build cloud applications. , a developer focuses on writing the code of the application while infrastructure management is left to the cloud provider who is responsible for the underlying resources, security, isolation, and scaling of the application. FaaS is an important, emerging category of cloud computing, which requires that software applications are designed and deployed using distributed, highly-decoupled service-based architectures, one example of which is the microservices architecture paradigm. FaaS is associated with on-demand functionality and allows developers to build applications without the overhead associated with server management. As such, FaaS is a type of serverless provisioning model wherein a provider dynamically manages and allocates machine resources, with the developers deploying source code into a production environment. This research provides an analysis of scalability, cost, execution times, integration support, and the constraints associated with FaaS services provided by several vendors: AWS Lambda, Google Cloud Functions, and Azure Functions. We discuss the implications of the findings for software developers.

Keywords- Online Compiler, Cloud Computing, Load Balancing Functions-as-a-Service, Infrastructures, Server less, Cloud Computing, Scalability, Constraints, AWS Lambda, Microsoft Azure, Google Cloud Functions.

Introduction

Cloud Computing is computing that involves a large number of computers connected through a communication network such as the internet, similar to utility computing. [1] The International Telecommunication Union (ITU) defines 'cloud service' as 'a service that is delivered and consumed on demand at any time, through any access network, using any connected devices using cloud computing

technologies.' Cloud Service is further classified into Cloud Software as a Service (SaaS), Communications as a Service (CaaS), Cloud Platform as a Service (PaaS), Cloud infrastructure as a service (IaaS) and Network as a service (NaaS). In this paper, we propose Online Compiler as a Software as a Service (SaaS). A compiler transforms source code from a higher level language to a lower, machine level language. This is mainly done in order to create executable files which can then be run in order to execute the program and its instructions.

Function-as-a-Service (FaaS) has emerged as a new paradigm that makes the cloud-based application development model simple and hassle-free. In the FaaS model, an application developer focuses on writing code and producing new features without worrying about infrastructure management, which is left to the cloud provider.

Many cloud-computing vendors, such as Google, AWS, and Azure, among others, offer FaaS services. AWS Lambda, Google Cloud Functions, and Azure Functions are among the most commonly used FaaS services in industry today [10]. Each vendor offers a different set of capabilities with their FaaS infrastructure implementations, from language runtime support and memory usage to the ability to execute functions at regional edge cache locations in response to events generated by content delivery networks [11]. When considering FaaS as part of a systems architecture, it is vital to choose the solution that works best for the system under consideration. For this reason, it is vital that factors surrounding FaaS infrastructures which influence this decision are discussed and investigated.

As developers, we often agonize over the amount of time spent procuring resources, setting up environments, and performing all the other tasks that prevent us from doing what we love most: developing! While cloud-computing technologies have helped to address this problem by making it easy to acquire resources such as servers, computing power, and storage, the problem of setting up these complex application hosts still plagues us. To further compound the issue, maintaining these servers can be quite costly in terms of time and money. Fortunately, technology often rises to meet the needs of its users, and so we have our featured serverless architecture.

In this paper, factors which will be analyzed include execution times, memory configurations, abilities to scale, pricing and cost of FaaS services, the constraints of FaaS infrastructures, and how well integrated vendor FaaS infrastructures are, not only with their own platforms, but how they can be integrated with third party services. This is an important factor as vendor lock-in is a major barrier to the adoption of cloud computing due to the lack of standardization [2].

Literature Review

FaaS is a new and emerging technology. Whilst it first began to be discussed around 2010 [8], it is only in recent years that the paradigm itself has witnessed sustained interest and is now being offered by the largest cloud providers (AWS, Azure, Google Cloud) as a service. As the team conducting this basic review did not have much experience with research, there was some difficulty in finding informative, trusted sources on the subject and a degree of uncertainty when judging the reliability of some grey sources included in this review. However, advice and training was given each week throughout the course of the six week research period on how to correctly conduct research, and in particular, multifocal literature reviews.

Kuhlenkamp and Werner [2] introduce a methodology for a collaborative SLR on FaaS benchmarking and report on preliminary result of 9 studies. They capture more fine-grained experiments within each paper and extract data regarding workload generator, function implementation, platform configuration, and whether external services are used. A completeness score of these categories represents the reproducibility of FaaS experiments and indicates insufficient experimental description. Somu et al. [4] summarize the capabilities of 7 FaaS benchmarking studies along 34 characteristics for parameters, benchmarks, and metrics. Their results indicate a strong focus on the AWS Lambda platform and identify a lack of support for function chaining, especially in combination with different trigger types.

Taibi et al. [5] conduct an MLR on server less cloud computing patterns to catalogue 32 patterns originating from 24 sources. Their MLR has a strong practitioner perspective but is limited to 7 peer-reviewed sources. Our work focuses on performance whereas their pattern catalogue only occasionally mentions performance as part of discussing a pattern.

Yussupov et al. [3] conduct a systematic mapping study on FaaS platforms and tools to identify overall research trends and underlying main challenges and drivers in this field across 62 selected publications. Their work covers a broader range of FaaS research and explicitly excludes FaaS benchmarking studies "without proposing any modifications" [3] through their exclusion criteria. Nevertheless, they identify 5 benchmarking studies and 26 function execution studies on performance optimization. Al-Ameen and Spillner [7] introduced a curated "Serverless Literature Dataset" that initially covered 60 scientific publications and preprints related to FaaS and Serverless computing in general, but in its latest Version 0.4 (2019-10-23) [6] the dataset has been extended to 188 articles. The authors classify their work as no survey itself, but rather envision its potential as input for future surveys such as ours. We demonstrate this potential in the manual search process for academic literature where the serverless literature dataset covers 34 out of 35 relevant studies. These two general studies identify publication trends, common technologies, and categories of research but do not extract and synthesize more specific data on FaaS benchmarking aspects we cover in our work.

Disadvantages of Existing System:

There is a potential downside to using Function as a Service. Some of the things you need to consider before you go all-in with FaaS include:

Vendor lock-in: Building your application on a FaaS platform may make you reliant on that vendor and make it difficult to switch.

Testing hurdles: Depending on the vendor, you may have challenges when creating a test environment for your application.

Cold starts: There's sometimes a delay in the execution of a function, as much as 3 seconds, which can adversely impact some types of applications.

Security: You are at the vendor's mercy when it comes to security and may not have the visibility you need to ensure the vendor complies with regulations governing your use or storage of certain types of data.

Cost: This item is repeated from the benefits list, but in some cases, FaaS can actually cost more than using dedicated servers, depending on the processes you are running.

The limitation on application state isn't the only constraint on serverless computing. There are a few more, and they may prevent your application from running as one or more functions.

Or, they might mean you need to rethink your design.

The platform loads functions on demand. They should start up quickly, usually in milliseconds.

Then the platform immediately gives them a request. When processing completes, it terminates them. The platform may reuse an instance with a "warm start" to save time, but the function cannot rely on this.

This is where the constraint on state comes from. But it also means that an application that performs a lot of initialization will not work well with FaaS.

AWS limits Lambdas to 15 minutes of execution time. Azure limits its Functions to 10 minutes.

This is plenty of time for an API call, but it might not be for a scheduled job. Unfortunately, functions have hard limits on execution time.

FaaS might also be a bad fit if you're concerned about vendor lock-in and can't figure out how to code around it. If you're going to have someone else run your code on their platform, you need to write to their API.

Depending on how you structure your code, you may be able to avoid lock-in. But if you do, serverless might not be the right solution. Or you might not care.

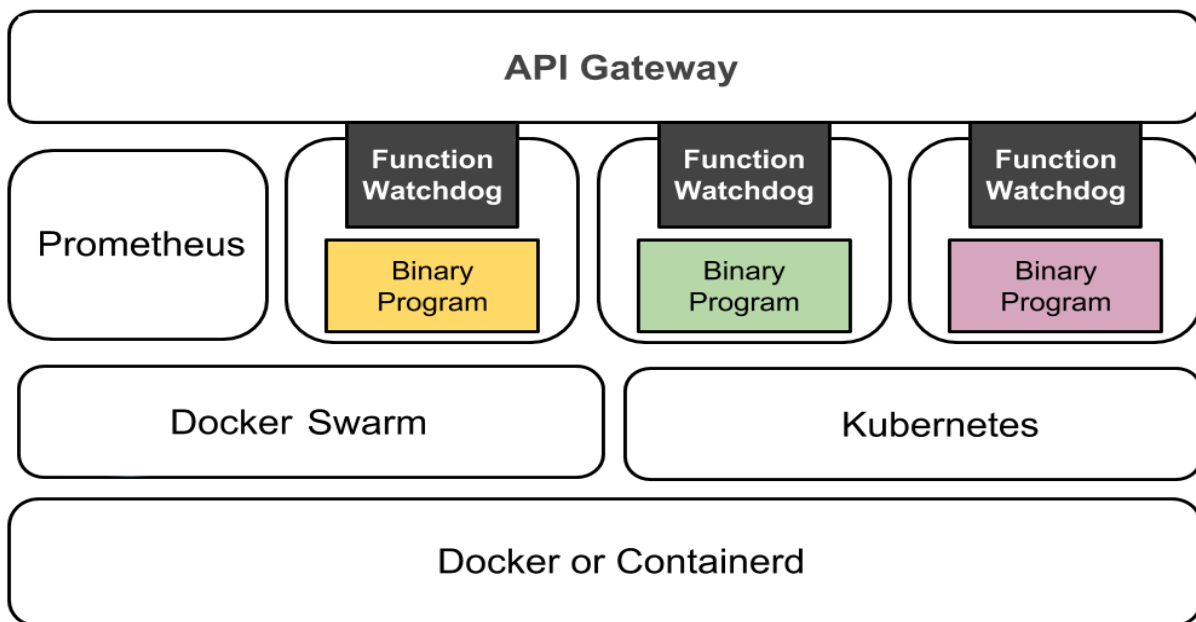
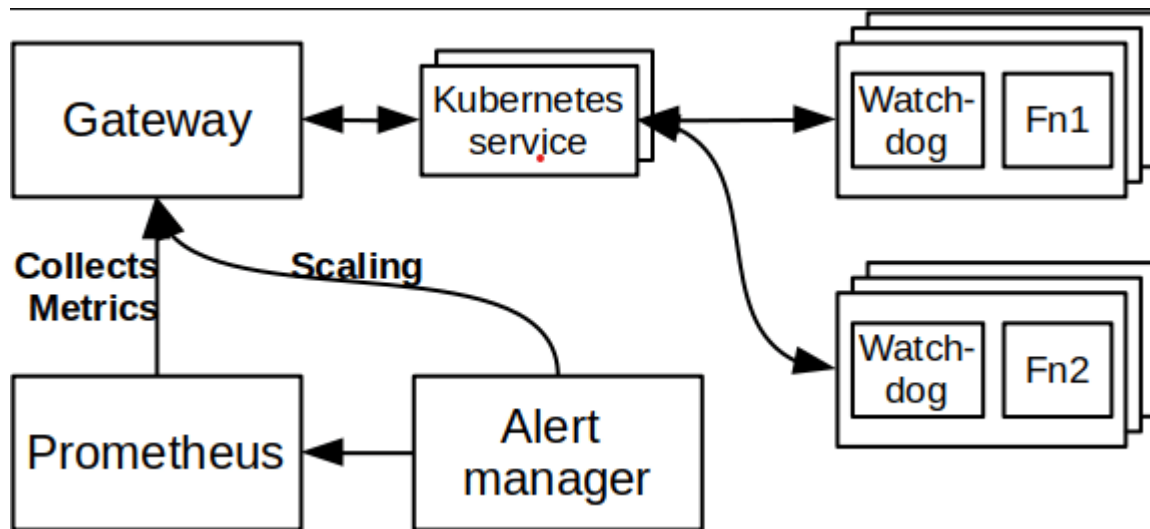
Proposed Approach:

Cloud computing model is for enabling convenient as well as a network access to a shared pool of configurable computing resources. In this internet world all the things are online. Here we use an online compiler. This project's main aim is, we can easily write program, compile and debug it in online. In this project, we have three online compilers namely, Online C/C++, JAVA and Perl compiler. Different programming languages are being compiled using cloud computing, which is portable and reduces the storage space, online java, c/c++, Perl compiler using cloud computing, which provides most convenient tool to compile code and remove the errors. These three compilers provide online compiler service, so no need to install separate compiler on each PC. By using all these application we can conduct online practical examination.

Architecture:

FaaS and serverless are generally synonymous with one another due to its ability to listen and act upon the events of other serverless services. However FaaS is a subset of serverless [10], which resides within the compute category. By understanding the variety of categories and the services that lie within we can better ascertain the best provider for the users architectural needs. The core categories that relate to architecture that are consistent across all three providers are the following, compute, storage, data stores and integration. The main purpose of this research is to see how FaaS integrates with other serverless services. For the sake of brevity, other compute services are omitted as the core focus of this research is FaaS.

Storage provides consistent object-level data storage across all three providers [14, 13, 15]. However AWS also provides EFS; an NFS file system service that can be easily integrated with on-premises or cloud resources [14].



System Requirement

Hardware Requirements-

32-bit Intel® Pentium® 4 or compatible processor running at 2 GHz or greater

512 MB RAM

Disk space: 30 GB at least

Software Requirements-

Any Linux based Operating system

Arkede

Docker,

Kubernetes

OpenFaaS

FaaS-cli

Java, C#, Python, Node.js, and Go, installed in system.

FaaS Templates Requirements-

- 1) Csharp
- 2) dockerfile
- 3) go
- 4) java11-vertx, java11
- 5) Node, node12-debain, node12, node14, node16
- 6) php
- 7) Python, python3-debain, python3
- 8) ruby

Setup Procedure

Step1- Install openfaas in system

The arkade install command installs OpenFaaS using its official helm chart. Arkade can also install other important software for OpenFaaS users such as cert-manager and nginx-ingress. It's the easiest and quickest way to get up and running.

You can use arkade to install OpenFaaS to a regular cloud cluster, your laptop, a VM, a Raspberry Pi, or a 64-bit ARM machine.

Get arkade

For MacOS / Linux:

```
curl -SLsf https://get.arkade.dev/ | sudo sh
```

For Windows (using Git Bash)

```
curl -SLsf https://get.arkade.dev/ | sh
```

Step 2- Create Dictionary function

We will use arkade to install and deploy apps and services to Kubernetes.

```
# Download only, install yourself with sudo
```

```
$ curl -sLS https://dl.get-arkade.dev | sh
```

```
# Download and install
```

```
$ curl -sLS https://dl.get-arkade.dev | sudo sh
```

Step3- Setup Manifest

Step4- FaaS cli secret congratulation

The OpenFaaS CLI allows you to create, update, list and delete secrets using faas-cli instead of Docker or Kubernetes command line tools.

The reason behind this is to give you simplicity when you need to use secrets for your functions as well as to provide a layer of abstraction, as it will work for both Kubernetes and faas.

Create

To create a secret from stdin, you can run:

```
faas-cli secret create secret-name
```

To create it from file use:

```
faas-cli secret create secret-name \  
--from-file=~/.Downloads/derek.pem
```

Target a specific namespace:

```
faas-cli secret create \  
--namespace staging-fn \  

```

secret-name \

--from-literal="04385e5c413c10ed68afb010ebe8c5dd706aa20a"

Step5- Deploy Dictionary function

Step6- Testing Dictionary function

Reference:

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Authored by :

Prof. Pramod Gadge

From

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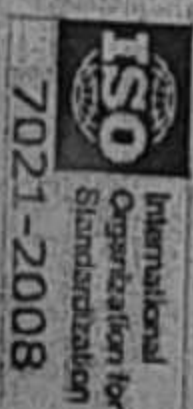
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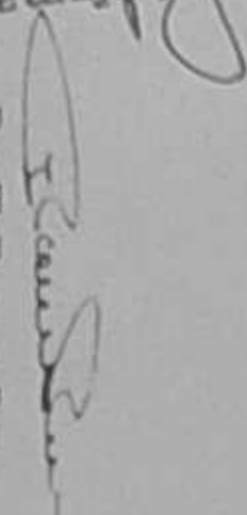
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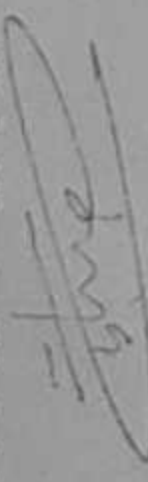
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Head of the Dept.

Electrical (Electronics & Power) Engineering
Anjuman College of Engineering & Technology
Sadar, Nagpur.

Dr. T. Rama Rao
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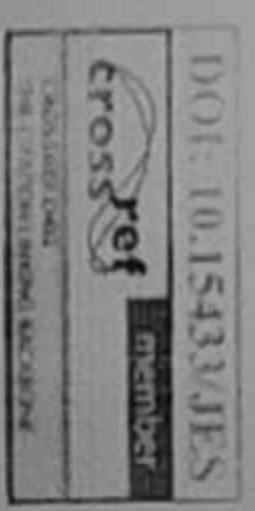
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JES JOURNAL, Vol 13, Issue 05, April /2022



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This is to certify that the paper entitled

CERTIFICATE ID: IJAEMA/7275

“Design of Energy Consumption Information system using GSM&Adafruit application”

Authored by :

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From

RTMINU/ACET/, Nagpur, Maharashtra, India

Has been published in

IJAEMA JOURNAL, VOLUME XIV, ISSUE V, MAY- 2022

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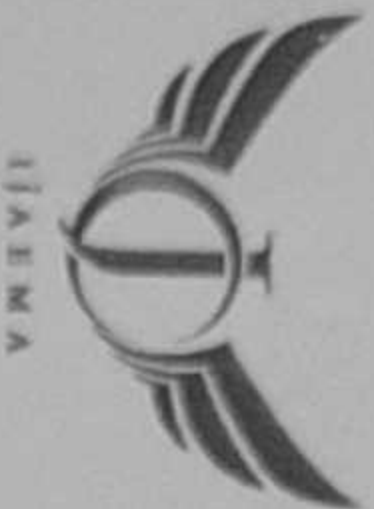
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www.ijrret.com
ISSN : 2395-566X



Online ISSN : 2395-602X

Print ISSN : 2395-6011

[UGC Journal No. 6(011)]

International Journal of Scientific Research in Science and Technology

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Ref. IJSRST/CertificateVolume 9/Issue 3/9448

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LIST OF CERTIFIACTES

DICKENSIAN JOURNAL

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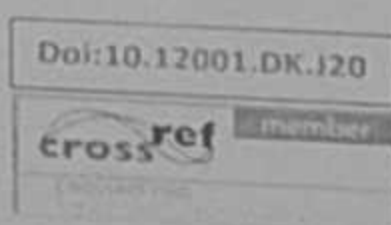
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LIST OF CERTIFICATES



Online ISSN: 2395-602X

Print ISSN: 2395-6011

[UGC Journal No. E4011]

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Ref : IJSRST/Certificate/Volume 9/Issue 3/9448

07-May-2022

This is to certify that Prof. Dr. Sayyad Naimuddin, Prof. Mohammad Safique, Aliya Husain Ali, Krutika Bagde, Suvarna Lichade have published a research paper entitled '*An Active System for Vehicle Accident Detection and Tracking*' in the International Journal of Scientific Research in Science and Technology (IJSRST), Volume 9, Issue 3, May-June-2022.

This Paper can be downloaded from the following IJSRST website link

<https://ijsrst.com/IJSRST22936>

DOI : <https://doi.org/10.32628/IJSRST22936>

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Scientific Journal Impact Factor = 7.214

Peer Reviewed and Refereed International Journal

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Sadar, Nagpur.

DICKENSIAN JOURNAL

An UGC Care Group-II

ISSN No : 0012-2440

Mail : editor Dickensian@gmail.com Website: <http://dickensian.org/>

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DICKENSIAN
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Paper Id : DNJ/1850

This is to certify that the paper titled
VEHICLE THEFT DETECTION AND TRACKING SYSTEM

Author by

Mohammad Saifque

From

Anjuman College of Engineering and Technology, Nagpur

has been published in

Dickensian Journal, Volume 22, Issue 5, May 2022.

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The International Journal of Analytical and Experimental Modal analysis

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An ISO : 7021 - 2008 Certified Journal

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Certificate of Publication

This is to certify that the paper entitled **CERTIFICATE ID: IJAEMA/7285**

"Power Generation From Vehicle Silencer"

Authored by :

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Anjuman College Of Engineering And Technology, Nagpur, Maharashtra-440001, India

Has been published in

IJAEMA JOURNAL, VOLUME XIV, ISSUE V, MAY- 2022



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The International Journal of Analytical and Experimental Modal analysis

An UGC-CARE Approved Group - II Journal

An ISO : 7021 - 2008 Certified Journal

ISSN NO: 0886-9367 / web : <http://ijaema.com> / e-mail: submit@ijaema@gmail.com



Certificate of Publication

This is to certify that the paper entitled **CERTIFICATE ID: IJAEMA/7022**

"Electricity Generation Through Agricultural Waste"

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Anjuman College of Engineering and Technology (ACET) Nagpur, India

Has been published in

IJAEMA JOURNAL, VOLUME XIV, ISSUE III, MARCH- 2022



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Certificate of Publication

This is to certify that the paper entitled **CERTIFICATE ID: IJAEMA/7022**

"Electricity Generation Through Agricultural Waste"

Authored by :

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Anjuman College of Engineering and Technology (ACET) Nagpur, India

Has been published in

IJAEMA JOURNAL, VOLUME XIV, ISSUE III, MARCH- 2022



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Certificate of Publication

This is to certify that the paper entitled **CERTIFICATE ID: IJAEMA/7176**

"ADVANCED DRIVER ASSISTED SECURITY SYSTEM FOR VEHICLES"

Authored by :

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From :

Anjuman College of Engineering and Technology

Has been published in

IJAEMA JOURNAL, VOLUME XIV, ISSUE IV, APRIL-2022

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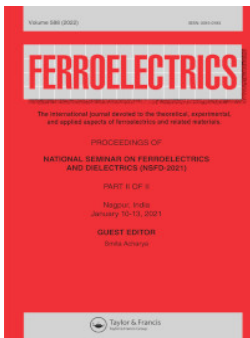
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Dielectric relaxation study of aqueous glycol ethers with water using time domain reflectometry technique in the frequency range 10 MHz to 50 GHz

Zamir S. Khan, Arsala Khan, M. P. Lokhande, Avadhut Deshmukh & A. C. Kumbharkhane

To cite this article: Zamir S. Khan, Arsala Khan, M. P. Lokhande, Avadhut Deshmukh & A. C. Kumbharkhane (2022) Dielectric relaxation study of aqueous glycol ethers with water using time domain reflectometry technique in the frequency range 10 MHz to 50 GHz, *Ferroelectrics*, 588:1, 65-77, DOI: [10.1080/00150193.2022.2034439](https://doi.org/10.1080/00150193.2022.2034439)

To link to this article: <https://doi.org/10.1080/00150193.2022.2034439>



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Dielectric relaxation study of aqueous glycol ethers with water using time domain reflectometry technique in the frequency range 10 MHz to 50 GHz

Zamir S. Khan^a, Arsala Khan^b, M. P. Lokhande^c, Avadhut Deshmukh^d, and A. C. Kumbharkhane^d

^aDepartment of Physics, Anjuman College of Engineering and Technology, Nagpur, India; ^bDepartment of Physics, Yeshwantrao Chavan College of Engineering (YCCE), Nagpur, India; ^cDepartment of Physics & Electronics, GVISH, Amravati, India; ^dSchool of Physical Sciences, Swami Ramanand Teerth Marathwada University, Nanded, Maharashtra, India

ABSTRACT

The Complex permittivity spectra of glycol ether (GE) compounds such as ethylene glycol mono-methyl ether (EGME), ethylene glycol ethyl ether (EGEE) and ethylene glycol butyl ether (EGBE) with water mixture over entire concentration range and at 25 °C has been determined using Time Domain Reflectometry technique in the frequency range 10 MHz to 50 GHz. The complex permittivity spectra for GE–water were fitted in Cole–Davidson model. The Static dielectric constant (ϵ_0), Relaxation time (τ), effective Kirkwood correlation factor (g^{eff}), excess permittivity (ϵ_0^E) and Bruggeman factor (f_B) have been calculated by non-linear least square fit method. The intermolecular interactions between GE-water binary mixtures suggest the non-linear behavior of dielectric parameters. The contribution of hydrogen bonding interactions among the solute-solvent mixtures is confirmed by Excess properties and Bruggeman factor.

ARTICLE HISTORY

Received 10 January 2021
Accepted 28 December 2021

KEYWORDS

Ethylene glycol mono-methyl ether; ethylene glycol ethyl ether; ethylene glycol butyl ether; complex permittivity; Kirkwood correlation factor; excess dielectric properties; Bruggeman factor

1. Introduction

Molecular interactions in the liquid and nature of rotational dynamic were provided by Dielectric Relaxation Spectroscopy (DRS) [1]. Glycol ethers (GE) is very interesting class of solvent having ether, that is, oxygen (–O–) and hydroxyl (–OH–) group. The hydroxyl group can act as proton donor as well as acceptor. Aqueous solutions of GE have a wide range of chemical, biological, pharmaceutical, industrial and condensed matter physics applications because GE and water molecules have the H-bond sites and they can enter into intra and intermolecular hydrogen bonding giving rise to different conformations [2–5]. Literature survey indicates that the glycol ethers has been studied in pure form and non-polar solvents such as dioxane, benzene and carbon tetrachloride but dielectric relaxation behavior of these systems in aqueous solution is scarce [6–8]. The molecules of these compounds have several hydrogen bonding sites which may leads to different conformations through intra and intermolecular interactions. The local structures of hydrogen bonding liquids are complicated due to molecular clusters and

network structures through the hydrogen bond. Ethylene glycol mono-methyl ether (EGME) with structural formula $\text{CH}_3\text{OCH}_2\text{CH}_2\text{OH}$ or 2-Methoxyethanol, or methyl cellosolve is used mainly as a solvent. It is a comprehensible, monotonous liquid with an ether-like smell.

It is in a group of solvents identified as glycol ethers which are prominent for their talent to liquefy a range of special types of substance compounds and for their miscibility with water and other solvents. It can be formed by the nucleophilic attack of methanol on protonated oxirine followed by proton transfer. Ethylene glycol mono-ethyl ether (EGEE) has structural formula $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_2\text{OH}$ or 2-Ethoxyethanol, it is also known Cellosolve or ethyl cello solve, is a solvent used widely in commercial and industrial applications. It is a comprehensible, monotonous, nearly fragrance-free liquid that is miscible with water, ethanol, diethyl ether, acetone and ethyl acetate. Ethylene glycol mono-butyl ether (EGBE) with structural formula $\text{CH}_3(\text{CH}_2)_2\text{CH}_2\text{OCH}_2\text{CH}_2\text{OH}$ or 2-Butoxyethanol is an organic compound. As a comparatively nonvolatile, low-priced solvent of squat toxicity, it is worn in several conjugal and manufacturing products as of its properties as a surfactant.

The hydroxyl group is a functional group of alcohols whereas oxy-group is functional group of ethers. So the ether alcohols having general formula are R-O-R-OH . The homologous series of mono-alkyl ethers of ethylene glycol has general formula $\text{C}_n\text{H}_{2n+2}\text{O}_2$, where $n = 1, 2, 3$, and so on. Dielectric studies have been carried out extensively on alcohols and its water mixtures to understand strong intra and intermolecular interactions through hydrogen bond, which play an important role in biochemistry, results in a peculiar dynamical property. The hydrophilic/hydrophobic balances in glycol ethers make the dielectric relaxation study interesting. Recently dielectric relaxation study of polymers and binary mixtures of 2-methoxyethanol-water have been successfully carried out in our laboratory [9–12].

In the present study the complex permittivity spectra of Ethylene glycol mono-methyl ether (EGME), Ethylene glycol mono-ethyl ether (EGEE) and Ethylene glycol mono-butyl ether (EGBE) with water have been measured at 25°C . The dielectric parameters such as static dielectric constant, relaxation time have been calculated. The dielectric behavior of these associating liquid have been discussed in terms of Bruggeman factor, Kirkwood correlation factor and excess properties.

2. Experimental

2.1. Materials

EGME, EGEE, and EGBE were obtained commercially (Merck, India) and were used without further purification. The water used in the preparations of mixtures was obtained by double distillation procedure. The binary mixture of GE and Water were prepared at different concentrations by volume fraction.

2.2. Measurement

The dielectric spectra were obtained by the time domain reflectometry (TDR) technique. The Tektronix Digital Serial Analyzer model number DSA8300 sampling mainframe

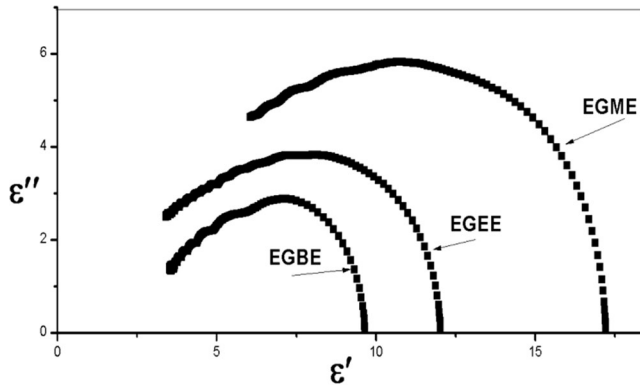


Figure 1. Cole–Cole plot for GE at 25 °C.

along with the sampling module 80E10B has been used. A repetitive fast pulse with 12 ps incident rise time was fed through coaxial cable having impedance 50 Ω . Sampling oscilloscope monitors change in step pulse after reflection from the end of line. Reflected pulse without sample $R_1(t)$ and with sample $R_x(t)$ were recorded in time window of 5 ns and digitized in 2000 points. The Fourier transformation of the pulses and data analysis were done to determine complex permittivity spectra $\varepsilon^*(\omega)$ using nonlinear least square fit method [13, 14].

3. Results and discussion

Asymmetric shape of the loss peak was observed for the alcohol and its water mixtures, and the dielectric spectrum was described well by the Havriliak-Negami (HN) equation.

The HN equation gives the complex permittivity as [15].

$$\varepsilon^*(\omega) = \varepsilon_\infty + \frac{\varepsilon_0 - \varepsilon_\infty}{[1 + (j\omega\tau)^{1-\alpha}]^\beta} \quad (1)$$

where ε_0 is the static dielectric constant, ε_∞ is the permittivity at high frequency, τ is relaxation time. α and β are the symmetric and asymmetric distribution of relaxation times, respectively. The model can be fitted in three ways: (i) If $\alpha=0$ and $\beta=1$ then single Debye relaxation, (ii) $0 \leq \alpha \leq 1$ then it would be a Cole–Cole model of symmetric distribution of relaxation times and (iii) $\alpha=0$ and β varied such that $0 \leq \beta \leq 1$, this behavior is identified as Cole–Davidson (CD) asymmetric distribution of relaxation times.

The dielectric loss spectrum of pure water in this frequency range is usually described by a single Debye relaxation [12, 16]. The Cole–Cole plot is shown in Fig. 1 (ε'' vs. ε') for pure GE at 25 °C. From Fig. 1 it is observed that the Cole–Cole Plots for the pure glycol ethers at 25 °C exhibit the skewed arc curve and the value of ε'' max is less than $(\varepsilon_0 - \varepsilon_\infty)/2$ which indicate that the dielectric behavior deviate from the single Debye relaxation. This deviation is usually explained by assuming there is not just one relaxation time but a continuous distribution.

The complex permittivity spectra $\varepsilon^*(\omega)$ of the glycol ethers–water mixtures have been fitted in CD model using least squares fit method to determine the dielectric relaxation

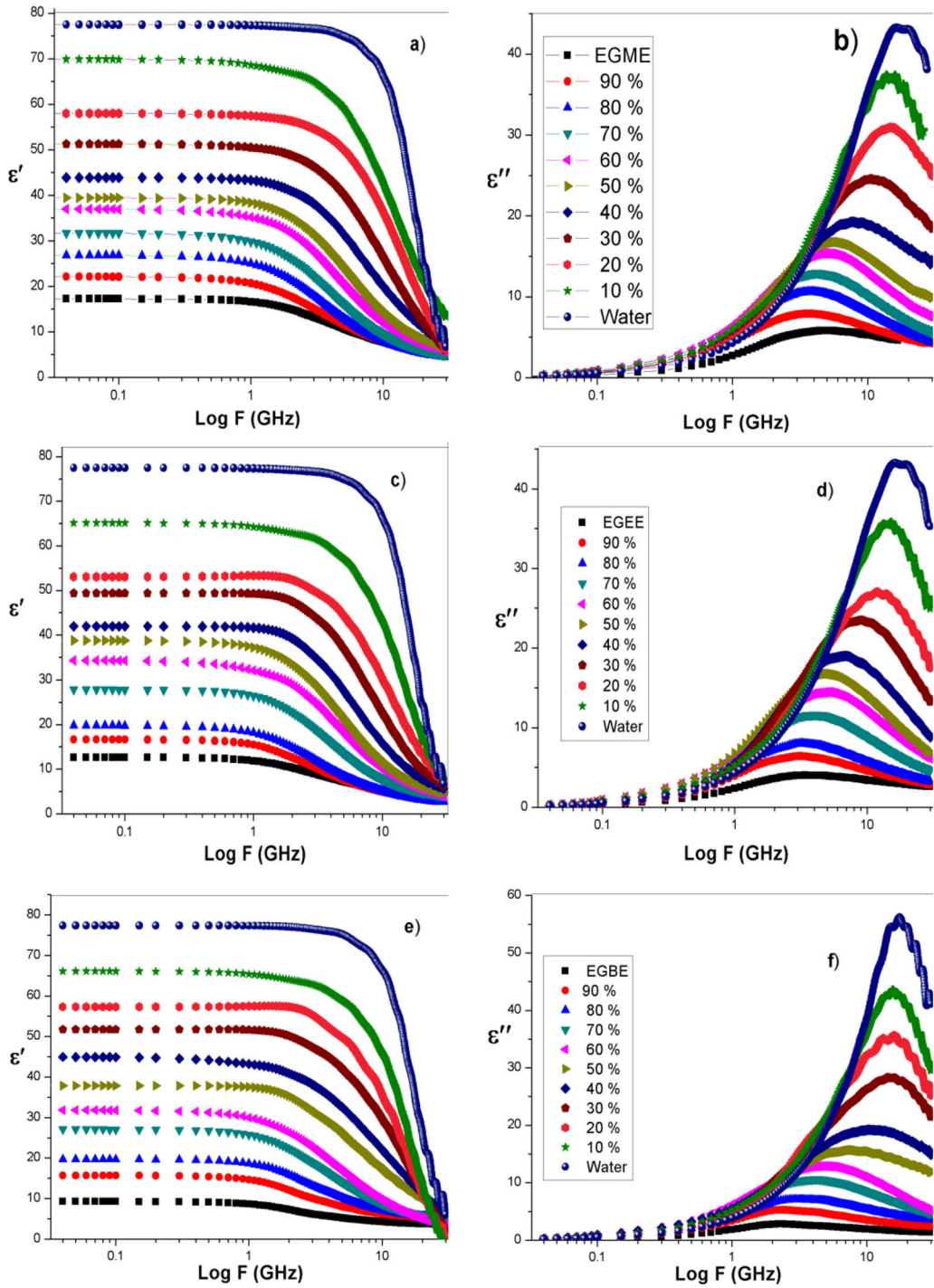


Figure 2. (a), (b), and (c) are the dielectric permittivity whereas (d), (e), and (f) are dielectric loss spectra for EGME, EGEE, and EGBE, respectively.

Table 1. Dielectric relaxation parameters for glycol ethers-water mixtures at 25 °C.

V_w	EGME-Water		
	ϵ_0	$\tau(\text{ps})$	β
0.00	18.07 (1)	25.03 (18)	0.754 (2)
0.10	23.12 (8)	35.24 (32)	0.774 (4)
0.20	27.63 (6)	38.08 (18)	0.854 (1)
0.30	32.70 (7)	34.75 (16)	0.866 (1)
0.40	38.14 (8)	30.21 (14)	0.871(2)
0.50	41.04 (11)	24.47 (14)	0.850 (2)
0.60	44.84 (15)	18.15 (11)	0.925 (2)
0.70	50.99 (17)	15.37 (8)	1.000 (2)
0.80	56.79 (19)	13.05 (9)	1.000 (1)
0.90	66.01 (13)	11.36 (7)	0.927(2)
1.00	78.49 (69)	9.72 (17)	1.000 (1)
EGEE-Water			
0.00	13.36 (4)	30.71(33)	0.704 (3)
0.10	17.48 (5)	42.88(33)	0.810 (2)
0.20	22.47 (5)	43.48(5)	0.850 (2)
0.30	28.74 (6)	38.97(7)	0.880 (1)
0.40	34.72 (3)	32.7(3)	0.913(8)
0.50	39.61 (4)	27.07(6)	0.918 (9)
0.60	43.12 (5)	22.44(5)	0.940 (1)
0.70	50.41 (5)	18.03(5)	0.956 (1)
0.80	53.46(10)	14.05(3)	1.020 (1)
0.90	63.18(12)	11.87(13)	1.090(1)
1.00	78.49(13)	9.72 (17)	1.000 (1)
EGBE-Water			
0.00	9.91 (5)	40.35 (59)	0.686 (5)
0.10	17.02 (10)	47.02 (99)	0.706 (6)
0.20	21.04 (10)	51.06 (52)	0.761 (4)
0.30	28.17 (6)	46.76 (18)	0.844 (2)
0.40	31.98 (2)	39.41 (15)	0.914 (7)
0.50	39.01 (15)	32.44 (13)	0.945 (3)
0.60	44.01 (17)	26.14 (10)	0.959 (3)
0.70	49.93 (29)	21.15 (10)	1.112 (5)
0.80	55.64 (31)	17.41 (8)	1.170 (4)
0.90	61.78 (5)	14.39 (30)	1.230 (4)
1.00	78.5 (13)	9.72 (17)	1.000 (1)

Note: Numbers in bracket denotes uncertainties in the last significant digits obtained by the least square fit method. For example, 18.07(1) means 18.07 ± 0.01 .

parameters. The dielectric permittivity spectra have been shown in Fig. 2(a–c) and dielectric loss spectra in Fig. 2(d–f) for EGME, EGEE, and EGBE, respectively, at 25 °C.

The corrected data have been fitted with the Havriliak–Negami (HN) equation. The values of the dielectric parameters at 25 °C are reported in Table 1.

3.1. Static dielectric constant (ϵ_0)

The values of dielectric constant at 25 °C for glycol ethers–water mixtures are plotted against volume fraction of water (V_w) shown in Fig. 3. The static dielectric constant increases for GE for addition of water. The values of dipole moment in gas phase for EGME, EGEE and EGBE are very similar but the static dielectric constants are in decreasing order such that $EGME > EGEE > EGBE$, as the chain length increases from EGME to EGBE the dielectric constant goes on decreasing.

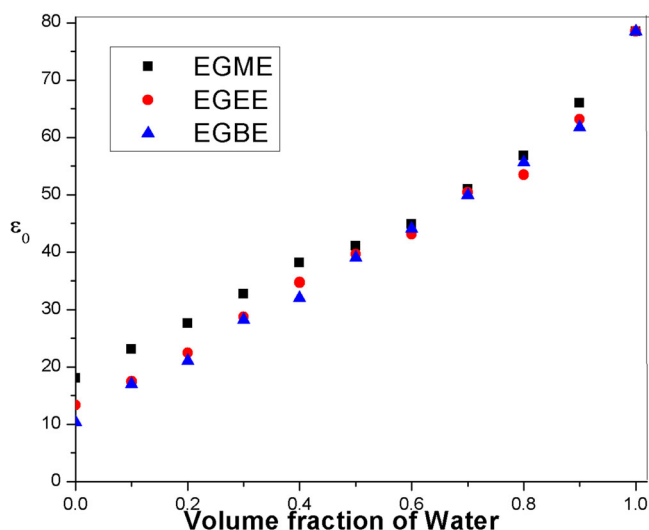


Figure 3. Static dielectric constant (ϵ_0) versus volume fraction of water (V_w) for glycol ethers-water mixtures.

In the present manuscript, we demonstrate huge manipulation of a hydroxyl group ($-\text{OH}$) on the Static dielectric constant (ϵ_0) value of a molecule. The value of ϵ_0 decreases with the increase in the number of carbon atoms in the chain of the molecule [17]. Water molecule does not have any carbon atom but EGME, EGEE, and EGBE molecule have carbon atoms. Therefore, the ϵ_0 value of EGME, EGEE, and EGBE should be very low as compared to water. It is observed that on the addition of glycol ether (GE) in water, the static dielectric constant increases and also increases with a decrease in temperature.

3.2. Dielectric relaxation time (τ)

The relaxation time is a function of molecular size and relaxation time τ increases from EGME to EGBE which are reported in Table 1. The values of relaxation time at 25°C for glycol ethers–water mixtures are plotted against volume fraction of water (V_w) shown in Fig. 4. The relaxation time decreases for GE for addition of water. Fig. 4, relaxation time increases with an increase in volume fraction of water in GE and attains a maximum value at $V_w = 0.2$ of GE-water mixtures. Then with a further increase in the volume fraction of water in a binary mixture, there is a gradual decrease in relaxation time and reaches a minimum value. The variation of relaxation time provides information regarding the hydrophilic character of the solute particle. The molecular relaxation time is dependent on the chain length of the molecule, viscosity and temperature.

3.3. Kirkwood correlation factor

The information regarding the orientation of dipoles in polar liquids is given by Kirkwood correlation factor [11, 18]. For pure liquids, the value of Kirkwood factor is obtained by using Kirkwood–Froehlich equation:

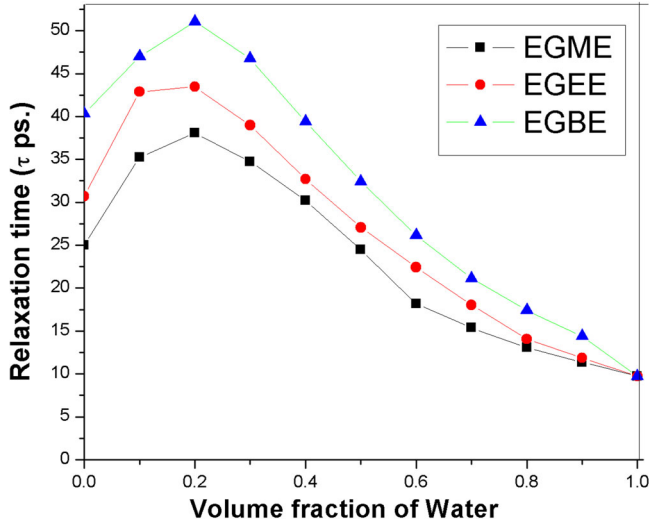


Figure 4. Relaxation time τ (ps.) versus volume fraction of water (V_w) for glycol ethers-water mixtures.

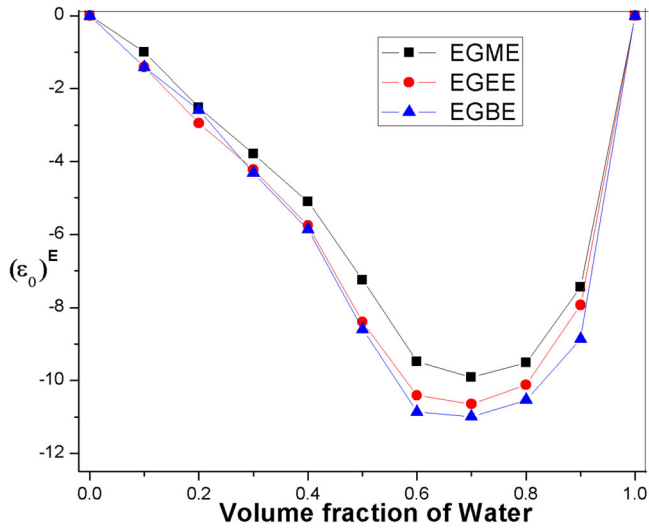


Figure 5. Excess permittivity $(\epsilon_0)^E$ versus volume fraction of water (V_w) for glycol ethers-water mixtures.

$$g\mu^2 \frac{4\pi N\rho}{9kTM} = \frac{(\epsilon_0 - \epsilon_\infty)(2\epsilon_0 + \epsilon_\infty)}{\epsilon_0(\epsilon_\infty + 2)^2} \quad (2)$$

where, g is the Kirkwood correlation factor, μ is the dipole moment of the liquid, N is the Avogadro's Number, ρ is the density of the liquid, ϵ_0 is the static dielectric constant, ϵ_∞ is the permittivity at high frequency, k is the Boltzmann constant, M is the molecular weight and T is the temperature. For the binary mixture, the effective correlation factor (g^{eff}) gives information of dipole-dipole correlation in associating binary mixture of polar liquids by the modified effective Kirkwood equation [19–21].

Table 2. Kirkwood correlation factor (g^{eff}) for glycol ether-water mixture at 25 °C.

V_w	EGME	EGEE	EGBE
0.0	1.64 (6)	1.45 (6)	1.36 (6)
0.1	1.80 (5)	1.48 (4)	1.41 (5)
0.2	1.88 (4)	1.56 (4)	1.50 (4)
0.3	1.98 (4)	1.84 (4)	1.79 (4)
0.4	2.05 (4)	1.98 (4)	1.92 (4)
0.5	2.09 (4)	2.05 (4)	2.01 (4)
0.6	2.17 (4)	2.10 (4)	2.11 (4)
0.7	2.25 (4)	2.20 (4)	2.18 (4)
0.8	2.42 (5)	2.35 (4)	2.30 (4)
0.9	2.50 (5)	2.40 (5)	2.37 (5)
1.0	2.82 (6)	2.82 (6)	2.82 (6)

$$\frac{4\pi N}{9kT} \left[\frac{\mu_w^2 \rho_w V_w}{M_w} + \frac{\mu_A^2 \rho_A (1 - V_w)}{M_A} \right] \times g^{\text{eff}} = \frac{(\epsilon_{0m} - \epsilon_{\infty m})(2\epsilon_{0m} + \epsilon_{\infty m})}{\epsilon_{0m}(\epsilon_{\infty m} + 2)^2} \quad (3)$$

where, g^{eff} is the effective Kirkwood correlation factor, μ_w is the dipole moment of water, μ_A is the dipole moment of GE, ρ_w , and ρ_A are the densities of the water and GE, respectively. V_w is the volume fraction of Water. The values of Kirkwood correlation factor for entire binary mixtures of glycol ethers–water are reported in Table 2. The g^{eff} values glycol ethers increases for addition of small amount of water. This value gives significance of association in the mixtures and orientation of dipoles in the liquids. The g^{eff} values for pure liquids, that is, for water, EGME, EGEE, and EGBE are 2.82, 1.64, 1.45, and 1.36, respectively. The significance of association effects according to decreasing order is as follows EGME > EGEE > EGBE. The g^{eff} values for water and glycol ethers are greater than unity, which suggest that the molecular dipoles have parallel orientation among themselves. Also water has higher correlation factor as compared to glycol ether indicates the strong intermolecular interaction in water molecules through hydrogen bonding whereas the g^{eff} for glycol ethers in pure form are such that, EGME > EGEE > EGBE.

3.4. Excess dielectric properties

The contribution of hydrogen bonds to the dielectric properties of the mixture is also studied in terms of the excess static dielectric permittivity. The excess permittivity (ϵ_0^E) can be written as [11, 22]

$$(\epsilon_0)^E = (\epsilon_0)_M - [(\epsilon_0)_w V_w + (\epsilon_0)_{GE}(1 - V_w)] \quad (4)$$

The excess static dielectric constant (ϵ_0)^E provides qualitative information about multimer formation in the mixture given as follows.

- i. The excess static dielectric constant (ϵ_0)^E is equal to zero means there is no interaction between solute–solvent mixtures.
- ii. The values (ϵ_0)^E < 0, means there is interaction between constituents of solute–solvent such that there is less contribution in the total number of effective dipoles in the mixture and (ϵ_0)^E values get reduced.

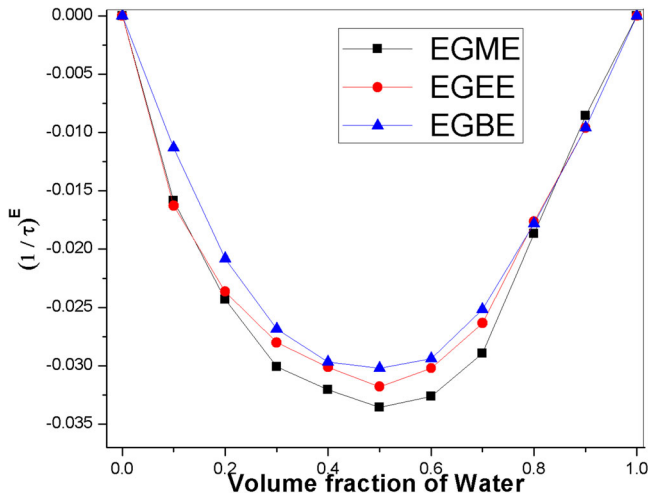


Figure 6. Excess inverse dielectric relaxation $(1/\tau)^E$ versus volume fraction of water for glycol ethers-water mixtures.

- iii. When $(\epsilon_0)^E > 0$, means there is interaction between solute-solvent mixtures such that there is increase in the number of effective dipoles contributed in the mixture and $(\epsilon_0)^E$ values get increased.

where, the subscripts M and W represent mixture and water, respectively, and V_W represents the volume fraction of water in solute. The plot of excess permittivity Vs. the volume fraction of water (V_W) is shown in Fig. 5. The plot exhibits a pronounced minimum and it remains negative for the whole concentration range. These negative $(\epsilon_0)^E$ values for GE-water mixtures show the experimental evidence of a molecular interaction among the unlike species through hydrogen bonding so that the total number of effective dipoles gets reduced. The magnitude of minima or maxima increases with the addition of the CH_2 group in the glycol ether molecule. It is attributed as the extensive volume contraction takes place due to strong solute-solvent interactions [23]. The pronounced minima of $(\epsilon_0)^E$ value for EGME & EGEE are found approximately at $V_W \approx 0.6$ and for EGBE at $V_W \approx 0.8$ which gives the stable adduct formation as water: EGME & EGEE in the mole ratio of 1:2.3 and for water: EGBE in the mole ratio of 1:4. From Fig. 5 the minimum in ϵ_0^E values for EGBE > EGEE > EGME indicates as increase in chain length, the hetero-molecular H-bond interaction reduces the number of effective dipoles

3.5. Excess inverse relaxation time

The excess inverse relaxation property is useful for perception of cooperative domain in the mixture and may give affirmation for formation of multimers in the mixture due to intermolecular interaction. The excess inverse relaxation time is defined as [24, 25]

$$(1/\tau)^E = (1/\tau) - [(1/\tau)_w V_w + (1/\tau)_{\text{EGME}} (1 - V_w)] \quad (5)$$

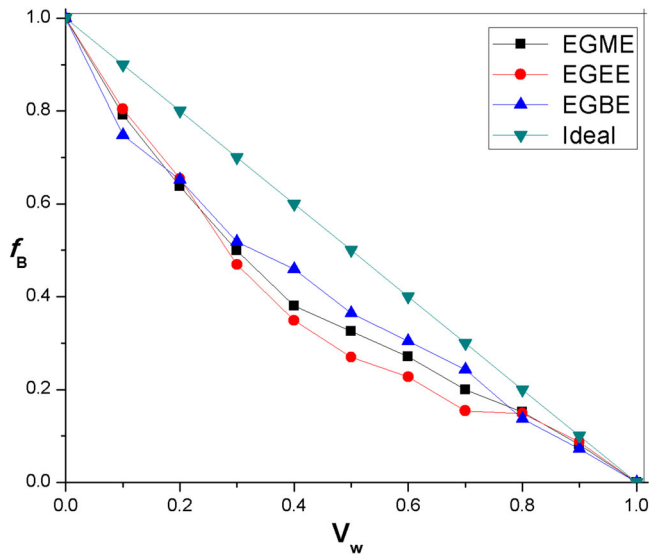


Figure 7. Bruggeman factor (f_B) versus volume fraction of water (V_w) at 25 °C.

where, $(1/\tau)^E$ is the excess inverse relaxation time which corresponds to broadening of dielectric spectral lines, the subscript w denotes the water, and V_w represents mole fraction of water in GE.

The information regarding dipolar rotational time from excess inverse relaxation time $(1/\tau)^E$ is as follows [13]

- i. $(1/\tau)^E = 0$ indicates that there is no interaction between the constituents of mixture, so their dipolar rotational time do not change.
- ii. $(1/\tau)^E > 0$ indicates that relaxation time effectively get reduced due to solute-solvent interaction resulting in faster rotational motion, that is, the field cooperates in the rotation of dipoles.
- iii. $(1/\tau)^E < 0$ indicates that relaxation time effectively gets enhanced resulting in slower rotational field.

In this study, the values of excess inverse relaxation time $(1/\tau)^E$ are found to be negative for all concentration shown in Fig. 6, which indicates that the rotation of dipoles is slow due to solute-solvent interaction formed by the hydrogen bonded structures which produces a field in such a way that the effective dipole rotation is hindered. From the Fig. 6 the value of Excess inverse dielectric relaxation $(1/\tau)^E$ are $EGME > EGEE > EGBE$.

3.6. Bruggeman factor

The static permittivity of binary mixtures can be obtained by using the Bruggeman mixture formula [26].

$$f_B = \left(\frac{\epsilon_{0m} - \epsilon_{wat}}{\epsilon_{oA} - \epsilon_{wat}} \right) \left(\frac{\epsilon_{oA}}{\epsilon_{om}} \right)^{1/3} = 1 - V_w \quad (6)$$

where, ϵ_{0m} , ϵ_{0A} , and ϵ_{0wat} are the static dielectric constant of a mixture, solute (GE) and water respectively and V_w is the volume fraction of water in GE. Bruggeman showed the linear relationship between the Bruggeman factor (f_B) and volume fraction of water but the experimental values behaves non-linearly which is show in Fig. 7. The nonlinear relationship of the experimental values is explained by the modified Bruggeman expression which is given as [27]:

$$f_B = \left(\frac{\epsilon_{0m} - \epsilon_{0wat}}{\epsilon_{0A} - \epsilon_{0wat}} \right) \left(\frac{\epsilon_{0A}}{\epsilon_{0m}} \right)^{1/3} = 1 - [a - (a - 1)V_w]V_w \quad (7)$$

where, “a” is the arbitrary parameter whose value is 1 which means the mixture is ideal that is there is no interaction between the solute and solvent. The calculated value of “a” for EGME, EGEE and EGBE–water mixture is determined using least square fit method and it is found to be 2.04, 1.83, and 1.70, respectively, at 25 °C. The larger value of “a” suggests that effective volume fraction of solute in water reduced very much.

4. Conclusion

The temperature dependent complex permittivity spectra of glycol ethers (GE) water mixture have been studied using Time Domain Reflectometry technique in the frequency range 10 MHz to 50 GHz. The dielectric permittivity spectra of GE-water are described by Cole-Davidson model. The negative values of Excess permittivity (ϵ_0)^E for EGBE > EGEE > EGME indicates as increase in chain length GE-water mixture and shows an experimental confirmation of certain interaction among the unlike molecules through bonding. The value of effective Kirkwood correlation factor is EGME > EGEE > EGBE and greater than one which confirms the parallel alignment of molecules. The modified Bruggeman equation confirms the interaction between the constituents of mixture.

Acknowledgment

This work was supported by the Department of Science and Technology, New Delhi (Project no. DST PROJECTSB/S2/LOP-032/2013) as well as School of Physical Sciences, SRTM University, Nanded, India for providing necessary facilities.

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Potential of Industrial waste zinc slag to stabilize weak soil.

¹Rashmi G. Bade, ²Taresh Patil, ³Sumera Khanam, ⁴Shahid Quazi, ⁵Rishabh Tiwari

¹Assistant Professor, ²Student of Graduation, ³Student of Graduation, ⁴Student of Graduation, ⁵Student of Graduation

¹Department of Civil Engineering,

¹Anjuman College of Engineering & Technology, Nagpur, (M.S.), India

Abstract: The rapid growth of industrialization generates a large quantity of waste. Along with iron production, large amount of iron slag is generated. This waste of slag can be mixed with the soil as stabilizer to improve the strength of the soil and soil behaviour. Many areas in our country there is most of Black cotton soil is available. Black cotton soil is very poor in strength and highly compressible and has extremely low bearing capacity. The admixture iron slag added in the soil to improve soil behaviour and its strength. The tests performed for testing geotechnical properties are water content test, specific gravity test, sieve analysis test, liquid limit test, and plastic limit test. These tests are showed the results of iron slag improve the geotechnical properties of the soil samples and these waste material iron slag is useful for our black cotton soil.

I. INTRODUCTION

Black cotton soil is very favorable for the cultivation of cotton. It is called black cotton soil because it is black in color formed by the presence of titaniferous magnetite. Black cotton soils have montmorillonite clay mineral which shows swelling and shrinkage behavior on wetting and drying. The black cotton soils are highly compressible and have extremely low bearing capacity. We can see the cracks in many lands having black soil; this is because during the dry season they form the crack for circulation of air. Though it is very good soil for cultivation but it problematic soil for civil engineering work due to its swelling and shrinkage property In this research an approach is made towards the way of improvement in the various geotechnical properties of black cotton soil such as index properties, swelling characteristics and strength characteristics by blending it waste material.

The environmental problems are very common in India due to generation of industrial by products. Due to industrialization enormous by products are produced and to utilize these by products is the main challenge faced in India. Iron slag is one of the industrial by product from the iron and steel making industries. The history of the use of iron slag a long way. Considering the specificity of physical and chemical properties of iron slag This study show that using iron slag with black cotton soil in different percentage i.e 5%, 10%, 15% resulted in plasticity index of soil. The strength of soil increase rapidly with increase the iron slag content and the optimum value P.I is obtained at 15% The result confirm that the use of iron slag overcome the pollution in the environment. The result shows that the iron slag added to the black cotton soil had greater strength.

II. LITERATURE REVIEW

The physical properties of Iron slag according to National Slag Association (NSA) Environmental Science & Technology [5] are angular shape, generally well-graded material, has a high degree of internal friction angle and high shear strength. Iron slag has high bulk specific gravity and usually less than 3% water absorption as well as dry unit weight 1600 – 1920 kg/m³, National Slag Association (NSA) Environmental Science & Technology. According to Proctor, the slag particle size is generally larger than silt or clay, which has an upper size 0.075 mm, and smaller than gravel which has a lower limit of 2 to 5 mm. The mechanical properties of Iron slag include good abrasion resistance, good soundness characteristics, and high bearing strength, Zumrawi and Khalill. Due to these mechanical properties Iron slag can be used as soil stabilization product in construction projects

The use of Iron slag has been established in a number of applications in the construction industry. Slag can be applied as a material in cement, as road base course material due to large bearing capacity and excellent in wear resistance as aggregate material for the asphalt concrete mixture as fine and coarse aggregates increment concrete mixture as improvement weak soil due to high angle of internal friction and high particle density.

III. MATERIALS USED

- **Soil:** Expansive black cotton soil collected from Vaishali Nagar, Nagpur. The properties of the expansive clay used in this investigation are given below:

Table: 1

Properties	Soil
Grain size distribution	425 micron
Specific gravity	1.56
Liquid limit	49.85%
Plastic limit	32.12%
Plasticity Index	17.73%

- **IRON SLAG:** Industrial waste product approx 5 kgs.

IV. TESTS CONDUCTED

Iron Slag in addition to the mixture, 5% of Iron Slag was also added to the soil mixture by weight. The percentage of Soil was maintained at a constant 5% by weight of the expansive soil sample, whereas the mixture of Iron Slag was increased in multiple percentages of 5% to obtain test samples on which tests were carried out and their properties studied. The proportions of Iron Slag used along with the soil in the study are 5%, 10%, 15% respectively. The following Tests were performed in order to check the properties of the expansive soil.

• Liquid limit

The liquid limit (LL) is conceptually defined as the water content at which the behavior of a clayey soil changes from the plastic state to the liquid state. However, the transition from plastic to liquid behavior is gradual over a range of water contents, and the shear strength of the soil is not actually zero at the liquid limit. We have taken magnesium sulphate by 10 % by the weight of soil.

Result: the liquid limit of soil comes out to be 51% with standard field soil.

• Plastic limit

All the tests were conducted in the controlled conditions as per the standard procedures given in the respective codes of Indian Standard.

V. RESULTS AND DISCUSSION

- **Liquid Limit:** The liquid limit (LL) is often conceptually defined as the water content at which the behaviour of a clayey soil changes from plastic to liquid.
- **Plastic Limit:** The plastic limit (PL) is defined as the water moisture content at which a thread of soil with 3.2mm diameter begins to crumble.

Table: 2

S.No.	Sample	Liquid Limit	Plastic Limit	Plasticity Index
1	Only Black cotton soil	49.14%	32.12%	17.73%
2	Soil Sample+ 5% Iron Slag	44.8%	30.59%	14.21%
3	Soil Sample + 10% Iron Slag	36.81%	25.25%	10.93%
4	Soil Sample + 15% Iron Slag	32.04%	23.29%	8.75%

From the above it shows that the Plasticity Index (PI) decreases with increase in the Iron slag content from 5% to 15%.

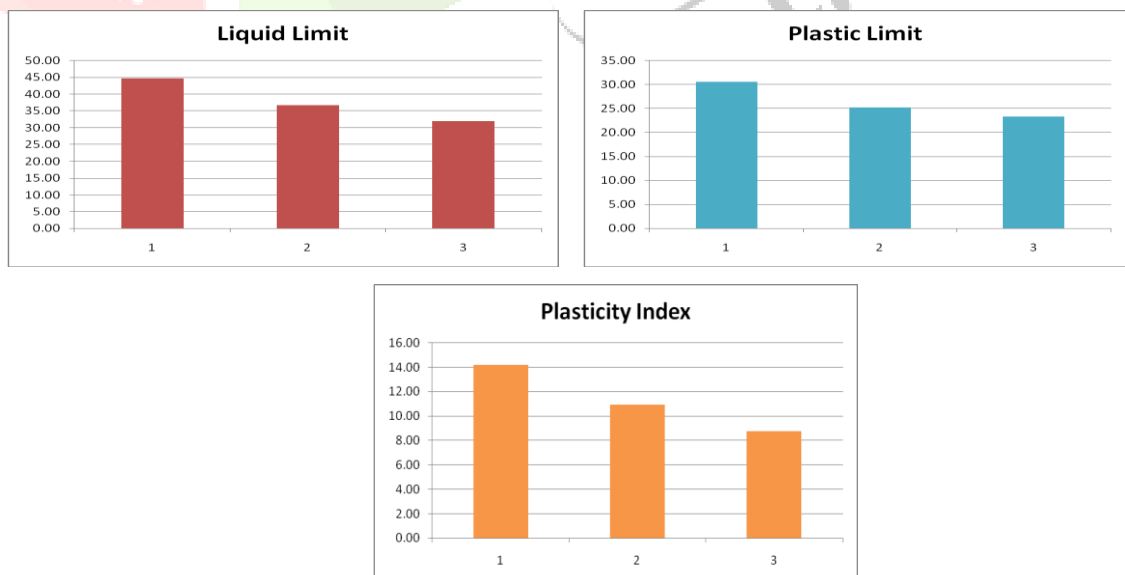
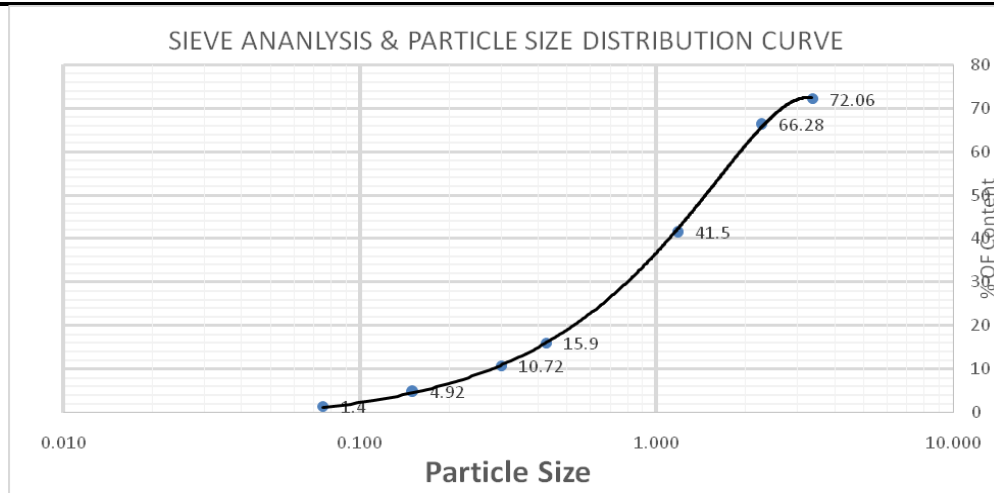


FIGURE 1. Graph representing Combine Liquid limit, Plastic limit and Plasticity Index of Potassium Chloride additive.



$$Cu = 0.63, Cc = 6.2$$

FIGURE 2. Graph representing Sieve analysis curve.

From graph it is seen that the soil is well graded soil.

VI. CONCLUSION

From the result it is clear that & addition of iron slag in expansive soil is possible and knows positive results with respect to improving Plasticity of soil. By using of iron slag resulted increase of plastic limits and decreases in Plasticity Index. The plasticity Index decreased from 17.73 to 8.75 of interacted soil sample us 17.73 which reduces gradually. The Plasticity Index from 17.73 to 8.75.

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ANALYSIS OF SHEAR WALL FRAMED BUILDING FOR DIFFERENT LOCATION UNDER SEISMIC CONDITION

¹ Mohan Kanojiya, ²Vaibhav Assudani, ³Anchal Rahate, ⁴Nazeef Afzal, ⁵Prof. Sayyed Aamir Hussain

¹UG Student, ²UG Student, ³UG Student, ⁴UG Student, ⁵Professor

¹Department of Civil Engineering,

¹ Anjuman College of Engineering & Technology, Nagpur, India

Abstract: In seismic design of multistoried building, shear walls are most common structure adopted to make the structure earthquake resistant. These are constructed to counteract the lateral loads caused by wind load and seismic loads. Shear walls provide adequate stiffness to the structure. So that the lateral drift will be in limits. Generally shear walls are the vertical cantilever which acts as a column. This investigation presents the study and comparison of earthquake behaviour of buildings with and without shear wall using STAAD Pro. In this study, reinforced concrete buildings are analyzed by changing the various position of shear wall with different locations considering various parameters such as story drift, lateral displacement and others.

Index Terms - Seismic analysis, Shear wall, Story drift, STAAD Pro V8i.

I. INTRODUCTION

Now-a-days multistoried buildings are rapidly constructed everywhere in the world and they are more slender and more sway than earlier buildings. The deformation of tall structures is composed of axial, bending, torsion, transverse shear. In recent period many new concepts and methods are adopted in field of seismic design. In general, RCC structures are constructed to control the lateral displacement. Shear walls are most common structural system which provides lateral stiffness and stability against the lateral loads. In frame structure, the shear walls behaviour is similar to the column which is subjected to combined flexure and axial load. So these are also called flexural members. Shear walls require proper designing and detailing in high seismic regions. Therefore it is necessary to determine the efficient, effective and ideal location of shear wall. This paper represents the analysis of structure with the effect of shear wall position on lateral displacement and story drift in RC frames. The analysis of shear wall was performed by STAAD Pro V8i using surface elements.

II. LITERATURE REVIEW

Shear wall system is most significantly used for tall structure in earthquake prone area. So, there are many research work was done in various aspects of shear walls which are as follows:

P.P. Chandurkar et.al. (2013) presented a study on “seismic analysis of RCC building with and without shear wall”. The paper determined the lateral displacement, story drift ratio, concrete quantity, total cost, % of Ast in column required of tenth storied building calculated by placing the shear wall in different location. From that analysis, the building with shear in short span at corner (model 4) is economical as compared to others.

Wakchaure M.R et.al.(2012) presented a study on “earthquake analysis of high rise building with and without infill walls”. In this analysis G+9, RCC frame building with the effect of masonry infill wall was studied. The top story displacement of high rise building reduces due to infill walls.

K.LovaRaju et.al.(2015) studied the effective location of shear wall on performance of building frame subjected to earthquake load. The pushover analysis for various models observed the structure with appropriate placed of shear wall has more significant of displacement and base shear

III. BUILDING MODELLING

In the present study, a RCC G+10 storied residential building with 3 meters height for each story is modeled. This residential building is designed as a plan of 24 x 30 m with a lift at centre. M25 grade of concrete and Fe 500 structural steel is used. The structure is supported as fixed at its base. The buildings are modeled and analyzed by using the software STAAD Pro V8i. Models are studied four zone IV comparing story drift, maximum lateral displacement etc. The study of models is designed by placing the shear wall in different location with the thickness of 250mm.

Model 1- BARE FRAME

Model 2- POSITION 'A'

Model 3- POSITION 'B'

Model 4- POSITION 'C'

Model 5- POSITION 'D'

3.1 Physical Details

The preliminary data taken for the analysis is as follows:- All the dimensions in mm. • No of stories: G+10

- Storey height: 3 m
- Beam size in all direction: 300 x 500 mm²
- Column size: 400 x 500 mm²
- Thickness of the slab: 150mm
- Grade of concrete: M25
- Grade of steel: Fe500
- Density of concrete: 25 KN/m³
- Density of brick: 20 KN/m³

3.2 Building Plans

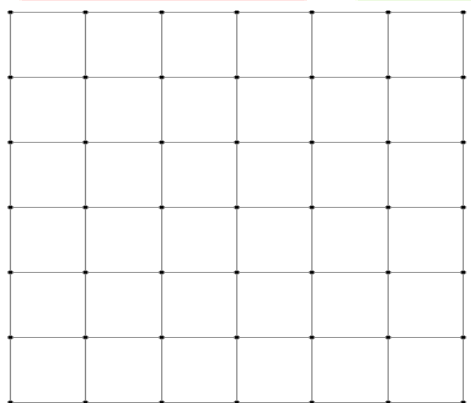


Fig 1:- Plan of Bare Frame Building



Fig 2:- Plan of Shear Wall At Position 'A'

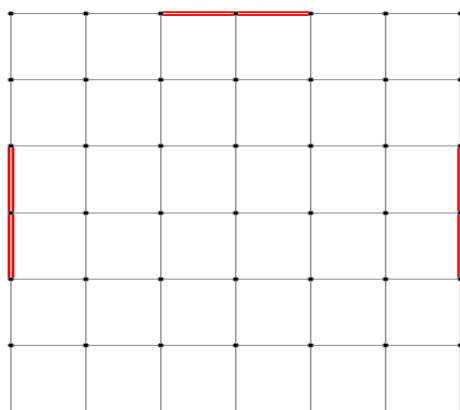


Fig 3:- Plan of Shear Wall At Position 'B'



Fig 4:- Plan of Shear Wall At Position 'C'

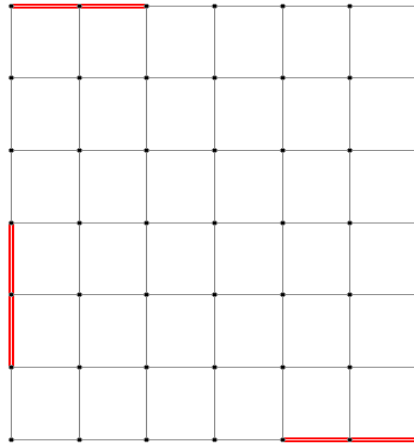


Fig 5:- Plan of Shear Wall At Position 'D'

Methodology

The loading of building is subjected to dead load and live load as per IS 875 (Part 1) (Part 2): 1987 respectively. As per Indian Code of Practice IS 1893 (Part 1): 2016, design the multistoried residential building against earthquake and wind loads. The member forces are calculated with load combination given in IS 456: 2000. Seismic provision for this building:

- Seismic zone : IV
- Types of the frame : Special Moment Resisting Frame
- Response reduction factor (R) : 5.0
- Importance factor (I) : 1.2
- Soil type : Medium soil
- Damping ratio : 5%

LOAD CASES & COMIBATIONS

LOAD CASE	DESCRIPTION
1 EQX+	Seismic in X +ve direction
2 EQX-	Seismic in X -ve direction
3 EQZ+	Seismic in Z +ve direction
4 EQZ-	Seismic in Z -ve direction
5 D.L	Dead Load
6 L.L	Imposed Load
7 RSX	Response spectrum in X direction
8 RSZ	Response spectrum in Z direction

NO. LOAD COMBINATIONS

- 9 D.L+L.L
- 10 1.5(D.L+L.L)
- 11 1.2 (D.L+L.L+EQ X+
- 12 1.2 (D.L+L.L+EQX-)
- 13 1.2 (D.L+L.L+EQZ+)
- 14 1.2 (D.L+L.L+EQZ-)
- 15 1.5 (D.L+EQX+)
- 16 1.5 (D.L+EQX-)
- 17 1.5 (D.L+EQZ+)
- 18 1.5 (D.L+EQZ-)
- 19 0.9 D.L + 1.5 EQ X+
- 20 0.9 D.L + 1.5 EQ X-
- 21 0.9 D.L + 1.5 EQ Z+
- 22 0.9 D.L + 1.5 EQ Z-
- 23 D.L+0.8LL+0.8EQX
- 24 D.L+0.8LL-0.8EQX
- 25 D.L+0.8LL+0.8EQZ
- 26 D.L+0.8LL-0.8EQZ
- 27 D.L+EQX
- 28 D.L-EQX
- 29 D.L+EQZ
- 30 D.L-EQZ
- 31 D.L+0.25LL

IV. ANALYSIS AND RESULT

The structural analysis of all models with and without shear walls have been done by using STAAD Pro. The comparison of different parameters such as maximum lateral displacement, story drift and other parameters are studied.

1. BASE SHEAR CRITERIA

Frame Type	Load Case	Storey	Levels	Max. Storey Shear in X direction	Max. Storey Shear in Z direction
Bare Frame	RSX	Base	-3.00	3589.04	3589.32
A	RSX	Base	-3.00	3752.05	3771.39
B	RSX	Base	-3.00	3954.24	4261.90
C	RSX	Base	-3.00	4294.04	4268.96
D	RSX	Base	-3.00	4849.38	5064.36

POSITION 'B' 'C' & 'D' ARE EFFECTIVE IN DEFLECTION CRITERIA

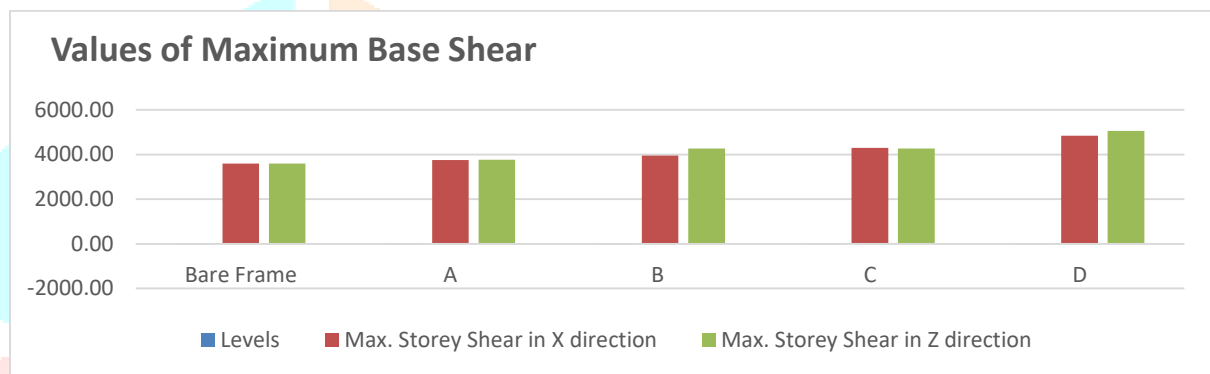


Fig 6:- Graph for Maximum Base Shear

2. DEFLECTION CRITERIA

DISPLACEMENT VALUES BY STAAD PRO									
S.No.	Frame type	Total building height	Node No.	Load Combination	Max. Displacement in 'X' Direction	Max. Displacement in 'Z' Direction	Max. permissible displacement allowed - H/500	Check for X direction	Check for Z direction
---	---	(m)	---	(L/C)	(mm)	(mm)	(mm)	---	---
1	Bare Frame	33	625	DL+EQ	66.38	62.39	66	NOT OK	OK
2	A	33	625	DL+EQ	34.24	27.73	66	OK	OK
3	B	33	625	DL+EQ	27.27	29.15	66	OK	OK
4	C	33	625	DL+EQ	37.11	31.04	66	OK	OK
5	D	33	627	DL+EQ	30.55	21.49	66	OK	OK

POSITION 'B' & 'D' ARE EFFECTIVE IN DEFLECTION CRITERIA

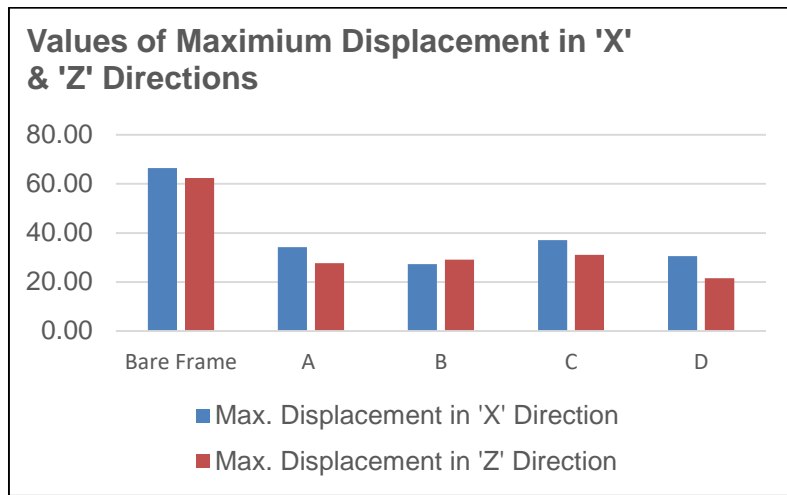


Fig 7:- Graph for Maximum Displacement

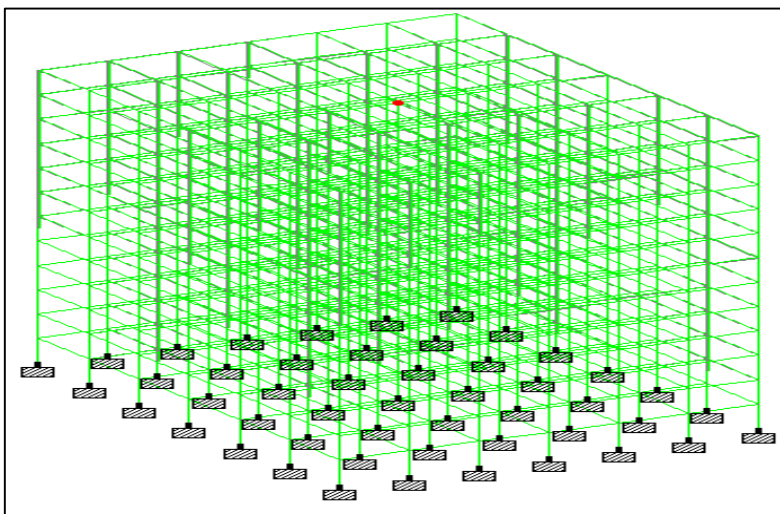


Fig 8: Deflection In Building

3. STOREY DRIFT CRITERA

STOREY DRIFT CALCULATIONS											
S.No.	Frame Type	Node No.	Load Combination	Max. Displacement in 'X' Direction (dx)	Max. Displacement in 'Z' Direction (dz)	Floor to Floor Height	Storey drift (Dx)	Storey drift (Dz)	Storey drift limitation (0.004H)	Check for X direction	Check for Z direction
---	---	(m)	(L/C)	(mm)	(mm)	(m)	(mm)	(mm)	(mm)	---	---
1	Bare Frame	20	DL+EQ	4.89	4.08	3.00	4.89	4.08	12	OK	OK
		120	DL+EQ	11.89	10.62	3.00	7.00	6.54	12	OK	OK
		189	DL+EQ	19.11	17.55	3.00	7.22	6.93	12	OK	OK
		218	DL+EQ	26.31	24.47	3.00	7.20	6.92	12	OK	OK
		267	DL+EQ	33.37	31.24	3.00	7.06	6.77	12	OK	OK
		316	DL+EQ	40.18	37.74	3.00	6.81	6.50	12	OK	OK
		365	DL+EQ	46.59	43.85	3.00	6.41	6.11	12	OK	OK
		414	DL+EQ	52.44	49.39	3.00	5.85	5.54	12	OK	OK
		463	DL+EQ	57.55	54.20	3.00	5.11	4.81	12	OK	OK
		512	DL+EQ	61.70	58.08	3.00	4.15	3.88	12	OK	OK
2	A	561	DL+EQ	64.68	60.83	3.00	2.98	2.75	12	OK	OK
		610	DL+EQ	66.38	62.39	3.00	1.70	1.56	12	OK	OK
		37	DL+EQ	0.91	0.70	3.00	0.91	0.70	12	OK	OK
		135	DL+EQ	2.67	2.04	3.00	1.76	1.34	12	OK	OK
		184	DL+EQ	5.04	3.86	3.00	2.37	1.82	12	OK	OK
		233	DL+EQ	7.87	6.06	3.00	2.83	2.20	12	OK	OK
		282	DL+EQ	11.00	8.52	3.00	3.13	2.46	12	OK	OK
		331	DL+EQ	14.31	11.16	3.00	3.31	2.64	12	OK	OK
		380	DL+EQ	17.71	13.90	3.00	3.40	2.74	12	OK	OK
		429	DL+EQ	21.09	16.66	3.00	3.38	2.76	12	OK	OK
478	DL+EQ	24.38	19.39	3.00	3.29	2.73	12	OK	OK		
527	DL+EQ	27.53	22.04	3.00	3.15	2.65	12	OK	OK		
576	DL+EQ	30.50	24.57	3.00	2.97	2.53	12	OK	OK		
625	DL+EQ	33.28	26.96	3.00	2.78	2.39	12	OK	OK		

STOREY DRIFT CALCULATIONS											
S.No.	Frame Type	Node No.	Load Combination	Max. Displacement in 'X' Direction (dx)	Max. Displacement in 'Z' Direction (dz)	Floor to Floor Height	Storey drift (Dx)	Storey drift (Dz)	Storey drift limitation (0.004H)	Check for X direction	Check for Z direction
---	---	(m)	(L/C)	(mm)	(mm)	(m)	(mm)	(mm)	(mm)	---	---
3	B	37	DL+EQ	0.77	0.58	3.00	0.77	0.58	12	OK	OK
		135	DL+EQ	2.15	1.60	3.00	1.38	1.02	12	OK	OK
		184	DL+EQ	3.99	2.95	3.00	1.84	1.35	12	OK	OK
		233	DL+EQ	6.19	4.57	3.00	2.20	1.62	12	OK	OK
		282	DL+EQ	8.64	6.38	3.00	2.45	1.81	12	OK	OK
		331	DL+EQ	11.24	8.33	3.00	2.60	1.95	12	OK	OK
		380	DL+EQ	13.93	10.36	3.00	2.69	2.03	12	OK	OK
		429	DL+EQ	16.62	12.42	3.00	2.69	2.06	12	OK	OK
		478	DL+EQ	19.27	14.45	3.00	2.65	2.03	12	OK	OK
		527	DL+EQ	21.82	16.44	3.00	2.55	1.99	12	OK	OK
576	DL+EQ	24.24	18.34	3.00	2.42	1.90	12	OK	OK		
625	DL+EQ	26.50	20.14	3.00	2.26	1.80	12	OK	OK		
4	C	37	DL+EQ	1.02	0.78	3.00	1.02	0.78	12	OK	OK
		135	DL+EQ	3.06	2.36	3.00	2.04	1.58	12	OK	OK
		184	DL+EQ	5.83	4.52	3.00	2.77	2.16	12	OK	OK
		233	DL+EQ	9.10	7.11	3.00	3.27	2.59	12	OK	OK
		282	DL+EQ	12.67	9.98	3.00	3.57	2.87	12	OK	OK
		331	DL+EQ	16.38	13.02	3.00	3.71	3.04	12	OK	OK
		380	DL+EQ	20.11	16.12	3.00	3.73	3.10	12	OK	OK
		429	DL+EQ	23.73	19.19	3.00	3.62	3.07	12	OK	OK
		478	DL+EQ	27.18	22.17	3.00	3.45	2.98	12	OK	OK
		527	DL+EQ	30.39	25.01	3.00	3.21	2.84	12	OK	OK
576	DL+EQ	33.34	27.68	3.00	2.95	2.67	12	OK	OK		
625	DL+EQ	36.04	30.16	3.00	2.70	2.48	12	OK	OK		

STOREY DRIFT CALCULATIONS											
S.No.	Frame Type	Node No.	Load Combination	Max. Displacement in 'X' Direction (dx)	Max. Displacement in 'Z' Direction (dz)	Floor to Floor Height	Storey drift (Dx)	Storey drift (Dz)	Storey drift limitation (0.004H)	Check for X direction	Check for Z direction
---	---	(m)	(L/C)	(mm)	(mm)	(m)	(mm)	(mm)	(mm)	---	---
1	Bare Frame	20	DL+EQ	4.89	4.08	3.00	4.89	4.08	12	OK	OK
5	D	39	DL+EQ	0.80	0.58	3.00	0.80	0.58	12	OK	OK
		137	DL+EQ	2.27	1.60	3.00	1.47	1.02	12	OK	OK
		186	DL+EQ	4.25	2.96	3.00	1.98	1.36	12	OK	OK
		235	DL+EQ	6.83	4.58	3.00	2.38	1.62	12	OK	OK
		284	DL+EQ	9.31	6.40	3.00	2.68	1.82	12	OK	OK
		333	DL+EQ	12.18	8.36	3.00	2.87	1.96	12	OK	OK
		382	DL+EQ	15.16	10.40	3.00	2.98	2.04	12	OK	OK
		431	DL+EQ	18.17	12.46	3.00	3.01	2.06	12	OK	OK
		480	DL+EQ	21.15	14.51	3.00	2.98	2.05	12	OK	OK
		529	DL+EQ	24.04	16.51	3.00	2.89	2.00	12	OK	OK
578	DL+EQ	26.82	18.42	3.00	2.78	1.91	12	OK	OK		
627	DL+EQ	29.43	20.22	3.00	2.61	1.80	12	OK	OK		

POSITION 'B' & 'D' ARE EFFECTIVE IN DEFLECTION CRITERIA

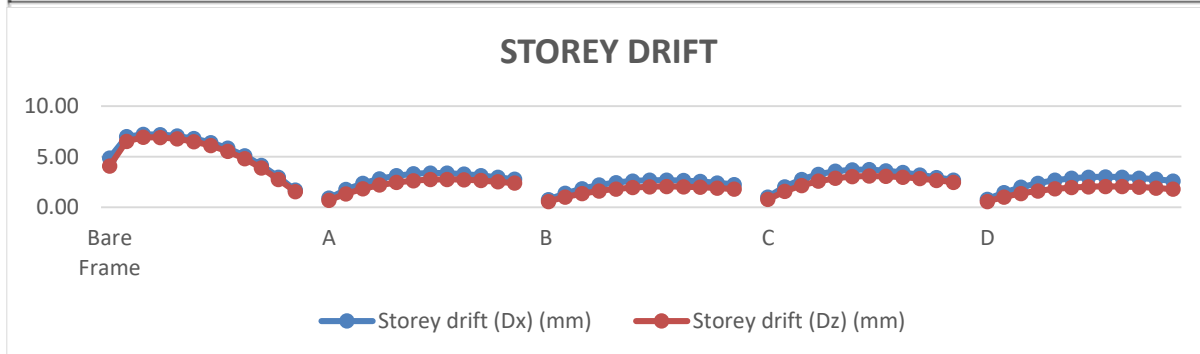


Fig 9: Graph for Maximum Storey Drift

4. FUNDAMENTAL NATURAL PERIOD CRITERIA

MODE	Maximum Fundamental Natural Period (T) in sec.				
	Bare Frame	A	B	C	D
1	2.245	1.452	1.292	1.533	1.341
2	2.175	1.296	1.120	1.384	1.123
3	2.038	0.904	0.842	1.076	0.872
4	0.738	0.383	0.339	0.419	0.344
5	0.711	0.329	0.289	0.362	0.290
6	0.670	0.219	0.212	0.274	0.215
7	0.428	0.200	0.197	0.198	0.198
8	0.409	0.188	0.186	0.196	0.188
9	0.391	0.186	0.180	0.186	0.181
10	0.298	0.179	0.173	0.181	0.174
11	0.280	0.174	0.172	0.171	0.173
12	0.271	0.172	0.163	0.170	0.163
13	0.225	0.168	0.160	0.167	0.161
14	0.207	0.161	0.160	0.160	0.161
15	0.203	0.160	0.160	0.158	0.159

POSITION 'B' & 'D' ARE EFFECTIVE IN DEFLECTION CRITERIA

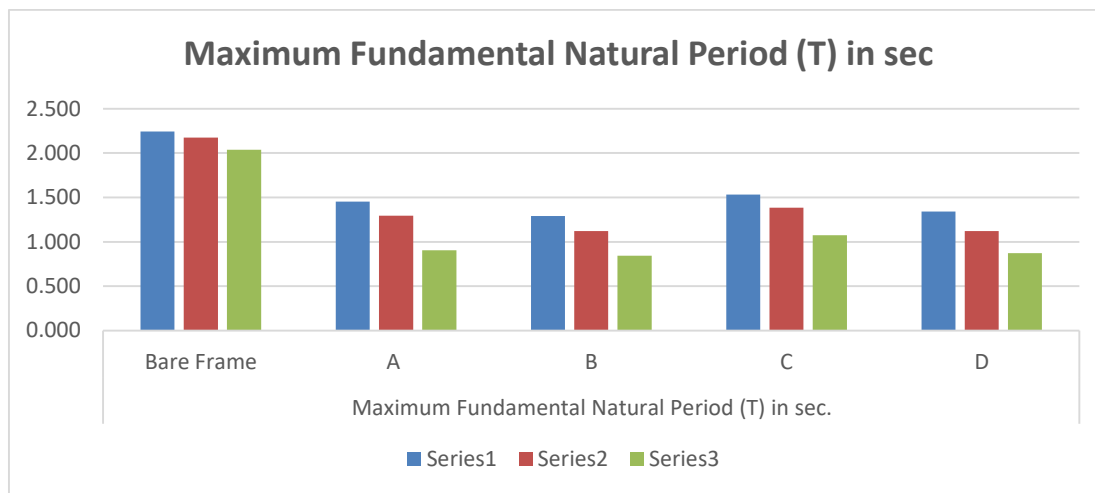


Fig 10: Graph for Maximum Natural Period

V. CONCLUSION

- From the comparison of the result it is found that the effective location of shear wall is found in the corner of the building.
- It can be concluded the provision of the shear wall decrease the time period comparatively with the bare frame.
- To provide shear wall increase the seismic performance of the structure.
- Tested model are A,B,C,D & Bare frame (without shear wall). In this tested models we observed that two of them B & D are effectively resist the criteria story drift than bare frame.

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A REVIEW ON EXPANDED POLYSTYRENE MONOLYTIC PANELS – EPS

Prof. Aquib Zafar Ansari ^a, Priyanka Gautam ^b, Zain Khan ^c, Suraj Shiwande ^d, Somesh Thakur ^e, Pranay Ratnakar Thombare ^f, Devendra Shinde ^g

^aAssistant-Professor, Anjuman College of Engineering & Technology, Nagpur, Maharashtra, India

^{b,c,d,e,f,g}UG Student, Anjuman College of Engineering & Technology, Nagpur, Maharashtra, India

ABSTRACT

The need for hours is a requirement for sustainability in the construction industry. Urbanization is accelerating in India, resulting in increased housing demand as well as a slew of issues such as pollution and unsustainable construction techniques. Traditional construction methods, which require a significant amount of time, materials, and energy, can achieve the same results. Natural resources and energy are also in short supply on a global scale. As a result, for better natural resource optimization, construction approaches and materials that reduce construction costs, CO₂ emissions, and construction time while using the least amount of energy are required. A wide variety of environmentally friendly building materials are now available. Structural Insulated Panels, Plastic Composite Lumber, Vacuum Insulation Panels, Recycled Steel, Insulating Concrete Forms, Plant-based Polyurethane Foam, Straw Bales, Structural Insulated Panels, Plastic Composite Lumber, Vacuum Insulation Panels, Recycled Steel, Insulating Concrete Forms, Plant-based Polyurethane Foam, Straw Bales, Structural Insulated Panels, Plastic Composite Lumber, Vacuum In recent years, research has been carried out all over the world to address specific challenges, and numerous innovative materials and technologies have been developed. One such building technology is expanded polystyrene sheet, or EPS. This research paper aims to investigate the material aspects that contribute to sustainability, with a focus on various parameters such as structural safety, cost effectiveness, and ease of construction and maintenance, as well as indoor comfort, using some real-time case studies and simulation techniques.

Keywords: Sustainable material; Expanded polystyrene sheet; Cost effective; Thermal Performance

1. MAIN TEXT

The use of Expanded Polystyrene Panels (EPS) in the construction of reinforced concrete buildings introduces a ready-made technology. The EPS core Panel system is a modern, efficient, safe, and cost-effective building solution. These panels can be load-bearing as well as non-load-bearing components. [11].

The EPS core panel is a three-dimensional panel composed of a welded wire space frame with a truss concept for stress transfer and rigidity and a polystyrene insulation core. The panel is in place, with shotcrete on both sides [9]. In terms of the management aspect of sustainability, project managers and decision makers will benefit from prioritising their management and maintenance processes based on importance, availability of funds, and so on [10]. Shotcrete is applied to the panels assembled on the job site, which gives the structure its bearing capacity. A growing gap in supply and demand for various materials has been identified in a study conducted by the Material Consumption Patterns in India in 2016 [7]. The EPS panel is made up of welded reinforcing meshes of high-strength wire, diagonal wire, and self-extinguishing expanded polystyrene uncoated concrete that are manufactured in the factory, and shotcrete is applied to the assembled panel at the construction site, which gives the structure its bearing capacity [2].

Furthermore, [9] stated that construction projects and buildings are designed and developed to meet the expectations of clients and professionals. A single panel structure may have up to four floors, whereas a double panel structure may have up to fifteen floors [6]. The finished panels are put together on-site. In this context, [3] revealed that inefficient handling and supervision of materials, as well as their storage, can cause construction delays. Unlike traditional building processes that require multiple employees to set up a wall using masonry stone and plaster, a single operator can lift and arrange the panels at their respective design positions, resulting in labour savings. [11]

The EPS panel is a versatile structural component that can be used for floors, walls, partitions, roofs, and staircases. The standard EPS panel is 1200 mm wide, 3000 mm long, and has a thickness range of 80-230 mm. The panels are finished on the job site with a minimum 30 mm thick shotcreting of cement and coarse sand in a 1:4 ratio applied under pressure. The shotcreting coat encases the EPS Core with steel welded wire mesh in the centre.

Advantages

<ul style="list-style-type: none"> • Construction Time Reduction 	<ul style="list-style-type: none"> • Integration with other systems 	<ul style="list-style-type: none"> • Cyclone Resistance
<ul style="list-style-type: none"> • Lightness, Handling, and Transportability 	<ul style="list-style-type: none"> • Fire Resistance 	
<ul style="list-style-type: none"> • Seismic Resistance 	<ul style="list-style-type: none"> • Thermal Insulation and Sound Insulation 	

2. LITERATURE REVIEW

Various literatures have been studied for experimental studies on EPS shortcreting panels and their behaviour. This chapter discusses the overview and comparison of results from various literatures. In North America, precast concrete sandwich panel (PCSP) technology has advanced gradually over the last four decades. The first non-composite prefabricated panels were made up of thick structural leaves, a layer of insulation, and non-structural leaves (Seeber et al., 1997). PCSP feature all of the desirable properties of a traditional precast concrete panel, such as durability, economy, fire resistance, vast vertical intervals between supports, and possible use as shear walls, bearing walls, and retaining walls. Furthermore, PCSP may be shifted to allow for building expansion. The panel's firm surface on both the interior and exterior provides resistance to harm and a completed product that requires no additional treatment.

The combined materials may be formed into composite panels, allowing for optimal design for a variety of applications. Individual materials' desirable qualities can be blended, while their poor ones can be removed. It achieves better strength-to-weight ratios by combining the shear strength of a lighter core material with the high compressive and tensile strength of dense leaves. The core material isolates and stabilises the outer facings during edgewise compression, torsion, or bending. The leaves are typically constructed of high-strength material and bear the principal loads. They withstand stress and compression to prevent buckling, tension failure, and impact deformation.

Pre-cast concrete sandwich panels (PCSP) are classified into three categories based on the degree of composite action accomplished (Shutt, 1997). A noncomposite sandwich panel has concrete leaves that operate independently to resist bending. Plane section behaviour is attained in each leaf, but not throughout the whole depth of the panel. A completely composite sandwich panel is one in which the two concrete leaves work together to prevent bending, allowing the panel to function as a single unit. A completely composite panel, in principle, displays plane section behaviour over its whole depth and at all places along its span. By allowing for adequate horizontal shear transmission between the leaves, full composite behaviour is accomplished. The steel mesh in the concrete leaves was linked with shear connections. The connections transfer load from the outside to the inner concrete leaves.

A partially composite sandwich panel is one in which concrete leaves work together to prevent bending at least partially. As a result, a partly composite panel resists bending to the same extent as a fully composite panel and a non-composite panel. The degree of composite action displayed by a panel may alter during the course of the panel's loading history.

Panels have received a lot of attention in the engineering world as a useful structural element. It has been employed in naval constructions as load-bearing elements (Aicher and Hofflin, 1999). However, in the building and construction business, the majority of sandwich panel research is focused to the investigation of the nonload bearing non-composite kind of PCSP (Jokela et al., 1981, Olin et al., 1984, Hopp et al., 1986 and Bush, 1998). The section will be divided into several sub-sections that will discuss the various materials used as the leaves and core, the shear connectors' influences on panel behaviour, and the structural behaviour of panels under various loadings that have been done on this type of panel, particularly in the context of their applications.

3. REVIEW OF PAST STUDIES ON PANEL

"Mechanical characteristics of EPS wall panels under shear and flexural loads," Mohammad Z. Kabir [1] worked on. EPS wall panels are utilised in the construction of external and interior load-bearing and non-load-bearing walls and floors in all types of buildings. The current study looks at the mechanical properties of EPS wall panels under static shear and bending stresses in order to gain a better understanding of their structural components. The numerical model is loaded in increments to reproduce the tests and enable for failure detection in flexural testing for vertical and horizontal bearing panels, as well as direct shear. The load displacement curves produced by finite element analysis are extremely comparable to the specimens tested. Maximum loads in flexural testing are equivalent to experimental ultimate loads for both wall and floor panels. Tension failure in the bottom leaf of concrete initiates the failure mechanism after migrating from the elastic zone at the load stage of 700 kg. The break then spreads to the top layer with a weight of 1200 kg. The bottom mesh is relinquished, and lastly, the crushing of concrete generates system instability. The maximum load is stated to be 2200 kg. The panel acts as a cantilever deep beam in direct shear analysis. EPS wall panels are utilised in the construction of external and interior load-bearing and non-load-bearing walls and floors in all types of buildings. The current study looks at the mechanical properties of EPS wall panels under static shear and bending stresses in order to gain a better understanding of their structural components. The numerical model is loaded in increments to reproduce the tests and enable for failure detection in flexural testing for vertical and horizontal bearing panels, as well as direct shear. The load displacement curves produced by finite element analysis are extremely comparable to the specimens tested. Maximum loads in flexural testing are equivalent to experimental ultimate loads for both wall and floor panels. Tension failure in lower leaves of concrete initiates the failure mechanism after migrating from the elastic zone at the load stage of 700 kg. The break then spreads to the top layer with a weight of 1200 kg. The bottom mesh is relinquished, and lastly, the crushing of concrete generates system instability. The maximum load is stated to be 2200 kg.

G. Carbonari [2] "Experimental and analytical research of the compressive behaviour of EPS sandwich panels" was completed. This study provides a thorough analysis of the behaviour of EPS sandwich panels subjected to typical load while accounting for a number of factors. Two experimental programmes were carried out for this purpose, which resulted in the suggestion of an analytical formulation to estimate the maximum load resisted. The results indicate how the height of the panel, the material qualities, the location and configuration of the reinforcement, and the position

and configuration of the reinforcement may all effect panel resistance. The eccentric location of the reinforcement should be given special consideration since it might significantly lower the maximum load resisted. Some recommendations for the best location of the reinforcement are made.

Wael MOURTAJA [3] "EPS Behavior of Shotcreted Light Weight Panel Buildings" was worked on. To build the skeleton section of an EPS construction, specially constructed two layers of reinforcement grids are employed, which are connected by zig zag form continuous cross bars. Because a layer of foam sheet has been inserted between the two sides of the reinforcing cages, shotcrete application from either side is almost effortless during the building phase. In the laboratory, a 1/2 scale model of a one-story specimen was created utilising this material and building technique and evaluated for lateral stresses. The low weight panels decrease the overall weight of the construction in half. Furthermore, the monotonic lateral loading suggests that the ultimate load obtained may be ten times greater than the design load, with all relative displacement criteria properly met.

Omid Rezaifar [4] "Nonlinear dynamic behaviour of structural frames produced with EPS wall panels with Vertical Irregular arrangement" was the project on which I worked. In this work, the hysteresis behaviour of integrated systems, RC frames, and pre-cast EPS wall sandwich panels in non-linear material characteristics is investigated. The seismic behaviour of a structure made with EPS wall panels is investigated for energy absorption and dissipation with material nonlinearities. The results compare standard bending RC frames to full box type shotcrete sandwich panel systems and demonstrate the variations in hysteresis behaviour for each system as well as any scenarios with irregularity in vertical stiffness such as soft story. Material nonlinearity was simulated using the Drucker-Prager failure criteria in this investigation. The behaviour of the FEM model was confirmed by the experimental results. Seventy-three frames were evaluated, and the results were researched and compared. A comparison of energy dissipation for stories and the effects of soft stories is offered.

M.Z.Kabir [5] worked on the project "Structural Performance of EPS Sandwich Panels Under Shear and Flexural Loading." In all forms of construction, EPS wall panels are utilised to build external and interior load bearing and non load bearing walls and floors. The purpose of this research is to better understand the structural components of EPS wall panels by investigating their mechanical properties under static shear and bending stresses. The numerical model is loaded in increments to reproduce the tests and provide failure detection in flexural testing for vertical and horizontal bearing panels, as well as direct shear. The load versus displacement curves produced by finite element analysis are extremely comparable to the specimens tested. Maximum loads in flexural testing are equivalent to experimental ultimate loads for both wall and floor panels. Tension failure in the lower Leaves of the concrete initiates the failure mechanism after migrating from the elastic zone at the load stage of 700 kg. The break then spreads to the top layer with a weight of 1200 kg. The bottom mesh is relinquished, and eventually, the system becomes unstable due to the crushing of concrete. The maximum load is stated to be 2200 kg. The panel acts as a cantilever deep beam in direct shear analysis.

Dr. Jasim M. AL-Khafaji [6] worked on the project "Structural Behavior of Normal and High Strength Concrete Wall Panels Subjected to Axial Eccentric Uniformly Distributed Loading." Concrete wall panels are subjected to axial eccentric distributed loads in this study; as a result of this form of loading, concrete wall panels react and fail in some way. There are several variables that influence the structural behaviour of concrete wall panels. This study presents an experimental investigation of the structural behaviour of concrete wall panels subjected to axial eccentric distributed loading; it also assesses the effect of parameters such as slenderness ratio (H/t), aspect ratio (H/L), and concrete strength on the behaviour of concrete wall panels. The experimental programme includes testing fifteen concrete wall panels hinged at the top and bottom with free sides by applying the load axially with eccentricity equal to ($t/6$); these panels are divided into five groups, each group consists of three panels with slenderness ratio (H/t) equal to (20, 25, 30) for each panel, three groups of normal concrete strength with aspect ratio (H/L) equal to (1.0, 1.5, 2.0) for each group, and the other two groups are of high strength. Concrete wall panel deflections are determined by the slenderness ratio (H/t), aspect ratio (H/L), and concrete strength. The aspect ratio (H/L) has a large influence on the failure mode of concrete wall panels; panels with a low aspect ratio prefer to crush, whereas panels with a high aspect ratio tend to buckle.

Nathan Koekoek [7] Sandwich panel technology and Easy panel provide a lot of benefits over traditional onsite production, as demonstrated in this research. Easy Panel was created to take use of the benefits of sandwich panel technology - strength combined with low weight - in line with the unique demands of property building. Aside from the general benefits, Easy panel construction streamlines the production process and supply chain, allowing for the greatest utilisation of both onsite and offshore production advantages. This results in increased efficiency and speed. Fewer resources are wasted, and projects are completed faster, providing for a faster return on investment. Society benefits from these advantages as well, because they have a lower environmental effect as a result of more efficient production and greater insulation. Furthermore, the Easy panel franchising model of turn-key delivery enables the ability to immediately join a local market when demand is identified, reducing possible shipping bottlenecks. All of this suggests that the negative implications of prefab offsite manufacture may be mitigated – or perhaps eliminated.

Tarek K. Hassan and Sami H. Rizkalla [8] Three different precast concrete sandwich wall panels, reinforced with carbon-fiber-reinforced-polymer shear grid and constructed using two different types of foam, expanded polystyrene (EPS) and extruded polystyrene (XPS), were selected from the literature to validate the proposed approach. The study findings showed that the proposed technique is compatible with the actual behaviour of the panels since the projected stresses compared well with the observed values at all load levels for the individual panels. Aside from that, the method is useful for determining the degree of composite interaction at various load levels for different panels at any given curvature. To compute the nominal moment capacity of EPS or XPS wall panels as a function of the maximum shear force created at the contact, a simple design chart is supplied. To compute the nominal moment capacity of EPS and XPS foam-core panels at various degrees of composite interaction, a simpler design chart is presented. The chart is solely valid for the present study's panel arrangement, shape, materials, and reinforcement. It may, however, be simply made for other panels. The graph depicts the impact of composite interaction on induced curvature.

Bernard A. Frankl et.al. [9] Six precast, prestressed concrete sandwich wall panels were developed and tested for flexural response under combined vertical and lateral stresses. The panels in the research were made with two distinct types of insulation: expanded polystyrene (EPS) insulation and extruded polystyrene (XPS) insulation. The chosen EPS insulation had a nominal density of 16 kg/m³ and a notional compressive strength of 90 KN, according to the manufacturer. The XPS insulation used had a nominal density of 29 kg/m³ and a nominal compressive strength of 170 KN. The panels measured 6.1 m 3.7 m, were 200 mm thick, and were made up of three layers. The flexural properties of six full-scale insulated

precast, prestressed concrete sandwich wall panels were studied. To imitate gravity and wind pressure stresses, the panels were exposed to monotonic axial and reverse cyclic lateral forcing. According to the findings of this study, the kind and design of the shear transfer mechanism has a considerable impact on panel stiffness and deflections. The kind of foam also influences panel rigidity.

4. CONCLUSION

A clear notion about EPS shortcreting panel and their behaviour has been gathered from numerous literatures. The needs for future housing systems continue to rise, but the pressure to keep costs low rises. To fulfill these objectives, structural designers must develop new materials and technologies that are both high in quality and low in cost. Because of its various advantages, including high sustainability, precast lightweight sandwich technology is one of the solutions accessible as both non-structural and structural parts. Foamed concrete is a form of cellular lightweight concrete that has been employed in lightweight PCSP, particularly as the core layer, due to its superior insulation, as observed by Rice et al. [13] in their study. When, however, Because the thickness of the core is generally bigger than the thickness of the leaves in a typical sandwich panel, the cost will rise substantially. The lack of strength of foamed concrete as a face material is primarily responsible for its reluctance to be used. Finite element analysis is used to validate and supplement experimental findings. Based on the findings of the experiment and finite element analysis, a semi-empirical equation will be produced. It is intended that the results of this research would be transmitted to industry by offering a quick and low-cost method of constructing a low- to medium-rise residential structure.

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A REVIEW STUDY ON DIFFERENT TRUSS TYPE RAILWAY STEEL BRIDGE

Gopal Dayaram Pal¹, Ashraf Patel², Niraj Meshram³,
Sayyed Aamir Hussain⁴

1,2,3Student, Dept. of Civil Engineering, Anjumam College of Engineering and Technology, Nagpur, Maharashtra,
India

4Assistant Professor of Civil Engineering, Anjumam College of Engineering and Technology, Nagpur, Maharashtra,
India

1. ABSTRACT:

This paper presents the investigation and focuses on alerting structural engineers to the possible distortions, associated to the steel bridge's in service life when subjected to a vehicle's dynamic actions. In this paper effort has been made to design Steel truss bridge structure. The basic emphasis has been given to minimize the total deformation of the structural member by optimizing the cross sections, material properties. The crust of our review focuses on the analysis of truss bridge structure by IRS loading, complex or simple because truss is the most widely used in steel bridges used in railways and pedestrian crossings. The analysis and design of steel truss Railway Bridge. The bridge with same railway loadings of BG has been assigned in different types of truss sections to determine the best stable section

KEYWORDS: Railway Bridge, Truss Bridge, Structural Analysis, Steel section, Economy.

2. INTRODUCTION

A bridge is a super structure that crosses over a gorge, road, river, railway, or other obstructions, permitting smooth and safe passage of vehicles, trains and pedestrians. A pedestrian bridge is a bridge designed for pedestrians and in some cases cyclists, animal traffic and horse riders, rather than vehicular traffic. A Railways bridge is design for railway traffic only using railway loading (IRS). The bridges complement the landscape and can be used decoratively to visually link two distinct areas or to signal a transaction. For communities in the developing world, a footbridge may be a community's only access to medical clinics, schools and markets, which would otherwise be unreachable when rivers are too high to cross. Simple truss

bridge designs have been developed to be sustainable and easily constructible in such rural areas using only local materials and labour. Truss structures are composed of members that are connected to form a rigid frame of steel. This broad application can be used in many areas, such as Pedestrian Crossing Bridge, rail Bridge, Road Bridge and other transportation bridges. The individual members of a truss bridge are the load carrying components of the structure, they are arranged in a triangular manner resulting in the loads carried to become either in tension or compression. Today truss bridge are used for many purposes, since they are simple to assemble and economical.

Bridge is an important structure required for the transportation network. With the fast innovation in technology the conventional bridges have been replaced by the cost effective structured system. For analysis and design of these bridges the efficient methods are available. In this paper comparative study on different type of truss bridge has been presented. Presently in India, a general type of truss steel bridge is designed, although at a moderate pattern of Steel Bridge is required to rise by the time due to the higher demands for railways traffic and short distance routes. The main objectives of the present study are to analyse and design truss bridge with railway loadings and to make comparative study of these bridges.

3. STEEL TRUSS BRIDGE:

Steel is widely used around the world for the construction of bridges of different size. It is a versatile and effective material that provides efficient and sustainable solutions. Steel has long been recognized as the economic option for a range of bridges. It dominates the markets for long span bridges, railway bridges, footbridges, and medium span highway bridges. It is now increasingly the choice for shorter span highway

structures as well. Society gains in many ways from the benefits delivered by steel bridge solutions. Landmark steel bridges embody good design, they are fast to build, and have stimulated the regeneration of many former industrial, dock and canal side areas.

The connected elements (typically straight) may be stressed from tension, compression, or sometimes both in response to dynamic loads. These trusses can be made of timber, steel or can be composite structure. In this study, steel trusses used for building bridges are considered. Steel has higher strength, ductility and toughness than many other structural materials such as concrete or wood. However steel must be painted to prevent rusting

Like other bridge types, there are both simple and continuous truss bridges. The members of a truss can be arranged in an almost unlimited number of ways, but the vast majority of trusses encountered in bridge belong to one of the common types listed below. The integral members of a steel truss bridge are shown in figure



Fig. 1: Skeleton of a Typical Steel Truss Bridge

4. TYPES OF TRUSS BRIDGE

According to the configuration of members a truss can be classified into different types and in this paper the truss configuration type was selected. Classifications of truss type according to their member configuration are listed below

- Bailey truss
- Bollman truss
- Bowstring arch truss
- Brown truss
- Howe truss
- Long truss
- Warren truss
- Pratt truss
- K type truss etc.

5. ADVANTAGES OF STEEL BRIDGE

The following are some of the advantages of steel bridges that have contributed to their popularity in India and in many other developed countries.

1. They could carry heavier loads over longer spans with minimum dead weight, leading to smaller foundations
2. Steel has the advantage where speed of construction is vital, as many elements can be prefabricated and erected at site.
3. In urban environment with traffic congestion and limited working space, steel bridges can be constructed with minimum disruption to the community
4. Greater efficiency than concrete structures is invariably achieved in resisting seismic forces and blast loading
5. The life of steel bridges is longer than that of concrete bridges
6. Due to shallow construction depth, steel bridges offer slender appearance, which make them aesthetically attractive. The reduced depth also contributes to the reduced cost of embankments
7. All these frequently leads to low life cycle costs in steel bridges In India there are many engineers who feel that corrosion is a problem in steel bridges, but in reality it is not so. Corrosion in steel bridges can be effectively minimized by employing newly developed paints and special types of steel.
8. The steel truss bridge as less cost (economical) compare to other bridge.
9. Steel truss bridge is Simple to assemble and speed up the construction time.
10. This bridge is Flexibility in design.
11. Steel bridge have also advantage over Resistance to dynamic loads.
12. The steel truss bridge has Easy maintenance

6. LITERATURE REVIEW

A bridge is a construction that crosses over a road, river, railway, or other impediments, allowing easy and safe passage of vehicles, trains and pedestrians. Numerous studies examined the dynamic performance of bridges structure investigation. A simplified method was followed so that you can execute an immediate analysis of the effects of the parameters involved within the hassle. The deformation of the bridge structure to the applying load is incredibly extensive; hence it's far clear that the dynamic reaction of the bridge underneath the shifting load (moving load) should be

taken into consideration within the technique of structural design.

Gupta. (2017). Present the investigation and outline of steel support railroad extension of range 50 m. The extension with same railroad loadings of 32.5 ton has been allotted in various sorts of bracket segments to decide the best steady and temperate area. Investigation and configuration is finished utilizing device STAAD star to enhance the area and decide best stable areas for examination. The plan of basic individuals from the support is done as per arrangement of Indian railroad standard code and Indian streets congress code.

R.Shreedhar, Spurti Mamadapur (September 2012) Analyzed a simple span T-beam bridge by using I.R.C. specifications and Loading (dead load and live load) as a 1-D (one dimensional) structure. Finite Element Method analysis of a three-dimensional structure was carried out using STAAD. Pro software both models were subjected to I.R.C. Loadings to produce maximum bending moment. The results were analyzed and it was found that the results obtained from the finite element model are lesser than the results carried from 1-D (one dimensional) analysis, which states that the results obtained from I.R.C. loadings are conservative and FEM gives economical design.

Shrivastava et. al. (2017). This examination exhibits the auxiliary investigation and plan of RCC box composite minor extension utilizing manual approach (i.e. MDM technique) and by computational approach (Staad-star) utilizing IRS - CBC codes. The basic components (top section, base chunk, side divider) were intended to withstand Ultimate Load criteria (greatest bowing minute and shear drive) Due to different burdens (Dead Load, Live Load, SIDL, LL extra charge, DL additional charge) and workableness criteria (Crack width) and a similar investigation of the outcomes got from the over two approach has been completed to approve the accuracy of the outcomes. Further, it was likewise watched that the investigation utilizing manual count turns out to be extremely repetitive and bulky and for a mind boggling kind of structure, consequently it is a significant complex undertaking to play out the examination physically, so the utilization of computational technique (Staad – expert and exceed expectations sheet) turns into the undeniable decision for plan. The outcomes acquired utilizing MDM technique demonstrates a decent concurrence with the outcomes got from computational

strategies.

K. Senthil et. al. (2017) 3d numerical examinations completed on railway bridges structure the use of Abaqus/Explicit finite detail application. The duration of bridge 30 m and single truck become considered inside the present study. The constitutive and fracture conduct of substances had been anticipated the use of JC version to be had in ABAQUS. The material parameters of JC model for the bridge contributors to be had within the look at. The responses of bridge were predicted in light of and von-misses stress. The investigations done by using considering the bridge towards elegance AA loading. The impact of intensity of primary girder turned into studied by using varying the intensity as 1600, 1400, 1200 and a thousand mm.

Sharma et.al. (2017). Examined that the outline, development and upkeep of physical and normally manufactured condition, including works like extensions, streets, waterways, dams and structures. It is the most established and broadest designing calling. All the designing claims to fame have been gotten from structural building. It is isolated into different sub disciplines including ecological designing, geotechnical building, auxiliary building, transportation building, material building, reviewing and development designing. The standards of all the above building perspectives are connected to the private, business, mechanical and open works activities everything being equal and levels of development.

Hani (2016). Contemplated that the basic outline includes thought of load cases (box unfilled, full, additional charge loads and so on.) and factors like live load, powerful width, braking power, dispersal of load through fill, affect factor, co-proficient of earth weight and so forth. Applicable IRCs are required to be alluded. The basic components are required to be intended to withstand most extreme twisting minute and shear constrain. This paper gives exchanges on the arrangements in the Codes, contemplations and avocation of all the above viewpoints on plan. The container scaffold can be broke down either by Software or Computational strategies. So it is important to examine the adequacy of results got from both the techniques.

Kumar. (July 2015). This current research's goal was to evaluate the monetary significance of the railroad cum street connect. This paper was done to discover the decrease in cost of development by giving single

scaffold to both street and also railroads. The investigation and configuration period of the undertaking was finished using STAAD PRO V8i. It was watched that the development of a solitary scaffold diminished the cost of two separate extensions for street and railroads, likewise arrive securing issue is decreased to some degree.

TT. Pramod Kumar, & G.Phani Ram (2015). This present research's goal was to appraise the monetary significance of the railroad cum Road Bridge. This paper was done to discover the decrease in cost of development by giving single scaffold to both street and additionally railroads. The examination and configuration period of the undertaking was finished using STAAD PRO V8i.

Pathak (January-2014). Examined different practices like twisting, shear, pivotal and torsion for on a level plane bended fortify bond solid box spans considering three measurements FEM utilizing SAP programming. This approach improves examination and the fundamental outline of bended extension segment. The expansion in the torsion for any arrangement of chart is relatively increments than that of bowing minutes, shear powers and pivotal powers which demonstrate that crate segment is having high torsional firmness and is nonlinearly shift with level of ebb and flow. From the investigation it is watched that different range, the duplication factor for variable level of ebb and flow is shifting directly for pivotal power and twisting minute, which is around 1.20 to 1.30 for 90° ebb and flow. Increase factor for torsion minute is differing nonlinearly having 1.80 to 1.90 for 90° ebb and flow, while there isn't important to apply augmentation factor for shear compel.

E.Yamaguchi. (2011) The post-member-failure conduct of a truss bridge turned into investigated via the static analysis and the dynamic evaluation. Large discrepancy among the consequences because of the 2 analyses turned into determined, which turned into discovered resulting from the fact that the 2 analyses led to special deformed configurations. Then an analysis approach of the publish-member-failure conduct became proposed in an effort to encompass the dynamic effect inside the static evaluation. The effectiveness of the proposed method has been proven via comparing the result with that because of the dynamic evaluation.

7. CONCLUSION

From this we can conclude that the above

study analysis for truss is very insightful. The study has addressed the possibility of analysis and design of truss steel bridges with locally available steel profiles. Based on the analysis and design made so far, the study has proved that, The construction of steel bridge with locally available steel profiles is an option worth .Even though the cost of local production is closer to importing it is still a good option since it helps in the capacity building of local design, fabrication and construction firms, creates job opportunities for many people and is a saving in foreign currency. For many short span bridges in railway construction projects, these local assembled steel truss bridges can be used as different type of truss bridges. In addition to the fact that these assembled truss steel bridges are preferable in inaccessible areas they also take very short time to erect.

8. ACKNOWLEDGEMENT

I would like to thank first my project guide Prof. **S.A. Hussain** for their guidance and invaluable words of advice, support and help given to me to do this review paper. Secondly I would like to thank my parents and friends for their appreciation and belief in me

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STRUCTURAL RETROFITTING OF REINFORCED CONCRETE BEAM BY USING CARBON FIBRE REINFORCED POLYMER (CFRP) SHEET

¹Syed Sohailuddin ²Sushma Verma, ³Ashfaque Ansari, ⁴Abdul Munib, ⁵Sandesh Yerkhede,

¹ Professor, ²Student, ³Student, ⁴Student, ⁵ Student

^{1, 2, 3, 4, 5} Department of Civil Engineering,

^{1, 2, 3, 4, 5} Anjuman College of Engineering and Technology, Nagpur, India

Abstract: Rehabilitation and strengthening of old systems using advanced materials is a contemporary study within the field of Structural Engineering. It is important to modify, repair, rehabilitate or rebuild an existing structure to achieve the expected life span. Life span of Reinforced Concrete (RC) structure can be reduced for no. of reasons, such as corrosion of concrete & development of surface cracks due to chemical agents, improper design and sudden unexpected external loads that also lead to the failure of the structure. The advanced properties of polymer composite materials such as extreme corrosion resistance, high strength, excessive hardness, extremely good performance and good resistance to chemical attack etc., have encouraged researchers and practicing engineers to apply the polymer composites to the rehabilitation of structures. This project shows an experimental study on retrofitted RCC beam using CFRP sheet. The main objective of study is to investigate the behavior of RCC beam after Retrofitting by CFRP sheets.

Index Terms - RCC (Reinforced Cement Concrete) Beam, Retrofitting, CFRP (Carbon Fiber Reinforced Polymer) sheet, FRC material (Fiber Reinforced Composite Material, epoxy).

I. INTRODUCTION

Rapid growth in production industries has given rise to the need for improved materials in terms of strength, hardness, density, and cost reduction with better stability. Composite materials have emerged as one of the materials processing such superiority in properties serving their capacity in a variety of applications. The use of natural or synthetic fibres inside the fabrication of composite materials has found extensive applications in various fields including construction, mechanical, vehicle, aerospace, biomedical, and marine.

Research studies over the past two decades have presented composites as an alternative to many conventional materials as the structural, mechanical, and tribological properties of fibre-reinforced composite (FRC) material have been greatly enhanced. Although composite materials were successful in increasing the durability of the material, there is currently a serious concern about the accumulation of plastic waste in the environment. This concern has compelled researchers around the world to develop environmentally friendly materials associated with cleaner manufacturing processes. Several different composite recycling processes also have been developed to deal with the thousands of tons of composite waste generated in a year.

Natural fibres are specifically classified as fibres that are plant-based, animal-based, and mineral-based. Since the asbestos content material with the mineral-based fibres is risky to human health, those are not well-explored fibres with respect to research into fibre-reinforced composite materials, at the same time as plant-based fibres offer promising characteristics which include low cost, biodegradable nature, availability, and good physical and mechanical properties.

II. CFRP SHEET

Carbon fiber reinforced polymer (CFRP) is a combination of extremely thin carbon fibers of 5-10 μ m in diameter, embedded in polyester resin. In CFRP the reinforcement material is carbon fiber which provides the strength and stiffness and commonly used polymer resin for the matrix-like epoxy, which bonds the reinforcement in an organized way. Carbon fiber is an anisotropic material in nature manufactured at 1300 $^{\circ}$ C. The major advantage of fiber includes low density, low conductivity, high fatigue strength, high elastic modulus (200-800 GPA), good creep level resisting chemical influences, and do not absorb water.

CFRP is most commonly used in industrial masonry structures for the Retrofitting of old structures that have been already damaged due to earthquakes, chemical reactions, environmental effects, etc. Since Carbon fiber Reinforced polymers (CFRPs) are one the stiffest and lightest composite materials so they are far superior to other conventional materials in many areas of applications. Norazman et al investigated the purpose of using CFRP to improve the tensile strength of reinforced concrete, and replace steel, totally and he concluded that the main Advantage of using CFRP as reinforcement is to avoid rusting and corrosion of reinforcement. Currently, CFRP Is being used for structural repair for structures damaged due to aging and extreme condition. Because of these benefits, carbon fiber finds great application in many industries such as aerospace, automotive, military, and recreational applications.

III. MATERIAL USED

No. of element	Material
1.	Cement
2.	Sand
3.	Water
4.	Coarse Aggregate
5.	Steel
6.	Carbon Fiber Reinforced Polymer
7.	Epoxy

IV. TEST ON MATERIALS

IV.1 .CEMENT

A grade of 53 ultratech cement satisfying all the requirements of IS 8112:1989 will be utilized. It will be tested for its physical properties as per Indian standard specifications.

Sr. no	Characteristics	As per IS code 8112:1989
1.	Standard consistency (%)	30%
2.	Fineness test (gm/m ²)	2.13gm
3.	Initial setting time	45 min
4.	Final setting time	60 min

IV.2. SAND

Sand used in this study was locally available with fitness modulus 3.126gm has been used.

IV.3.WATER

We use normal tap water to mix concrete which has neutral ph.

IV.4.COARSE AGGREGATE

Maximum size of aggregates of 20mm will be used and grading zone of aggregates was zone II as per IS specifications.

Sr. no	Characteristics	As per IS code
1.	Elongation test	23.3%
2.	Flakiness index	17.25%
3.	Sieve analysis	3.219 gm

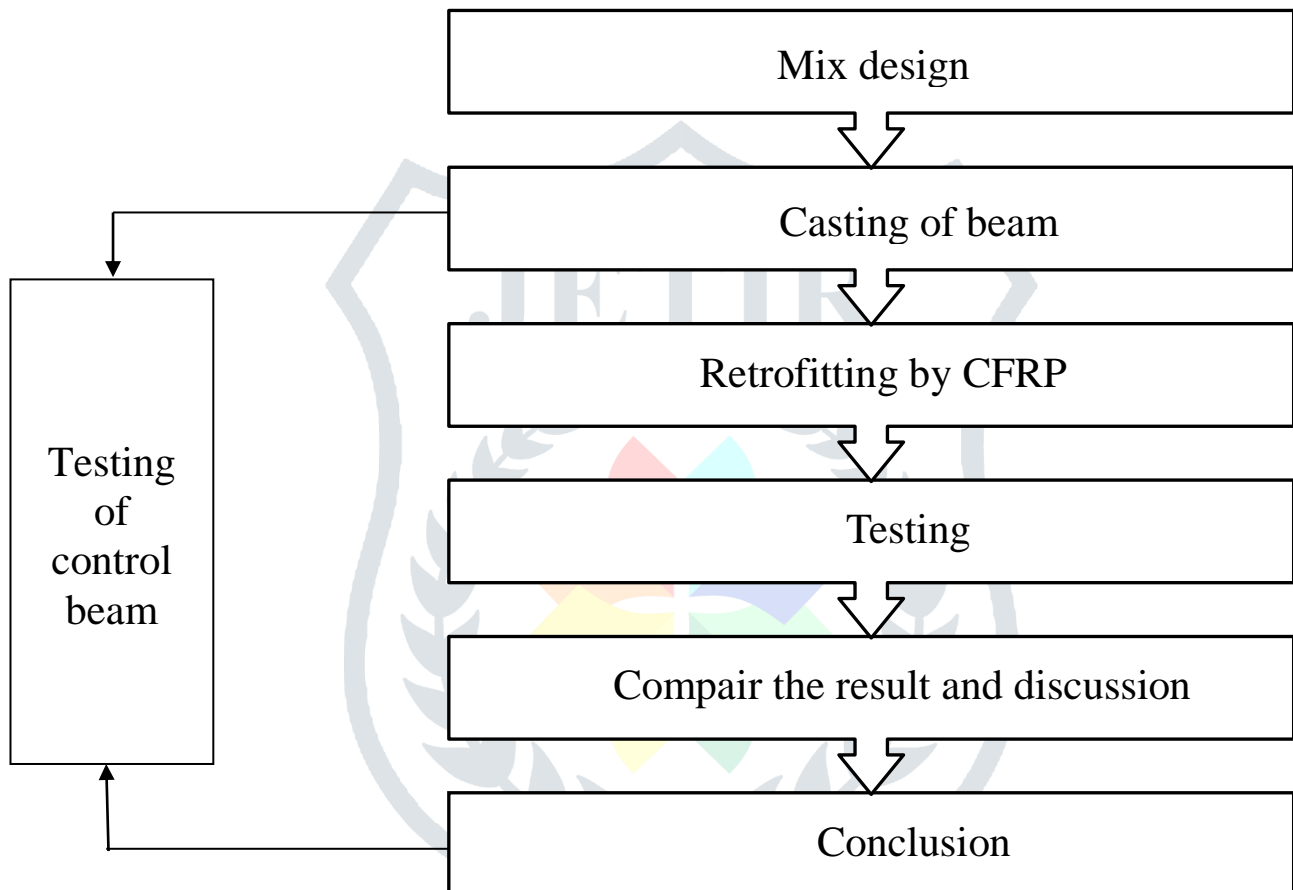
IV.5.CARBON FIBRE REINFORCED POLYMER

CFRP is having high strength and durability, and one more thing it is easy to install. It is commonly used whenever high strength and rigidity are needed. Carbon fiber sheets of different thicknesses will be used as a retrofitting material for the beams.

IV.6.EPOXY

Epoxy resin with hardener was used as a bond purpose between the concrete surface and carbon fiber sheet. The epoxy resin primer is mixed as per the guidance of the manufacturer's instructions. And the mixing is carried out in a plastic container having a base hardener ratio (Base: Hardener =3.33Kg: 1Kg) i.e., a hardener with 30% of epoxy resin. After the uniform mixing, epoxy resin is applied to the concrete surface of RC Beams.

V. METHODOLOGY



V.1.MIX DESIGN:

- Rate analysis for single R.C.C beam : 1:1:2
- As per IS code: 10262
- Grade of concrete M25
- Wet vol. Of concrete = $0.15 \times 0.3 \times 1$
= 0.045 m^3
- Dry vol. Of concrete = $52/100 \times 0.045 + 0.045$
= 0.0684 m^3
- Quantity of cement = $(\text{dry vol.}/1+1+2) \times 1$
= $(0.0684/1+1+2) \times 1$
= 0.0171 m^3
- Quantity in kg = $(0.0684/4) \times 1440$
= 24.624 kg
- No. Of bags (cement) = $0.0171/ 0.0347$
= $0.49 \approx 0.5 \text{ bag}$
- Quantity of sand = $(0.0684/1+1+2) \times 1$
= 0.0171 m^3
- Quantity in kg = $(0.0684/4) \times 1450$
= 24.795 kg

Quantity of aggregate	=	$(0.0684/1+1+2) \times 2$
	=	0.0342m^3
Quantity in kg	=	$(0.0684 \times 2/4) \times 1500$
	=	51.3 kg
Quantity of water	=	as per IS code 456
Water /cement ratio	=	0.50
Water/ cement	=	0.50/1
Water	=	$0.50 \times \text{cement in kg}$
	=	0.50×24.624
	=	12.312kg \approx 12.312 Liters.

Percentage of steel used = as per is code 456:2000

Cross section area	=	L X B
	=	(0.15×0.3)
	=	0.045m ²

Cross sectional area of 1 bar	=	$3.14 \times d^2 / 4$
	=	$3.14 \times 0.010^2 / 4$
	=	0.000785m ²

Cross sectional area of 4 no's of bars	=	0.000785×4
	=	0.00314m ²
Percentages of steel	=	$(0.00314 / 0.045) \times 100$
	=	0.6%

V.2.CASTING OF BEAM:

Six beams were cast while three beams are non-retrofitted and the other three are retrofitted beams. All the samples had the same dimensions and were similar in shape i.e. rectangular having dimensions 1000mm in length and 300mm X 150mm in cross-section. To design the beam, the design mix ratio was used. Shows rectangular reinforcement cage with 10mm diameter and 8mm diameter of 4 bars for stirrups as shear reinforcement with c/c spacing 150mm. First, three beams were tested in single-point loading for failure. The rest three beams were tested in single-point loading until cracks appeared on them.

V.3.RETROFITTING OF CFRP

The beam we fix after 28 days. The beam is wrapped on all four sides with a CFRP sheet using a complete wrapping technique. Before epoxy primer was applied, the beam surfaces were clean with water and roughened to a better bond between the concrete surface or CFRP sheet. And mixing is done in a plastic tray with a hardener or epoxy ratio of 10:1. I.e. 10% of hardener is used. As per the guidance of manufacturer instructions. After mixing, epoxy resin was applied to the solid surface of the RC beam. After that, the CFRP sheet was applied to the beam, air bubbles are formed there. Then we removed the air bubbles by using the roller brush. This retrofitting is done at room temperature. Move the retrofitted beam to a resting position at room temperature for 2 days before testing.

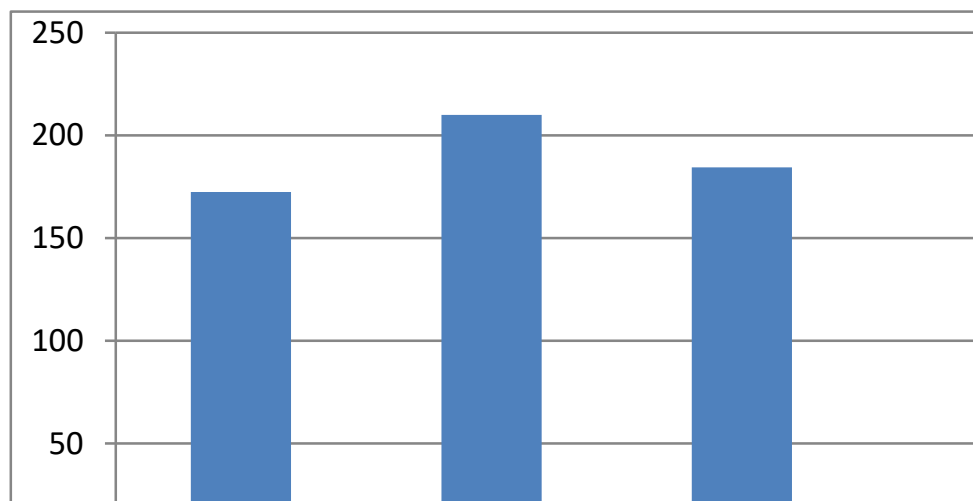
V.4.TESTING OF BEAM

The controlled and retrofitted beams were tested under the triaxial load to ascertain the ultimate load-carrying capacity .the distance from both the end of the beam is 100mm, roller support on provided side's side. The support conditions for the tested sample are the same as shown in fig. consists of a beam supported on the two steel rollers bearing 100mm from the ends of the beam. The remaining portion of 800mm was divided into three equal parts of 266mm a. Until the appearance of the first crack was recorded on the UTM machine, the deflection of the beam was noted. Then the factor load was recorded as the load at which load on automatic UTM. The load-deflection graph was obtained. The deflection curve of a beam in triaxial loading is analysed.



V.5. COMPARISON OF RESULT AND DISCUSSION

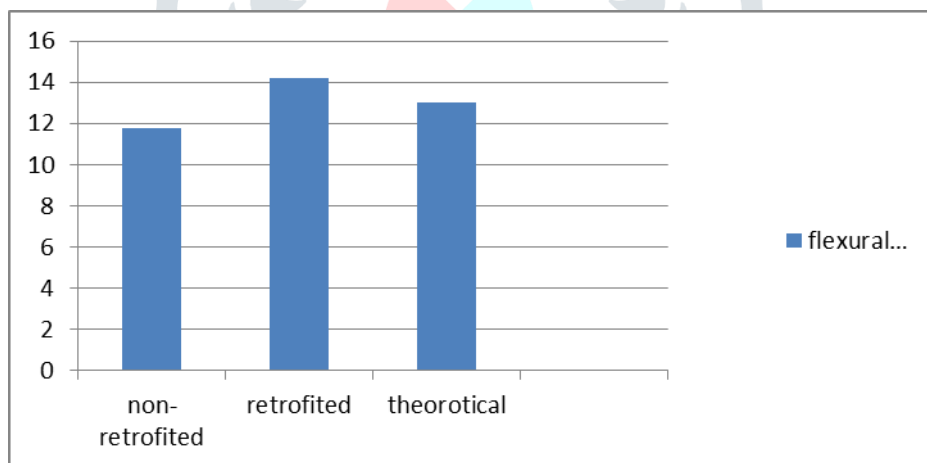
From the present experimental work we can find the load bearing capacity of conventional beam and Retrofitted Beam, Flexural strength and deflection in both beams. The fully wrapping techniques used for strengthening of the beam, initially the cracks were not visible. As the increase the loading increase the propagation of the crack but due to wrapping of CFRP sheet around the beam leads less cracks formation. The result show in given graph due to experimental work performs on beam in laboratory.



Graph. No. 1: Load carrying capacity of conventional or non-retrofitted Beam

Flexural Strength:

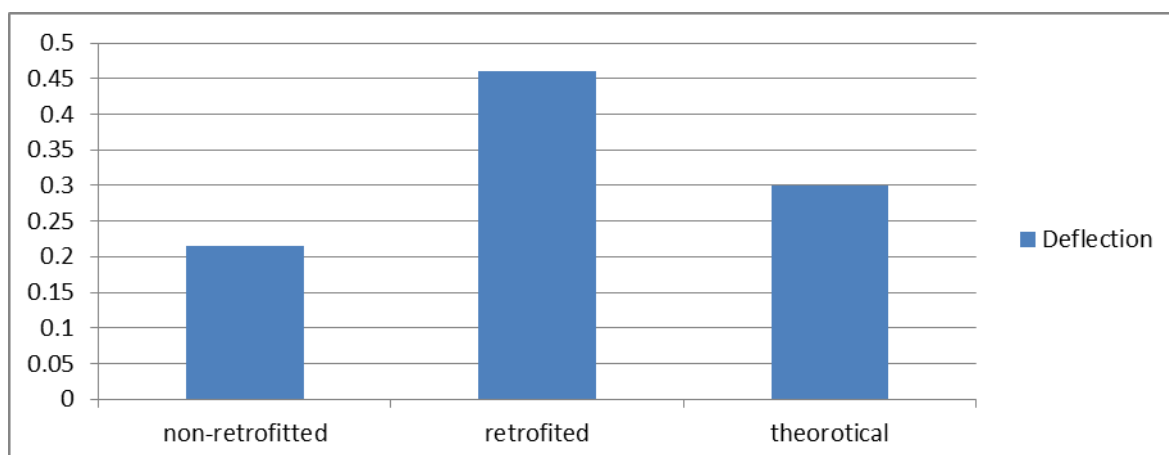
Flexural strength is measure of the tensile strength of concrete structure. It is maximum bending stress that can be applied on structure before yields. We can measure theoretically and perform the experimental test on the both beam.



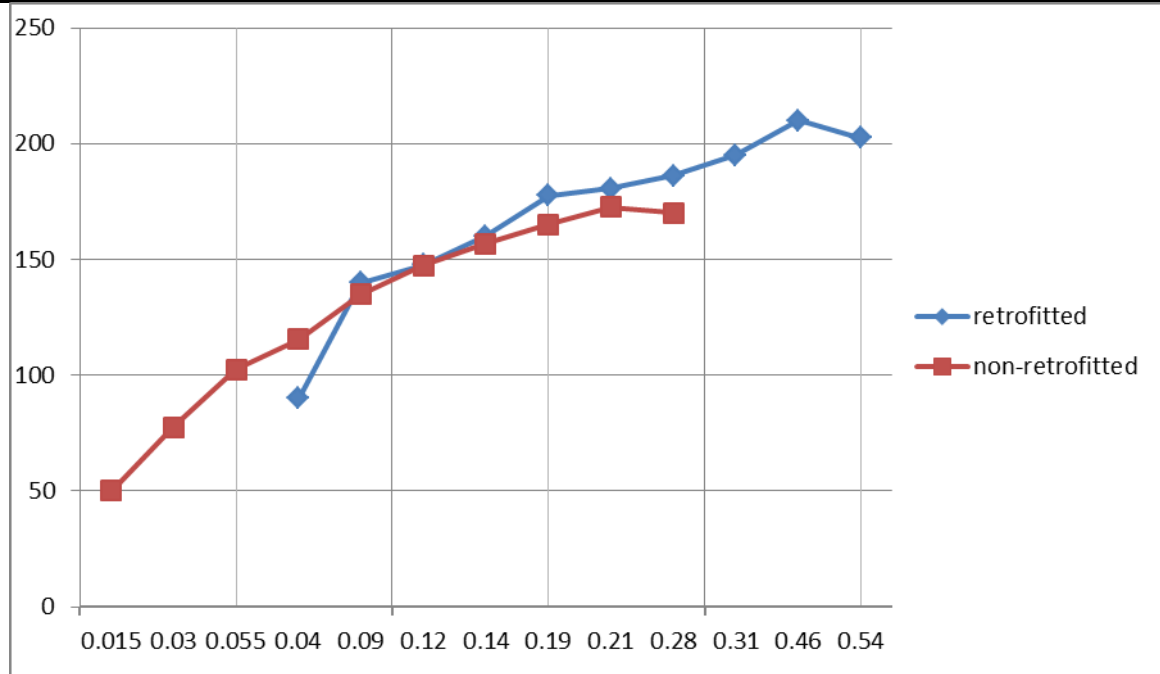
Graph no. 2: Comparison of flexural strength of Conventional & Retrofitted beam

Deflection:

Deflection, in the structure its means the movement of a beam or node from its original position. It happens due to the forces and loads being applied to the structure.



Graph no. 3: Deflection in mm



Graph no. 4 comparisons of Deflection between Non-retrofitted and retrofitted beam.

V.6.CONCLUSION

In the study the behavior of RC concrete beam Retrofitted with CFRP sheet after applying load in connectional and retrofitted beam.

The following conclusions are obtained from the study:

- i. The maximum load-carrying capacity increased by this study is 210kN. This results in 20% increase when compared with non-retrofitted.
- ii. The crack formation was reduced in the CFRP sheet retrofitted beam compared to the non-retrofitted beam.
- iii. Increase the thickness of the CFRP sheet this gives more effective results for concrete repair and reinforcement.
- iv. The study shows the main failure if mixing ratio and proper application of chemical (epoxy and hardener) affects the load-bearing load bearing capacity and the efficiency flexural reinforcement of the beam.

Based on this studies should be performed to investigate the b of CFRP retrofitted beam and non-retrofitted beam. Also analyse the beam using STAAD pro and numerical work should be done for comparing behaviour of retrofitted beam.

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Title: Effect of Corrosion on Bond Strength and Development Length of Reinforcing Bar in Epoxy-Grouted Nut Coupler

Author(s): Naseeruddin Haris and Sangeeta Gadve

Publication: Materials Journal

Volume: 119

Issue: 5

Appears on page(s): 239-250

Keywords: corrosion; coupler bond strength; development length; epoxy; impressed current; nut coupler; pullout test; reinforcing bar

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Title: Mechanical Properties of Reinforcing Steel Bars Corroded at Different Levels

Author(s): Naseeruddin Haris and Sangeeta Gadve

Publication: Materials Journal

Volume: 118

Issue: 4

Appears on pages(s): 109-120

Keywords: anodic current; corrosion; experimentation; levels of corrosion; mechanical properties; reinforcing bar; tensile test

Date: 7/1/2021

Abstract:

Corrosion of reinforcing steel bars in concrete has always been one of the major causes of structural failure. This paper experimentally investigates the effect of corrosion on the mechanical properties of reinforcing bars. In the experiment, an anodic current is impressed at the specific current density to reinforcing bars of various diameters to attain different levels of corrosion. The correlation of actual mass loss with predicted mass loss, as per Faraday's law, and the equivalent section area loss are reported. Further, the uniaxial tensile test is performed on these corroded specimens to obtain load-displacement relations. Based on the test results, stresses and strains are evaluated for all the specimens, and their responses to induced corrosion are reported. Statistical models are developed for predicting

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Comparative Analysis of Different Truss Type Railway Steel Bridge Considering Railway Loadings

Adnan Khan¹, Shraddha Indurkar², Ashfiya Anjum³, Jagruti Ganthale⁴, Prof S.A. Hussain⁵

^{1,2,3,4} Student, Dept. of Civil Engineering, Anjumam College of Engineering and Technology, Nagpur, Maharashtra, India

⁵Assistant Professor of Civil Engineering, Anjumam College of Engineering and Technology, Nagpur, Maharashtra, India

1. ABSTRACT:

Bridges are constructed for connection road, railway in the obstacle like canal, river, valley etc. truss bridges are the structure whose load bearing superstructure are made up of Truss. Truss usually transfer its load to single member to others members because of its rigid nature. In truss bridges solid section are used are. As we know steel sections are economic structure having greater radius of gyration by which compressive strength increases. In this study presents the analysis and design of steel truss railway bridge of span 20 m, height 4m and width 5m. The bridge with railway loadings as per IRS of maxim load of 9.33t/m has been assigned in different types of truss sections to determine the best stable and economical truss bridge. Analysis and design is completed using tool staad pro to optimize the section and determine best stable sections for comparison. The design of structural members of the truss is done in accordance with provision of Indian railway standard code. Some parameter like shear force, axial force, deflection and weight of steel of a structure are determined using STAAD Pro software and comparison is made for different models i.e. howe truss bridge, pratt truss bridge, k- type truss bridge and warren truss bridge. From the comparison of results howe truss is economical and gives better results as compared to other truss bridge.

KEYWORDS: Railway Bridge, Staad.Pro, Structural Analysis, Steel section, Truss.

2. INTRODUCTION

In India, Economic progress mainly depends on the railway and is considered as the Life line of the Nation. India has the second largest rail network in the world, transporting over four billion people annually and the total figure of existing railway bridges are approx. 1, 20,000. Out of these, 731 are long span open girders, 19014 are rolled steel joist or plate girders. So it can be seen that more than 20% are Steel girder bridges. Due to continuous movement trains, the members and their connections are subjected to repeated loadings due to which the stiffness of the joint gets reduced, which are more prone to fatigue damage. The conventional static, dynamic or stability analysis of Steel Trusses bridges assumes that their members are connected at rigid or hinged joints. However in reality Steel Trusses are

reinforced at their joints by Gusset plates, which possess rotational flexibility.

The Girder Bridges are widely adopted for short and medium spans. Deck and Girder usually act together to support the entire loads for highway and railway bridges to carry in Shear and Flexural bending. I-Girder Bridges are economical, simple to design and relatively straightforward to build. If the bridge contains any curves, the beams become subject to twisting forces, also known as torque, therefore they are best used to construct bridges that do not have any significant curves.

The codal provisions used for standard loads in case of bridges are according to IRS. Railway Bridges have to be designed to withstand the live loads specified by the Indian Railway Standards (IRS). The design guide lines of Railway Bridges in India shall be in accordance with the Indian Railway Standard (IRS) Code of Practice. The longitudinal loads for Broad Gauge standard loadings for spans of 20m are 25t Loading-2008 with a maximum axle load of 25.0t for the locomotives as per IRS. For this study, 25t Loading-2008 has been considered.



Figure 1.1: Truss Bridge Structure

3. METHODOLOGY:

Which are analyses with the help of staad pro software. Proposed steps are as followings:

- 1) Model the structure in staad pro v8i.
- 2) Provide property to the section.
- 3) Create different types of steel truss bridges Apply Railway loading for broad gauge axel and deadload as per Indian standards.

3.1 TYPES OF TRUSS BRIDGE

According to the configuration of members a truss can be classified in to different types and in this the truss configuration type was selected. Classifications of truss type according to their member configuration are listed below

- Howe truss bridge
- Pratt truss bridge
- Warren Truss Bridges
- K-truss bridges

3.2 GEOMETRY DESCRIPTION OF STEEL TRUSS BRIDGE:

In the present study steel bridge frame is modeled in analysis tool staad pro in which steel trusses bridge is analyzed and optimized, and railway loading is considered as 336.73 KN axle loading, dead load as per 875 part-1 is calculated and applied. The following four cases for comparison are as follows

- a. First howe truss bridge 20 m length.
- b. Second is bridge geometry is taken as warren truss truss 20 m length.
- c. Third one is bridge geometry is taken as pratt truss bridge 20 m length.
- d. Fourth one is bridge geometry is taken as K type truss bridge 20 m length,

Table 3.1: Description of Structure

Sr No	Description	Value
1	Length of Bridge	20 m
2	Number of bays in X direction	10
3	Number of bays in Z direction	1
4	Height of Bridge structure	4m
5	Width of the bridge section	5 m
6	Section of inclined members	I section
7	Section of vertical members	I section
8	Railway track	Board Gauge
9	Support type	Pinned support

3.3 LOAD CALCULATIONS:-

1. Live Load -

Axle load For Broad Gauge - 1676mm –

Maximum axle load of 245.2 KN (25.0t) for the locomotives and a train load of 91.53 KN/m (9.33t/m)

Total Load of BG = Locomotive load + Train Load

$$= 245.2 + 91.53$$

$$= 336.73 \text{ KN/m}$$

2. Dead Load –

a. Self-Weight of truss

b. For design of ballasted deck bridges, a ballast cushion of 400mm for BG shall be considered.

$$= \text{Thickness} \times \text{density of concrete} \times \text{width of bridge}$$

$$= 0.400 \times 25 \times 5$$

$$= 50 \text{ KN/m}$$

c. Load of supporting Slab

Slab thickness = 150 mm

DL of Slab = Thickness x density of concrete

$$\text{DL of Slab} = 0.150 \times 25$$

$$= 3.75 \text{ KN/m}$$

3.4 3D View of Truss Bridge

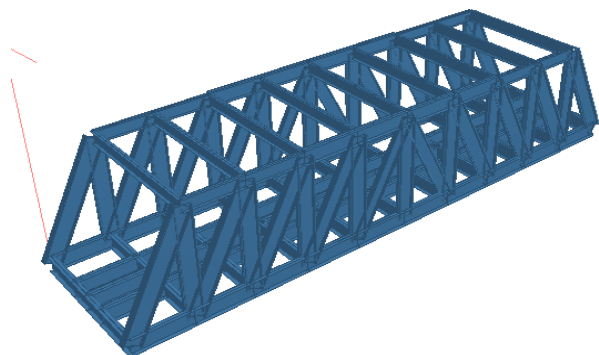


Figure 3.1: 3D view of Howe Type Bridge

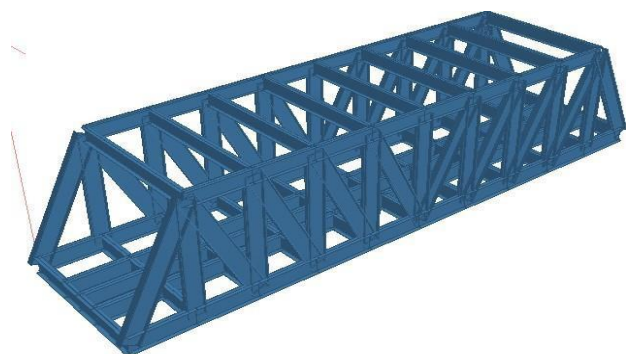


Figure 3.2: 3D view of Pratt Types Bridge

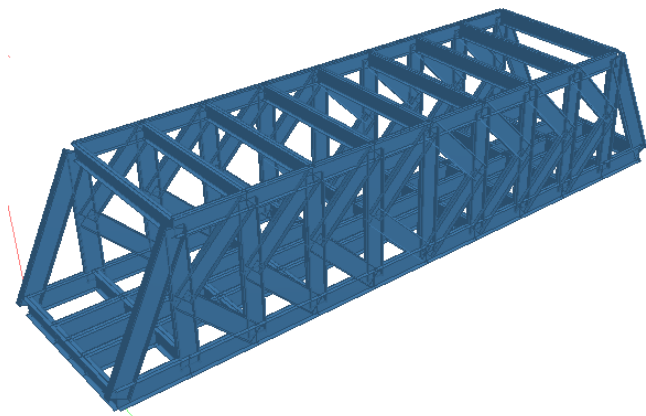


Figure 3.3: 3D view of K-Type Bridge

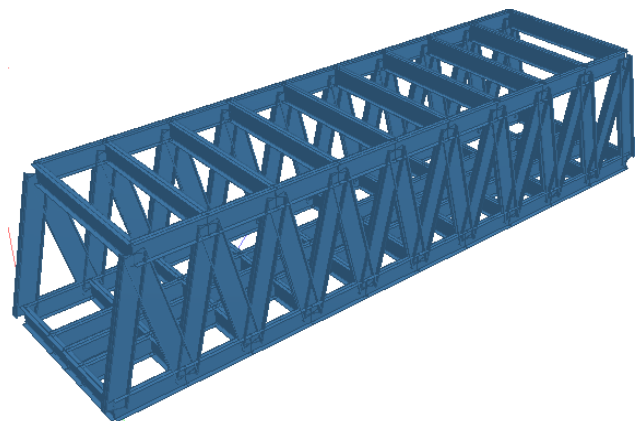


Figure 3.4: 3D view of Warren Type Truss Bridge

in K Type Truss Bridge whereas minimum in Pratt Truss Bridge type structure for same loading.

Table 4.1: Maximum Shear Force

Type of Truss Bridge	Howe Truss Bridge	Pratt Truss Bridge	K Type Truss Bridge	Warren Truss Bridge
Maximum Shear Force (KN)	479.81	475.243	484.339	476.419

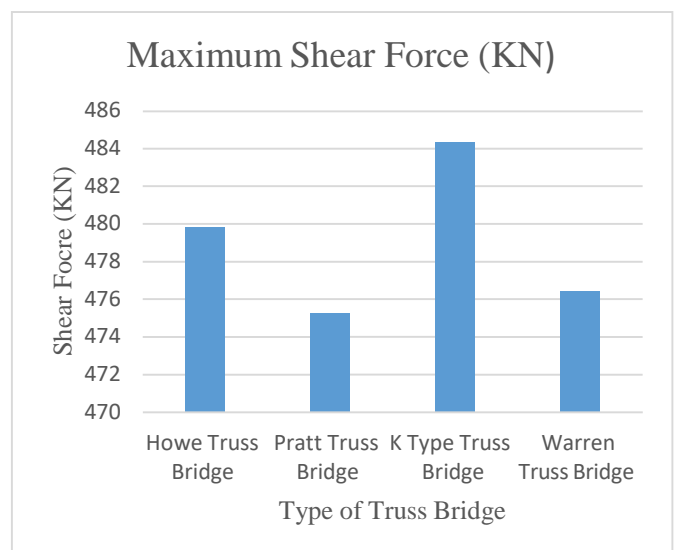


Figure 4.1: Maximum Shear Force of Truss Bridge

4. RESULTS AND DISCUSSIONS

4.1 Overview

Structural Analysis and Designing Program (STAAD PRO V8i SS6) software is used for linear dynamic analysis to determine the response of structures. In this chapter comparison of performance of Howe Truss Bridge, Pratt Truss Bridge, and K-Type Truss Bridge and Warren Truss Bridge is carried out.

This chapter includes results of the bridge truss. The main aim of the work is to find economical Truss bridge by comparing the all other steel truss bridge. Comparison of performance of structure based on Shear Force, Axial Force, Deflection and weight of steel.

4.2 GRAPHICAL REPRESENTATION OF RESULTS

4.2.1 SHEAR FORCE:

Magnitude of maximum stress for various forms of truss has been plotted in figure no 4.1 it is determined that in this comparative study maximum shear force is in K Type Truss Bridge whereas Pratt Truss type steel bridge shows minimum shear force value which results in balanced section, therefore maximum unbalanced forces are present

4.2.2 AXIAL FORCE

Magnitude of maximum stress for various forms of truss has been plotted in figure number 4.2 below it is determined that maximum axial force is generated in Warren Truss Bridge whereas minimum in howe type truss which shows that maximum force distribution will be measured in Warren Truss Bridge as compared to other cases.

Table 4.2 Maximum Axial Force

Type of Truss Bridge	Howe Truss Bridge	Pratt Truss Bridge	K Type Truss Bridge	Warren Truss Bridge
Axial Force (KN)	1211.1	1220.562	1212.679	1235.632

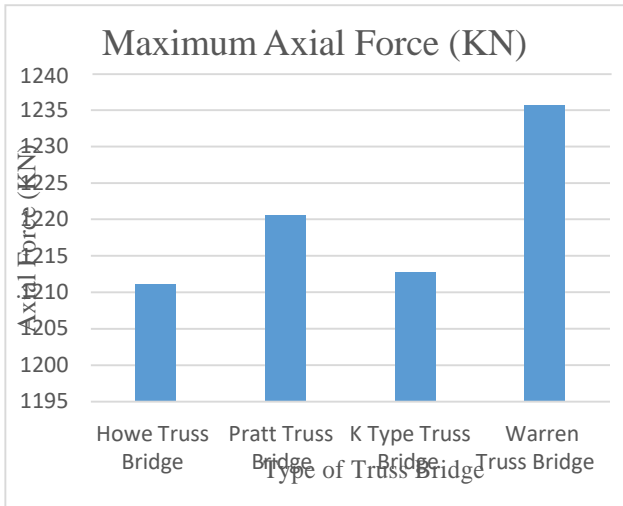


Figure 4.2: Maximum Axial Force of Truss bridge

4.2.3 DEFLECTION

Magnitude of maximum stress for various forms of truss has been plotted in figure no 4.3 below it is determined that deflection is maximum in Pratt Truss Bridge and followed by howe bridge whereas minimum in K Type Truss Bridge and warren type steel bridge which indicates that Pratt Truss Bridge and howe truss bridge will require more supports as compared to other cases.

Table 4.3 Maximum Deflection

Type of Truss Bridge	Howe Truss Bridge	Pratt Truss Bridge	K Type Truss Bridge	Warren Truss Bridge
Maximum Deflection (mm)	23.399	24.491	20.33	21.939

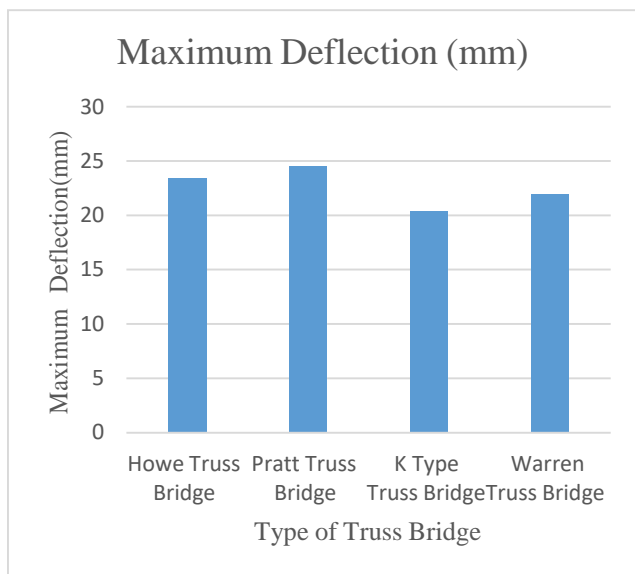


Figure 4.3: Maximum Deflection of Truss bridge

4.2.4 STEEL SECTION WEIGHT:

Magnitude of maximum stress for various forms of truss has been plotted in figure number 4.4. It is observed that warren truss type bridge structure will be more costly for same loading as compared to other cases whereas howe type bridge will be economical in comparison to other cases.

Table 4.4 Weight of Steel

Type of Truss Bridge	Howe Truss Bridge	Pratt Truss Bridge	K Type Truss Bridge	Warren Truss Bridge
Weight of Steel (KN)	407.141	412.869	434.976	480

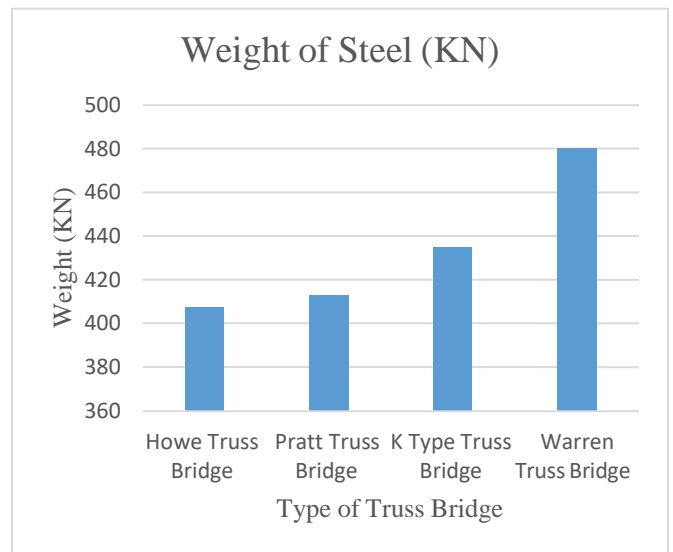


Figure 4.4: Weight of steel for Truss bridge

4.2.5 COMPARISON OF ALL SECTION WITH RESPECTIVE COST

The cost of the truss bridge structure is mainly depends on type of truss, type of material, connections, site conditions and workmanship. Type of truss is varies as per design requirement, cost of the material and connections is depend on selection of sections and type of connections respectively. Workmanship is depend upon site location, site conditions, structural specification etc. it is different with different structure.

I-sections is available in standard size so no extra fabrication cost is required, Truss is fabricated piece wise in workshop and only assemble on site with the help of bolted or welded connection so cost of connection of I section truss is less as compared.

Comparison of cost of all type of truss bridge is done based on cost of material and cost of connections and other factors considered as constant.

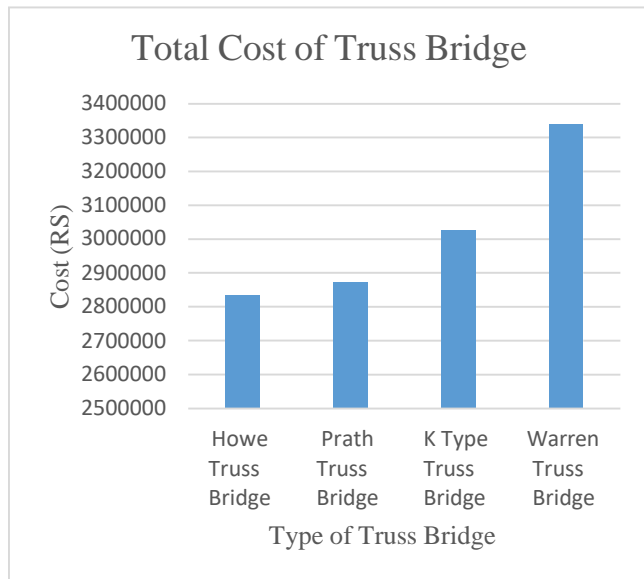


Figure 4.5: Total Cost of Truss Bridge

Comparison shows that the Warren Truss Bridge is most expensive, Howe Truss Bridge 15.3 %, Path Truss Bridge 14% and K Type Truss Bridge 9 % cheaper than the Warren Truss Bridge. The most economical bridge is Howe Truss Bridge.

The howe truss bridge and Pratt Truss Bridge gives better results in shear force, axial force and weight of steel and howe truss bridge and Pratt truss is sable and economical truss bridge for railways and other traffic and has more advantages compared to other truss bridge so adaptation of the howe truss bridge is more effective.

5. CONCLUSION AND FUTURE SCOPE

5.1 GENERAL

This chapter includes results of the steel truss bridge. The main aim of the work is to find economical truss bridge by comparing the all other truss bridge with respective weight and cost of the structure.

As discussed in the last chapters, we have considered four type of truss bride i.e Howe truss bridge, Pratt truss bridge, K type truss bridge and warren truss bridge. And we consider vehicle load cases (IRS 25T-2008 Loading) along with dead load & rail load for the Steel Bridge for analysis by using Staad-Pro software. Following are the salient conclusions of this study-

Some of main observations and conclusion are as follows:

1. Shear Force: In terms of unbalance forces Pratt type truss bridge and Howe truss bridge is more

stable showing less shear forces, whereas maximum is observed in K-Type truss bridge.

2. Axial Force: For the case of Axial force analysis, It is observed that out of the four Warren type truss bridge gives maximum values whereas owe has least value i.e. 1211.1 KN
3. Deflection: They observed that Maximum deflection is observed in Pratt truss bridge whereas least in K type truss bridge.
4. Steel Structure Weight: As India is a developing country therefore there is a need of economical sections to have a cost effective design to bear same loading in lesser cost. In this study they observed that out of all four cases howe type truss bridge shows least values which mean for the same loading it will take less weight of construction material which makes it more economical than others. i.e. 407.141 Newton.
5. The most economical steel truss bridge for Board Gauge railway for loading of IRS 25t Loading-2008 is Howe Truss Bridge as compare to other type of truss bridge.

6. ACKNOWLEDGEMENT

1. I would like to thank first my project guide Prof. Amey R. Khedikar for their guidance and invaluable words of advice, support and help given to me to do this review paper. Secondly I would like to thank my parents and friends for their appreciation and belief in me

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Waterproofing of roof with discarded tyre rubber crumb powder

Pro. Syed Sohailuddin¹, Juned Turak², Prathimesh Wagh³

¹(Assistant Professor, Anjuman College of Engineering And Technology, Nagpur

Email: sohailsyed111@gmail.com)

² (Civil, Anjuman College of Engineering And Technology, Nagpur

Email: junedturak@gmail.com)

³ (Civil, Anjuman College of Engineering And Technology, Nagpur

Email: prathimeshwagh642@gmail.com)

Abstract:

The main aim of this research is to analyse the feasibility of recycled rubber tires for use in the field of construction. It aims to find a rubber-concrete mixture using recycled rubber tire crumbs that can enhance the waterproofing capacity of concrete.

Keywords — Waste tire rubber crumbs, concrete, rubcrete, water absorption, compressive strength, workability.

I. INTRODUCTION

About one crore 10 lakhs all types of new vehicles are added each year to the Indian roads. The increase of about three crores discarded tyres each year pose a potential threat to the environment. Tyres are recycle yet significant number are added to existing tyre dumps or landfills. The generation of waste tyres far exceeds than now being recycle. Waste rubber tyres cause serious environment problems all over the world. These accumulated waste materials can be used in Civil Engineering Construction.

Early studies on the use of worn out tyres in asphalt mixes were very promising, not much attention has been given to the use of rubber from scrap tyres in Portland cement concrete.

II. TYRE CRUMB

Crumb rubber may be produced by an ambient process (mechanical sizing) or by cryogenic process (freezing). In the mechanical process, tyres are reduced to chips or shreds and then put through granulators which separate and remove loose steel and fiber and further reduce rubber particle size.

Finally, the small rubber chunks are ground to produce rubber crumb of 30 to 80 mesh size. In the cryogenic process, tyre chips are frozen in liquid nitrogen as they pass through a cryogenic tunnel then broken down by impact. They then pass through a series of screen meshes where they are shattered into their three component parts: rubber, steel and fabric. Although the cryogenic process is the more expensive of the two, it produces smoother and smaller crumb.



TYRE CRUMB

III. IMPORTANCE OF THE STUDY

Rubber tire wastes were already used in making asphalt mixes for paving roads and other related construction works. The rubber properties such as its density, moisture absorption, and thermal insulation were factors that make it a good material for water proofing as well as for insulation benefitting the construction industry. Also, the study utilized waste materials which help in conserving our environment. This can benefit the community due to the fact that rubber tire crumbs are cheaper than other aggregates and sometimes they can be obtained at no cost at all. Because of lighter mass in the concrete mixture, when rubber tire crumbs were used, the weight of the structure would be reduced at the same time.

IV. METHODOLOGY

A. Collection of raw materials

1. Cement: OPC 53 Grade conforming to IS: 8112-1989
2. River Sand: Collected from Jain sand suppliers
3. Tyre rubber crumb powder: Procured from tyre recycling industry in khapa, where the material is available in bulk quantity.

B. Testing on materials

CEMENT:

- i. Initial and final setting time
- ii. Consistency test
- iii. Strength test

AGGREGATES:

- i. Specific gravity
- ii. Water absorption
- iii. Impact value
- iv. Flakiness index
- v. Abrasion test

SAND:

- i. Specific gravity
- ii. Bulking of sand
- iii. Silt content test

C. Mix design

Mix design is defined as the process of selecting suitable ingredients of concrete and determining

their relative proportions with the object of producing concrete of certain minimum strength and durability as economically as possible. Generally we are using M20 grade of concrete for better result.

- **Quantity of material used for Conventional Concrete Cubes**

Weight of cement = 5160gm

Weight of sand = 7725gm

Weight of aggregate = 15480gm

- **Quantity of material used for rubberish Concrete Cubes with 3% crumb replacement of fine aggregate**

Weight of cement = 5160gm

Weight of sand = 7493.25gm

Weight of crumb = 231.75gm

Weight of aggregate = 15480gm

- **Quantity of material used for rubberish Concrete Cubes with 1% crumb replacement of fine aggregate**

Weight of cement = 5160gm

Weight of sand = 7647.75gm

Weight of crumb = 77.25gm

Weight of aggregate = 15480gm

V. TESTING RESULTS

1. CEMENT

- Initial setting time and final setting time = 70 min and 180 (initial setting time should be more than 30 min and final setting time should be less than 600 min)
- Consistency test = 29 % range (25-35 %)
- Strength test = 23 mpa for 7 days (range 20 – 22%)

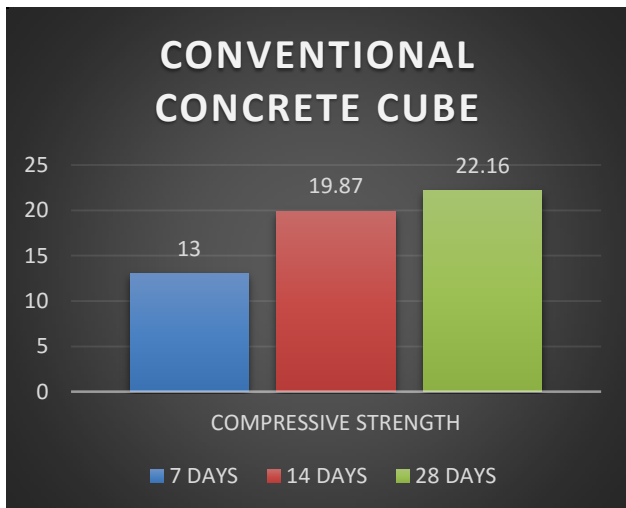
2. AGGREGATES

- Specific gravity = 2.85 range (2.5 to 3.0)
- Water absorption = 1.2 % (it should not exceed 3%)
- Impact value = 7.85% (it should be less than 45%)

- Flakiness index = 8.56% (it should be less than 35%)
 - Abrasion test = 9.5 % (it should be less than 18 %)
- All the values are within limit so we can use the aggregates.

3. SAND

- Specific gravity = 2.66 % (it should be around 2.65 to 2.67)
 - Bulking of sand = 13.55 % i.e., moisture content 2.6 % (excessive moisture content increases the workability but loses its strength)
 - Silt content test = 3.77 % (it should not exceed 8%)
- After performing all the experiments on various materials and all the values are within limit therefore our material is suitable for further use.



4. COMPRESSIVE STRENGTH

Fig. 1 Compressive Strength of Conventional Concrete Cubes.

Fig. 2 COMPRESSIVE STRENGTH OF RUBBERISHED CEMENT CONCRETE CUBES WITH 3% REPLACEMENT OF SAND

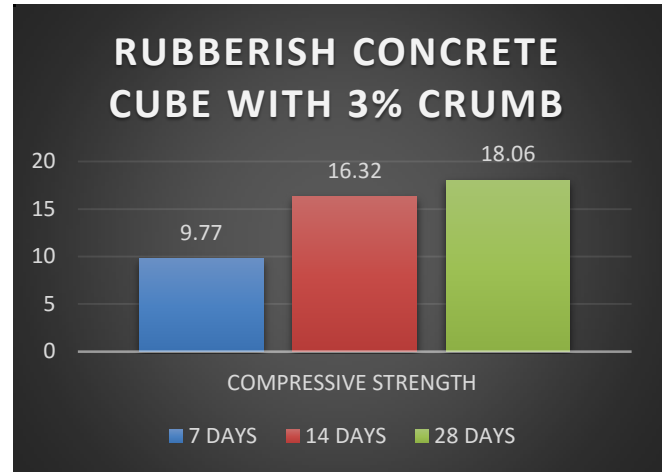


Fig. 3 COMPRESSIVE STRENGTH OF RUBBERISHED CEMENT CONCRETE CUBES WITH 1% REPLACEMENT OF SAND

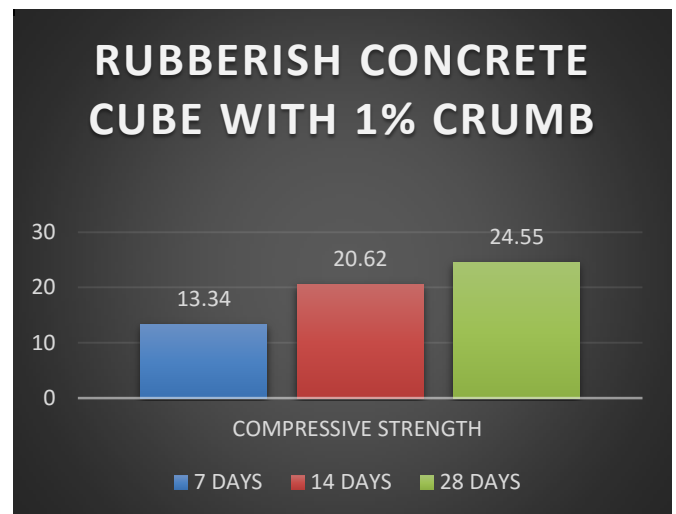
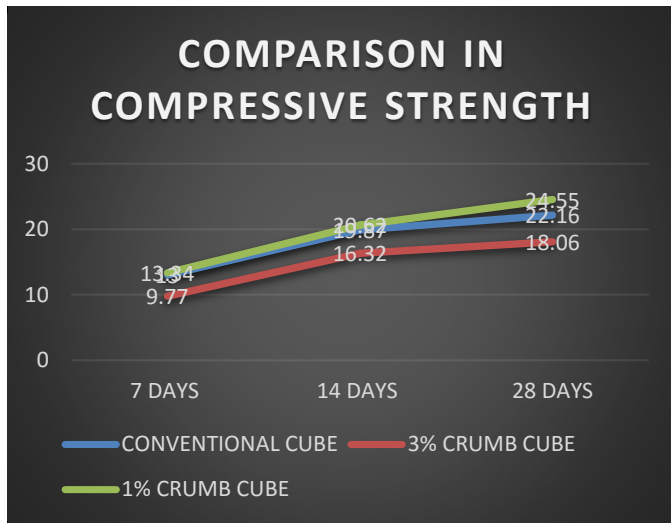


Fig. 4 COMPARISON



From the comparison chart it was observed that strength was increase by 9.74% with replacement of 1% of crumb rubber to the fine aggregate in concrete. But, compressive strength was reduced by 18.5% with replacement of 3% of crumb rubber to the fine aggregate in concrete respectively.

VII. WATER ABSORPTION TEST

TABLE 1: TRIAL 1

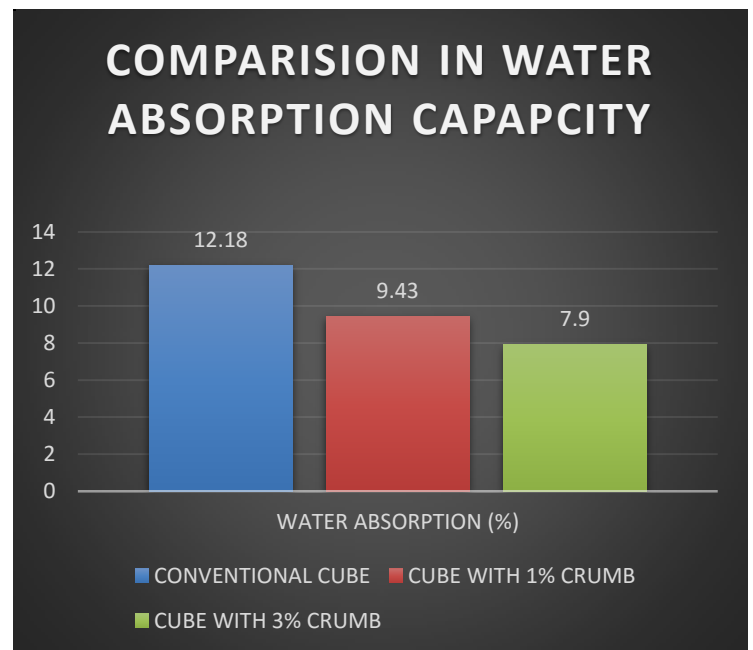
SPECIMEN	CRUMB (%)	Oven Dry Mass (kg)	Dry Mass (kg)	Water Absorption (%)
1	0%	2.323	2.60	11.94
2		3.376	2.642	11.2
3		2.134	2.42	13.42
AVERAGE				12.18

TABLE 2: TRIAL 2

SPECIMEN	CRUMB (%)	Oven Dry Mass (kg)	Dry Mass (kg)	Water Absorption (%)
1	1%	2.309	2.55	10.44
2		2.289	2.51	9.65
3		2.181	2.36	8.2
AVERAGE				9.43

TABLE 3: TRIAL 3

SPECIMEN	CRUMB (%)	Oven Dry Mass (kg)	Dry Mass (kg)	Water Absorption (%)
1	3%	1.983	2.152	8.02
2		1.843	1.995	8.25
3		1.855	1.993	7.44
AVERAGE				7.9



From the above results it shows that concrete incorporated with rubber tire crumb powder has a lower water absorption than ordinary concrete mix. The specimen with the lowest water absorption was the one in which we replace 3% crumb to fine aggregate which had a water absorption rate of 7.9% which is less than the conventional cube with water absorption rate of 12.18%.

VIII. BENEFITS

Advantage of this treatment:

- a) Utilization of waste material.
- b) All materials are easily available.
- c) Having lower density, it reduces load on roof.
- d) Flexible materials which does not crack.

IX. CONCLUSION

From this experiment, the following conclusions could be drawn:

1. Recycle rubber tire crumbs be used as partial replacement of aggregated which can reduce the water absorption, permeability of concrete which can make it waterproof.
2. The design mixture having lower absorption than conventional concrete that is normally used in the construction industry but higher rate of absorption than commercial concrete with waterproofing chemical admixture. It has potential for waterproofing but concrete with admixture shows greater reduction of rate of absorption as well as permeability and strength.
3. Rubber concrete mixture has the lowest rate of absorption among the design mixes provided by the researchers. Compared to normal concrete that is conventionally used in the construction industry, has lower rate of absorption. But then, compared to commercially used concrete for waterproofing incorporated by a chemical admixture, it has higher rate of absorption than that.
4. Rubber concrete has a potential of reducing concrete's water absorption as well as permeability.

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DESIGN OF IRREGULAR A - SHAPED MULTISTOREY BUILDING

Mayuri Awale*¹, Shanila Qureshi*², Oais Patel*³, Muzammil Ahmad Ansari*⁴,
Sumedh Atrah*⁵, Usman Ghani*⁶, Prof. Mohd Azaz*⁷

*^{1,2,3,4,5,6}U.G Student, Department Of Civil Engineering, Anjuman College Of Engineering And Technology,

Nagpur, Maharashtra, India.

*⁷Professor, Department Of Civil Engineering, Anjuman College Of Engineering And Technology, Nagpur, Maharashtra, India.

ABSTRACT

This research is on the design of an Irregular A - shaped building. Irregular structure is a revolutionary topic in civil engineering. The two most significant aspects of new structures are form and function, which are growing more sophisticated as elements of equally sophisticated "systems" that we live in. Both the shape and the structural system must be sound in order for the construction to be both aesthetically pleasing and functionally successful. Nowadays, it is usual to see structures that are irregularly shaped or sculptural in nature. The irregular shape building differs from regular building in terms of shape, structure, reliability, economy and aesthetic appearance. The study focuses on design and load analysis of an irregular A shaped (G+3) multistorey mall. The design is performed in AutoCAD software and load analysis in STAAD PRO V8i software.

Keywords: Irregular Shaped Building, Sculptures-Like, Multistorey Mall, Autocad, STAAD PRO.

I. INTRODUCTION

The regularity of the structure refers to the structure's symmetrical and compact shape. The objective of building regularity is to minimise unpredictably high stress concentrations that might lead to local collapses and changes in dynamic behaviour. Irregular structures, such as those with an L-shaped plan, that can be described as "irregular" using both perceptive criteria and irregularity norms supplied by guidelines, show that the irregularity is "visible" if the diaphragms are rigid and the columns are distributed according to the shape. The irregularity causes torsional effects in the response, which can be accounted for at the design stage. The majority of the structures are constructed in plain rectangular designs. Uneven structures combined with odd and odd shapes, on the other hand, are frequently destined to become iconic. When compared to traditional buildings, these irregularly shaped structures usually give off a very futuristic look. Such structures quickly stand out as architectural icons, often relating directly to the stakeholders' distinct personality and ideology. These irregularly shaped building designs now rely on digital technologies for their design and construction.

II. METHODOLOGY

The A - shaped irregular building's plan is carried out in AUTOCAD software. Design is only done in required software. The floor plan can be defined as a drawing sized to a suitable scale such that the positions and orientations of the room are depicted clearly from above that is from a bird's eye view. The floor plan is the top view of the floor of a building or any structure and is regarded as the most fundamental architectural drawing. The floor plan is a two-dimensional representation of the floors of a building including the size and details. Designer, engineer's, contractors and Architects use the floor plans extensively to represent the arrangement of the available floor space within a building. Precisely the floor plan can be defined as the vertical orthographic projection of an object in a horizontal plane cutting through the building such that the walls, Windows, doors and the other elements such as stairs, within a floor of the building are included. The major importance of the floor plan can be; It act as a medium to communicate the ideas regarding how the available space can be utilized within the building. It also depicts the scope of work required and the scale of the project. It can be used for the interior designing and layout. A column or pillar in architecture and structural engineering is a structural element that transmits, through compression, the weight of the structure above to other structural elements below. In other words, a column is a compression member. The plan which contains column size & position is called a column layout plan. The column layout plan is very important for a Structure. Because without column layout it's impossible to locate the actual location of the structure.

AutoCAD Drawing

- First the ground floor plan is carried out composing of space distribution of the given plot and the corresponding carpet area. Featuring the entry, exit, staircase and etc.
- Further second and third floor plan is executed embracing of the shops, escalator, moving space and other.
- Beam layout is carried out showing the placements of beams and further plinth layout is also exhibited.

STAAD PRO Software

STAAD Pro is one of the most widely used structural analysis and design software products worldwide. It can make use of various forms of analysis from the traditional static analysis to more recent analysis methods like p-delta analysis, geometric non-linear analysis, Pushover analysis (Static-Non Linear Analysis) or a buckling analysis

III. MODELING AND ANALYSIS

AutoCAD Drawing

We have done modelling of our project, irregular building using software AutoCAD. AutoCAD is a commercial computer-aided design (CAD) and drafting software application. Developed and marketed by Autodesk. AutoCAD develops the application in both the 2D and 3D formats and provide the information to the application. It provides tools to design the software used in the industry, architectures and project management. It provides an easy way to design the software with the designs and architect it according to the need. AutoCAD software is used to draw and design the documents and the applications with easy customization options. AutoCAD provides a platform to be used by professionals to create the designs and 3D models. It allows the creation of the professional technical drawings and conceptual designs used for representation of the logics. It allows the drafter to provide the finishing touches and designing with the detailing and linking to the online data. It provides suppliers or operational professionals to review the drawings and modify it according to the requirements. AutoCAD software provides the design and the shape for the products that needs to be created. It provides flexible and user -friendly features with the tools to design the applications and document the workflows. This involves aggregate and import models for the formats and usually allows the design to get created without any change in source model. It provides tools to provide the formats by detailed designing the layouts and drawings using the views automatically. It also has the provision to create detailed design layouts and views can be drawn automatically using the source model.

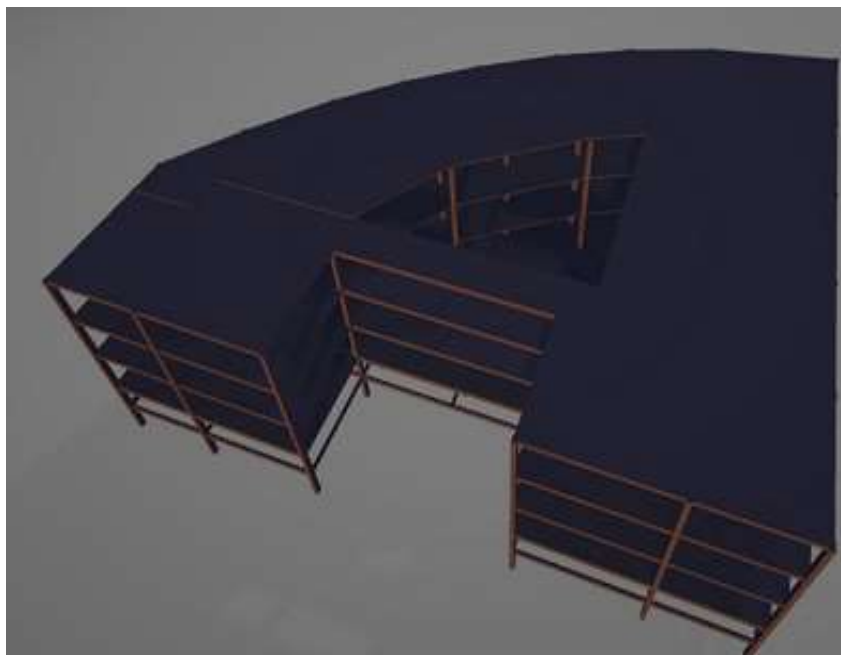
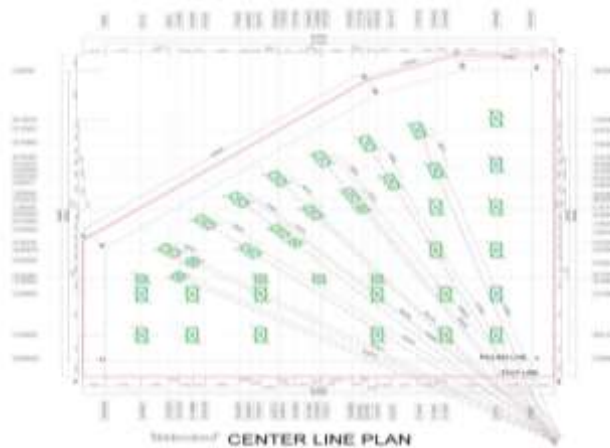


Figure 1: 3D view of building.



Figure 2: Front view of building



IV. RESULTS AND DISCUSSION

Execution of line plan of all the story was done in AutoCAD software. The seismic zone is considered to be Zone 2, the story drift all the corresponding story in shown in STAAD PRO software. the below graph shows maximum story drift.

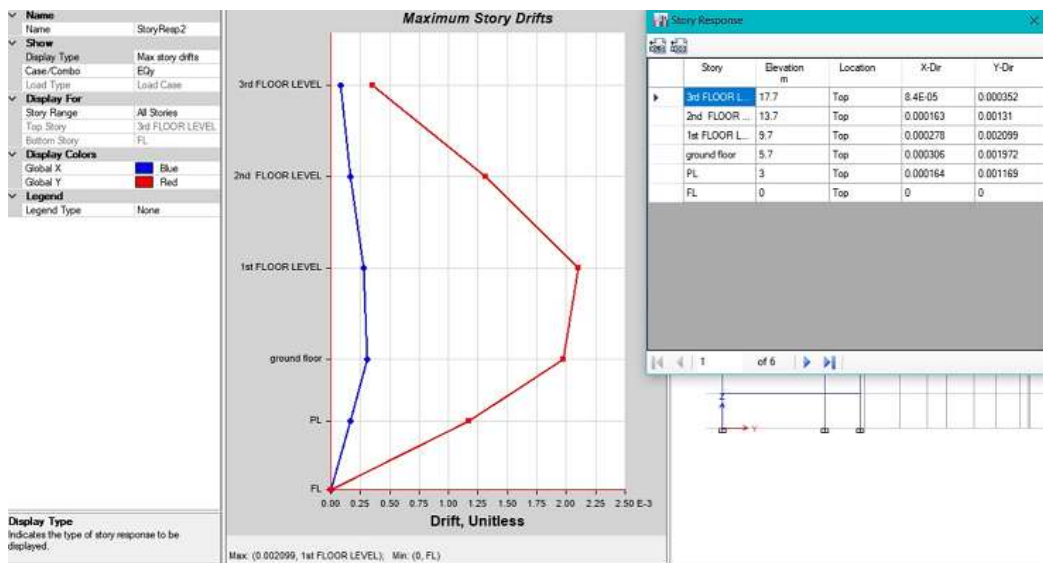


Figure 2: Story drift graph

V. CONCLUSION

Even though building a structure which is not common to regular structure should be emphasized to work on. More areas of construction should be studied to expand knowledge in the construction field. Irregular building requires a skill full mindset to have a proper knowledge of design and analysis. The challenges in the design and other execution can be studied and a solution can be carried out for further work if done in this field.

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SEISMIC PERFORMANCE OF OVERHEAD WATER TANK WITH OF DIFFERENT CAPACITIES & STAGING HEIGHT

**Aaquib Zafar Ansari*¹, Mohammad Mohsin Ali*², Md. Faisal Reza*³, Kashif Khan*⁴,
Shakeel Hashmi*⁵, Kamraan Sayeed*⁶, Rozina Sheikh*⁷, Sakshi Parmar*⁸**

*¹Assistant Professor, Anjuman College Of Engineering And Technology, Nagpur, Maharashtra, India.

*^{2,3,4,5,6,7,8}Final Year Students, Civil Department, Anjuman College Of Engineering And Technology,
Nagpur University, Nagpur, Maharashtra, India.

ABSTRACT

A vast population of this planet depend on water tanks for treated water supply and these structures are one of the basic needs of human beings nowadays. To ensure proper designing of the structure considering different earthquake zones, staging heights and different tank capacity, a detailed analysis has to be carried out. The water tank has to be operable even after an earthquake or severe wind load conditions. The main object of this paper is to find out safe design criteria of an RC overhead water tank which can counteract the effects due to earthquakes and different dynamic response of the structure. In this paper, some of the research papers which deal with the seismic analysis of RC elevated water tank along with reference to different staging heights and capacities have been reviewed. Most of the authors performed the analysis using the softwares like STAAD.PRO, SAP and ETABS. The required data for the design of the water tank is obtained after proper modelling of the structure on the software. Conclusively, the required knowledge of the design of the water tank in different conditions have been gained after the review.

Keywords: Earthquake Zones, Seismic Analysis, Staging Height, Water Tank, Wind Load.

I. INTRODUCTION

Treated water is a need of all humans and sufficient supply of water depends on the water tanks in many areas. Overhead water tanks are designed for different capacities depending upon the needed supply. Either way they are designed for a larger volume and any discrepancy in the designing of the structure can be fatal to nearby living beings. The threat of earthquakes is one of the paramount problems that can lead to the failure of the water tank. They are needed to be designed such that they do not fail when an earthquake occurs. Therefore the design of the water tank is needed to be safe. There are various factors which govern the safety of a structure such as base shear, overturning moment, deflection induced in the structure etc. Earthquake zones play an important role while designing an overhead water tank as increase in earthquake zones (i.e, zone I to zone V) results in instability of the structure. Hence the design of a liquid retaining structure needs critical attention and well suited design parameters. Various studies and researches have been carried out over the decades to ensure safe design of a water tank in different topographical conditions.

II. LITERATURE REVIEW

Tiruveedhula Chandana & S.V. Surendhar (2019)

Three types of RC elevated water tanks namely circular, rectangular and intze were analysed for cost efficiency and seismic behaviour and a comparison has been made among these three types of water tank. The three types of water tank have been modelled on STAAD.Pro software for the same capacity of 1000 KL. The design procedure also includes gravity analysis, static analysis and wind analysis. The values of maximum base shear, maximum overturning moments and maximum displacement are obtained from the STAAD.Pro software from seismic and wind load analysis. From the results of cost analysis, circular water tank was found to be most economical while intze water tank was marked down as costliest. Circular type of water tank experienced maximum displacement, base shear and overturning moment when compared to other two types of water tank due to its support conditions. Conclusively it has been found for a windy place where wind load is more than normal, intze water tank is most suitable whereas for seismic loading conditions, circular water tank is most preferable.

Ayub Patel & Sourabh Dashore (2017)

Ayub Patel and Sourabh Dashore carried out a seismic analysis of RC elevated water tanks having different capacities. For the analysis square and circular water tanks have been considered of 100m³ and 200m³ capacities under different earthquake zones (i.e, zone III, zone IV and zone V). They also analysed the model on the STAAD.Pro software for different staging heights (i.e, 12m, 18m and 24m). From the result they observed that as they moved from zone III to zone V, for same design, the base shear value went on increasing from zone III to zone V while a considerable decrease in base shear was witnessed when staging height was increased in all earthquake zones for both circular and square water tank. Also, with increase in capacity, base shear increases linearly. They concluded that lower zones exhibit lower deflection and base shear and for higher zones they increase. Despite the initial decrease in deflection observed for 3m, 6m and 9m span of staging, it went on increasing afterwards. Moreover, the values of deflection and base shear were observed more in circular tank than the rectangular one.

Mr. Santosh Rathod, Prof. M B Ishwargol (2018)

The two authors carried out an analysis of overhead water tank with different base width and staging heights. They studied the behaviour of the reinforced cement concrete overhead water tank of capacity one lakh litres and also they made a comparison between different staging height and different base width of model and by using staad.pro software complete analysis has been completed. There are some following points observed during analysis they consider full tank level, earthquake zone III, damping ratio 5% and by using different IS code loads are calculated. wind loads calculated using IS: 875 (part3), dead load using IS: 875 (part 1), earthquake load using IS: 1893-2002 and Load Combinations are as per IS: 1893 (part-2) codal provisions for liquid storage structures. . They considered 6 numbers of columns and 12 bracing beam in staging. Of the results they observed that as staging height increases bending moment value and the base shear numbers also slightly increased. It was noticed that with decrease in height of cylindrical wall, the value of base width increases and hence the value of base shear acutely increased. Moreover, for the same criteria, the displacement value is found to be drastically increased.

Sayed Habiburrahman Haqbin, Chintan D. Patel and Bansal. R. Patel (2006)

The authors have done seismic analysis of reinforced elevated rectangular water tank using IS: 1893 (part 2): 2006 draft code. The authors are taking a tank with two degree of freedom as per IS: 1893 (part 2): 2006 draft code with large mass of 300 m³ and which is placed at the top of frame supported system and they stated that the performance of the tank under the earthquake loading is greatly based on the various staging heights which is considered as (6m, 9m, 12m, 15m, 18m and 21m) and various seismic zones which is taken as (I, II, III, IV & V) and also seismic forces based on the staging height. The above results were studied from STAAD.Pro analysis software and excel sheet program to find out maximum base shear, overturning moment, quantity of concrete, and amount of reinforcement for different staging height and seismic zones. This study is carried out by considering that the liquid mass is split up into two parts i.e convective and impulsive masses. After studying all the parameters they have come to result that base shear, overturning moment and displacement are increased with increasing the staging height and seismic zones due to increase in the height of structure cause increment of distance between mass and center of gravity as per IS: 1893 (part 2): 2006. And it is also discover that in the case of study of seismic zones such as I, II, III, IV & V are changed but the geometry of the model remained constant therefore the quantity of concrete is not changed. But the reinforcement quantity is increased because of increase in seismic zones. Therefore, they have come to the result that the software is able to provide the requirement of reinforcement to withstand the seismic forces without any variation in the cross section.

Miss. Sonali M. Maidankar , Prof. G.D. Dhawale and Prof. S.G. Makarande (2015)

The authors have intend to study the behavior of different staging under different loading conditions. The objective of this study is to give the structure better performance during earthquake. For further analysis they have considered 500 m³ capacity tank with the variation in staging height which is 12m, 16m, 20m with three types of bracing were applied to the staging of elevated circular water tank for various earthquake zones. They have prepared 27 models by means of SAP 2000 v15 for finding out base shear and nodal displacement for the staging with normal bracing, cross bracing and radial bracing for both empty and tank full conditions. The combination of load which is used in this model with different types of bracing which gives minimum base shear and considerable displacement for measuring earthquake zones. They have also considered spectrum method in the analysis of structure for the software. The results which are obtained were correlated with the

manual calculation. IITK guidelines play vital role for finding out base shear and sloshing force as well. Impulsive and convective mode is also taken into consideration for hydrodynamic pressure calculation. After the completion of software analysis and by manual method they have come to the result that increment in height of staging causes increment of column moment in bracing, bending moment in bracing and shear force in bracing. They also discovered that shear force in bracing is minimum for radial bracing, axial column force and base shear is not much affected by height of staging, increment of height of staging for zone IV causes increment in displacement, cross bracing shows least value for base shear for all zones and staging height and maximum displacement is more in cross bracing.

Harsha J T & Krishnamoorthy A (2018)

Seismic response evaluation of elevated water tank for different earthquake zones has been analysed by the authors. The authors have discussed about the analysis of the seismic response of elevated water tank for the various seismic ground motion. They consider a rectangular tank of 5m wide and 3m height imposed on a framed structure which is fixed at the bottom and 6 m of height above the ground level, with the column of dimension 0.5m X 0.5m and with the wall thickness of 0.3m, and they have used a finite element model structure and also liquid is considered for the examination. The inside liquid in the tank is categorized into four noded elements and the fluid structure interaction is also taken into account. This fluid is taken as incompressible and of zero viscosity. The effect of wall thickness and the result of time history is used to present base shear, sloshing displacement and fluid pressure. This analysis shows that the response of elevated tank is totally based on the flexibility of wall and the type of earthquake. The tank they have considered is of two noded beam element with two transitional and one rotational degree of freedom and at every node and the fluid is modelled using four noded two dimensional isoparametric elements with one pressure degree of freedom at every node. They have also considered peak ground acceleration of the earthquake for the analysis. From the study it is find out that the response reaction of the tank such as base shear, pressure and sloshing displacement varies with the different earthquake the responses are also effected by thickness of the wall and the flexibility of tank has significant effect on the response of the tank.

Maria Momin, Dr Vikram A Patil & Somanagouda R. Takkalaki (2021)

Analysis of rectangular elevated water tank for seismic load from zone II to zone IV has been done by the authors. It is performed to analyse a rectangular water tank having capacity of 250 m³ and compare the forces which are generated in different seismic zones due earthquake on the elevated water tank. Therefore they have considered different seismic zones such as zone ii,iii and iv for finding out the seismic forces that are acting on elevated water tank and these zones also analyse for computing base shear and base moment .the values of base shear and base moment is also used for comparison between zone ii,iii and iv. The performance of the study is done by using impulsive and convective mode by considering IS code 1893 (part-2):2014. And also they have considered all forces in both tank full and empty tank condition. After the completion of their analysis they represented all the results in the form of graph and table, with help of these graphs and tables they have come to the result that increase in seismic zones causes increment in base shear, increment in base moment and increment in hydrodynamic pressure on wall and base slab, it is also concluded that zone ii to zone iv is taken as hard rock in tank full and empty condition.

Vrushali Gujar & Shahayajali Sayyed (2019)

The main motive of this paper is to propose a seismic response of intze water tank for various types of staging such as frame staging, shaft staging of water tank & from that select one which have best earthquake resistance behaviour . Dynamic & static analysis of water tank is studied using staad.pro software. The aim of the study is to determine seismic effect on elevated intze water tank with different staging system. Examination and the design of elevated water tank against earthquake drawn from the staad pro v8i software is recognized to be important. This is done so that he structural function should remain even after earthquake. Study of different tank behaviour for different geometry and staging has been examined. Any motion of free liquid surface inside the container should be examined. Three cases are considered empty tank, fully filled tank, partially filled tank. Partially filled tank condition show less damage compare to other two tank conditions i.e. Half filled tank and empty filled tank . The dynamic and static response on the water tank is considered in the paper . Earthquake effects are not same in all zone and it varies from zone to zone (zone II , III, IV).

Hemishkumar Patel , Prof. Jayeshkumar Pitroda & Dr. K. B. Parikh (2014)

Overhead type of water tank are built for direct distribution by gravity flow and are usually of similar capacity. Grounds for which the water will be consumed human consumption or industrial it determines dealing with the material which should not harm humans health. The paper is an appeal of optimization procedure of design of circular elevated tank and analysis of structure which should examine the total economy of the tank as an objective function with different properties of tank that are as follows; the capacity of tank, the length and width in rectangular tank, the water depth in circular tank, unit weight of water and tank floor slab thickness as design variable. All tanks are meant to be designed as crack free structures to put an end to any outpouring. Water and petroleum respond to concrete however, no specific treatment towards the surface is required. The wastes which are collected from the industries that waste can also be collected and processed in concrete tanks with few measures that have to be taken care of. The pumps which are not long term will not affect pressure of water in the distribution system as the pressure is maintained by gravity. As there are no corners to a circular water tank therefore can be made water tight easily. Circular storage of water tank is very economical for storage of water up to 200 lac litres and with diameter that ranges from 5m to 8 m. Circular water tank has side walls designed for hoop tension and bending moments. A hoop tension force for circular tank is lower compared to rectangular tank for higher capacity. Total water load taken by a rectangular tank is slightly higher than water load taken by circular tank. Because of total water load in circular tank, an axial force in column is lower than that of the rectangular tank for larger capacity.

Ankesh Birtharia and Sarvesh K Jain (2015)

This paper summarizes the study of tectonic response for elevated water tanks. According to seismic code is: 1893(part i): 2000, 60% of india is prone to earthquakes. Analysis of elevated water tanks different from other construction in two ways: (i) at seismic excitation, the water inside the tank exerts hydrodynamic force on tank walls and base (ii) as compare to other structures fluids containing elevated water tanks have low ductility and repetition leading to necessity of increased design tectonic forces. A concrete pedestal tower were analysed and also cross branced frame. This effect of tank wall flexibility and also both rocking and translational motions of vessel were included in the study. (i) flexibility of bracing should be considered for dynamic analysis of elevated water tanks, (ii) vertical ground motion contributes significantly to the dynamic instability of conical elevated tanks and (iii) seismic stability is investigated for three condition viz (i) empty condition, (ii) half filled condition and (iii) full tank condition and it is observed that third condition is most difficult as per above points, This study was the first experimental study carried out on a small-scale liquid-filled conical vessel. The simplified models developed subsequently were validated by comparing the results with meticulous analytical models or experimental study on scaled tank models. the conclusion from this study are, The dynamic characteristics of elevated water tanks in which tank consist of a truncated cone having a top superimposed cylindrical cap were identified experimentally in later studies by El Damatty [2005].

III. CONCLUSION

After detailed analysis comprising of all the papers, the following points are needed to be taken into account while the seismic investigation of an overhead water tank is being carried out.

1. Circular water tank was found to be most economical while intze water tank was marked down as the costliest.
2. The response of the overhead water tank totally depends on the flexibility of wall and the kind of earthquake zone.
3. Base Shear, Overturning moment and displacement were found to be increasing with increase in the staging height and seismic zone.
4. The execution of the analysis is carried out by using impulsive and convective mode with the reference of IS: 1893 (part-2) - 2014.
5. The effect of earthquake is not same in all zone it varies from zone to zone (Zone II, III, IV, V)
6. Circular columns for staging of water tank have been observed to be safer than the rectangular columns.
7. Tank Empty condition has less Base shear compared to Full tank condition. Vice versa for the displacement. Cross type of arrangement has more deflection than frame and least in radial, and vice versa is the stiffness.
8. Larger column size tend to expand the seismic capacity via higher value of yield and ultimate forces.

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