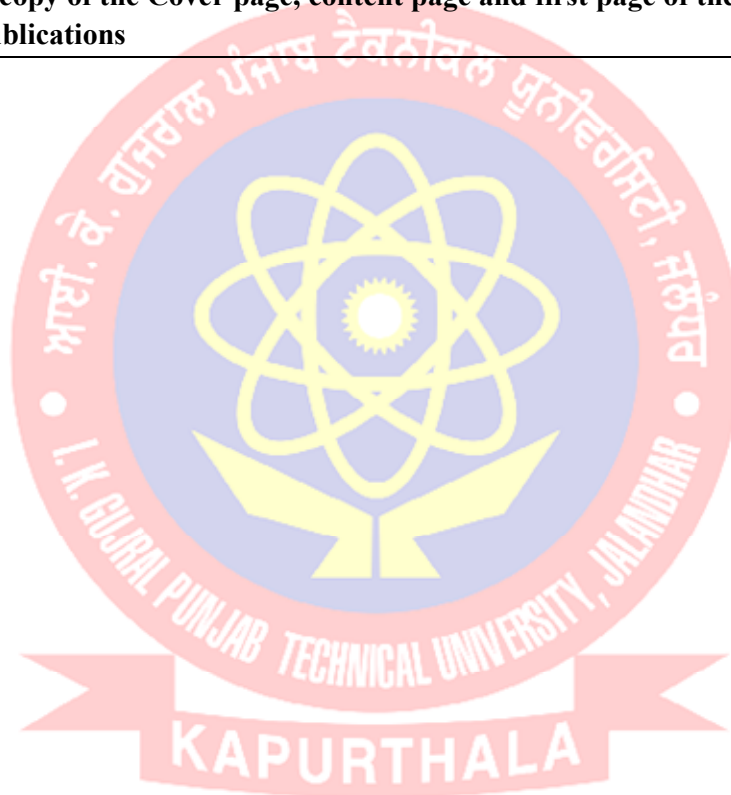


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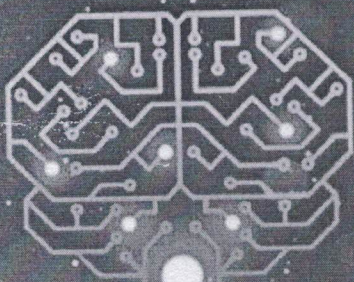
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Editors

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Head
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I.K. Gujral Punjab Technical University
Jalandhar-Kapurthala Highway, Kapurthala-144603 (Punjab) India

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Static and Dynamic Analysis of Multi-Storey Building with Floating Column & their Buckling Behaviour

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Abstract—Floating column is that type of column which is constructed without rigid foundation on a beam. Now a day, floating columns is a typical feature in the modern multi-storied buildings. The structural members fail due to buckling when they are subjected to heavy loads. Columns are the main elements in resisting lateral load moment and also play vital role in seismic performance of the building. In this study seismic performance of multistoried building with and without floating column and buckling analysis of column has been carried out. To analyze five and ten stories structure models were created considering zone IV parameters. Static and dynamic analysis of all models was carried out by STADD-PRO software. The structural response for parameters like floor displacement, base shear, shear force, bending moment, elastic critical load corresponding to member strength for the columns were also studied.

Keywords: Floating Column, Earthquake, Buckling.

I. INTRODUCTION

Earthquake proves to be most disastrous for Civil Engineering infrastructure, if not considered properly during design. There are number of factors or conditions which make the structure unstable and lead to failure of structure. The structure fails, when the stress in the building due to some external forces reached the yield or ultimate strength of the member, exceed a specific maximum deflection. Buckling is a broad term which describes the mechanical behavior and generally defined as the deformation which occurs due to increase in the small magnitude of load, causing the change in member shape. The elastic buckling of the member is generally analyzing by long slender compression member. With the advancement in research, it is observed that discontinuities are crucial in the load transfer mechanism. Due to discontinuities, in the path of load transfer at different floor level, the earthquake effects are different for each floor level in the buildings which leads to poor performance of the building.

The Floating Column: Now a days with change in design technology around the world, complex structures are being constructed efficiently giving due consideration

to seismic phenomenon. The floating column in building works as large function space for storage purpose. In some cases, floating column may be provided economic structure. Floating column in multi-storied residential building has been studied by various researchers (2,3,4,6,8 and 10).

Avinash P. et al (9) investigated the seismic performance of the building with and without the floating column in terms of various parameters such as displacement, storey drift, maximum column forces time period of vibration etc. with various location of floating column and compare it with normal building. In this the building are modeled by using the finite element software ETABS. They conclude that floating columns are not suitable in high seismic zone. Gaurav K. et al (7) studied the dynamic structural behavior of simple configuration multi storey building with floating column. The analysis was done by using the ETABS software. Dynamic action is caused by the both wind and earthquake so with different level of forces along the height of the building. Pramod G. et al (5) analyzed the multi-storied steel structure building in zone 'II' and find the behavior of soft-storey at different floor level of building under the seismic load action. Sameer et al (1) analyzed the floating column in multistoried building. They developed FEM codes for the 2D multi storey frames with and without floating column under different earthquake excitation having different frequency content keeping the PGA and time duration factor constant. The study concluded that with increase in ground floor column the maximum displacement, inter storey drift values are reduced and base shear and overturning moment vary with the change in column dimension.

Different types of software's are available for modeling and validations. In the present study, STADD-PRO was used for analyzing the buckling behavior of floating column in RCC framed structure. STADD-PRO was also used for comparing analysis of Multi-storied structure with and without floating column. Various parameters

Utilization of Sunflower Husk Ash in Concrete: A Sustainable Option

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Abstract—The present paper aims to review the utilization of sunflower husk ash in a sustainable manner. The concurrent study was carried out in order to find the suitability of agro waste ashes as an alternate substitute of cement in concrete. For the present project, six concrete mixes with cement were replaced with varied amounts of sunflower husk ash ranging from (2% to 12%) in M20 grade concrete. The optimum replacement level has been evaluated corresponding with 28 days of compressive strength of concrete. In order to study the effects of these additions, workability, density, and compressive strength properties test of concretes have been conducted. The result indicated that sunflower husk ash at 10% replacement level can be effectively used without compressive strength.

Keywords: Sunflower Husk Ash, Agriculture Waste, Compressive Strength, Cement.

I. INTRODUCTION

In India, Sunflower or Surjmukhi is one of the short-duration crops of the Zaid season, introduced in 1969. The scientific name is *Helianthus* is the combination of “Helios” means Sun and “Anthon” which means the flower is originated in North America. In 2020-2021, According to United States Department of Agriculture, the production of sunflower was 50.04 million metric ton out of which 26.8 million metric ton was used for sunflower oil. This crop had gained popularity worldwide due to its good quality of oil, photo-insensitive property, different crop duration, high-energy husk, higher seed multiplication ratio, high-quality oil, and less water demand [1].

In India, the total production is 100 thousand metric tons, at some time the total consumption is 1.7 million metric tons, the remaining is imported. It has less production due to inaccessibility of good quality seeds, rain during the flowering period, damage by the birds, and less involvement of private companies [2].

According to the Oilseed Department of Agriculture, India (2017), its immature seed is used as feed for poultry, latex from leaves is a good source of rubber. The flower is an abundant source of nectar and pollen for honey. The fully grown seed contained 40 -53% of edible oil used in various types of cooking purposes.

Its vegetable is light yellow contains a high percentage of linoleic acid which is good for heart patients. It has lecithin, tocopherols, and furfural, nutritious for birds also [3]. Agricultural waste ash is an end product, which is produced from those industries which use agricultural waste as fuel. Such types of ashes are not useful and most of the time are dumped near the water bodies to get moisture. Because of its lightweight, it can fly with wind from one place to another. The disposal of these ashes may become a major issue for the environment and society. The efficient use of these ashes can solve the environmental problem and may also affect the economic production of concrete.

Sunflower husk is the exterior cover of sunflower seeds. The husk is a waste generated during the sunflower seed and non – oil sunflower seeds de-husking process to get kernels. The husk contains 220 – 280 g per kg of the total weight of sunflower seeds.

Havrysh et al. (2020) suggested, sunflower husk is a good source of energy in oil mills. It is a biofuel of the combustion-based power plant, curtailed 200 – 300% CO₂, user can meet their demand and sell surplus electricity, get benefited with income up to 24.7 -65.7% [4]. Sunflower seed used in the incineration process and boiler and emits Carbon mono-oxide (18 – 23) mg/m³, sulfur trioxide (2031 – 2105)mg/m³, and Oxide of Nitrogen (240 – 293)mg/m³ during the production of sunflower oil. Sunflower seed husk has 2500 – 2700 Kcal/Kg calorific values. [5,6]. In some countries, it has highest energy content is 15.4 MJ/Kg. because its carbon content is neutral, its energy generation could mitigate climate change [4].

The concurrent study was carried out in order to find the suitability of sunflower seed husk ash as an alternate substitute of cement in concrete. As the utilization of cement as building material becomes costly, it is a cheap material and can save water, energy and reduce the emission of greenhouse gases. These ashes can be easily available or produced and can be used in construction



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Sustainable Use of Plastic Waste and Crumb Rubber in Bituminous Concrete Production



Gurpreet Singh and Rajiv Chauhan

1 Introduction

India's rapid population growth has the world's second-largest population, and India's estimated total population amounted to around 1.33 billion people [1]. This massive crowd and industrial sector development adds an immense amount of non-biodegradable solid wastes to the environment. This growth involves not only livelihoods but also requires a broad network of mobility. Economic and social growth has a close connection in every nation's economy to the creation of its transport sector [2]. The nation has an overall road length of 5,603,293 km; of which 142,126 km are paved roads, as reported by the Transportation Ministry in 2013 [3].

Road network is one of the most widely used by people across all modes of transport. Hence, keeping the roads in good order is important, road performance is dependent upon the materials used. At the top layer of flexible pavement, the highest stress resistance occurs, which is why they are made primarily of bitumen from superior material. Bitumen has acted as a binding material for constructing roads and pavements for many years. Demand for bitumen has increased as a result of rapid urbanization. Bitumen is commonly used in constructing road, mainly due to its excellent binding and waterproofing properties. The appealing properties of bitumen depend on the form and composition of the mixture. Bitumen is a viscoelastic material; hence, its strength and adhesion mechanisms are determined by loading rate and temperature. If insufficient binder is used in the mix, then premature failure in the pavement can occur, such as cracks, and rutting, potholes. The bitumen thus

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A Comparative Study on Modified Bituminous Mixes Using Waste Plastic by Wet and Dry Methods

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ABSTRACT

Road network system of India is deteriorate day by day due to rapid increase in traffic and improper maintenance. Usage of higher quality materials and use of innovative techniques should be put into practice in order to enhance road designing process. In several countries around the world, it has been studied over the past three decades that changing the bituminous binder by inserting waste polymer to enhance the serviceability life of pavement. This research paper aims to shed light on the use of plastic coated aggregate (PCA) in asphalt mixing and to analyze PCA's efficiency using various tests. The present research was conducted to suggest applying PCA for construction of flexible pavement in eco-friendly way to achieve efficiency in good manner. The major advantage of using PCA to construct pavement in economical way by reduction in usages of bitumen and also improve the properties of aggregate. Dry mix (DM) and Wet Mix (WM) methods are adopted to mixing the waste plastic in bituminous mix. In this paper both the mixing method compared each other by utilizing shredded waste plastic bottles made of Polyethylene Terephthalate (PET) in bituminous mixes. The physical properties of traditional and PCA were also compared. The Marshall blend was prepared by using bitumen grade VG-10, PCA, stone dust and cement as a filler to make Bituminous Grade -2 as per Ministry of Road Transport and Highway (MoRTH). To find out optimum binder content Marshall Specimens were casted with bitumen content in range of 4% to 7% with an increment of 0.5% by weight of total mix. The aggregates used for prepared total mix coated with PET content of 3 %, 5%, 7%, 9% and 11% by weight of optimum bitumen content. To find out its suitability in field, Marshall stability, flow value and volumetric characteristics of mix were determined and compared to traditional bituminous concrete mixtures (without plastic). PCA had better binding property, less water absorption, and higher Marshall Stability value was also shown in the sample. The results indicate that Dry mix method (DM) has been found to be effectual than Wet mix method (WM), and is a better option to solve environment pollution due to plastic waste.

Keywords

Dry mix method, Flexible Pavement, Flow value, Marshall Test, Plastic Coated Aggregate (PCA), Plastic waste, Wet mix method.

1. INTRODUCTION

Infrastructures, besides their application in the citizen's day-to-day life also describe the country's level of development. Construction buildings, transport facilities, hydraulic structures etc. are some of the widely classified infrastructures. Today, where a transport system covers a vast amount of the infrastructure industry, the main concern of engineers and researchers is to find an economical, sustainable and environmentally friendly Bituminous Concrete mix. Hence, till this time in order to find solid and robust asphalt concrete pavement engineers use essentially aggregate, bitumen and filler materials. However, construction using such materials comes with a big cost in the budget of the country. On the other hand, a high percentage of the country's budget is often consumed by maintaining the existing roads. As a result, the key issue is to find construction materials that best suit the worst environmental conditions, meeting all the criteria of strength, flexibility, cost effectiveness, reliability and environmentally friendly. The problem of pavement failure occurred by environmental factors, rapid increase in traffic load, etc is overcome by improved the binding properties of bituminous mix. So, there is need to increase the bitumen content in bituminous mix. Bitumen which is obtained from fractional distillation of crude oil is using in the pavement construction as a binding material and a prime component of the road system. Bitumen is very costly as compared to other materials used in road construction. Due to lack of fund there is need to improved the pavement quality by adding some suitable admixture or improved roadway design. There are no's of chemical admixture available in the market to enhance the properties of bitumen. These chemical admixtures not only increase the overall cost of the project also have ill effects on the health pavement workers. To keeping view this point in mind plastic waste is used in construction of road in sustainable way. The plastic waste like polythene bags, wrappers and bottles used to improve the properties of the bituminous mix as well as reduce the so many environmental issues.

There are mainly two process the to modify bitumen mix using plastic waste; first to add the polymer directly to bitumen that process is known as Wet mix (WM) secondly by coating the hot aggregate by shredded plastic waste and immediate after that applying hot bitumen to the plastic coated aggregate (PCA) by Dry Mix (DM). Modification of bituminous mixes has many advantages such as decreased thermal susceptibility and rutting, minimization of low temperature cracking, greater adhesion to the aggregate, increased tire traction etc. A comparative study of the different

Laboratory investigation on the behaviour of modified bituminous concrete mix developed using plastic waste

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ABSTRACT

Increased road traffic combined with insufficient maintenance due to a lack of funds causes the roads to rapidly deteriorate. Now-a-days pavement performance has been observed to be reduced due to the increase of axle load and traffic intensity which causes cracks, pot holes and rutting. The seasonal change in temperature has a significant effect on bitumen behaviour, due to its viscoelastic nature. Many steps can be taken to lighten this cycle, such as improved use of better material quality and pavement design process. The bitumen grade produced in India without admixtures cannot cope with extreme weather conditions across our country; there is a need to validate bitumen mixes with appropriate admixtures. Bitumen admixtures are often of a chemical nature that will cause health effects for the workers paving the pavement. The use of waste materials such as plastic is increasingly promoted in flexible pavement construction and finds a method of safe disposal of waste of such product to reduce the effects on the environment. Waste plastics such as polythene bags, bottles, etc were combined in this study with the bitumen grade 80/100 in an environmentally friendly way. In order to simulate the field conditions Marshall Stability test was carried out on the samples developed by partially replacing bitumen with waste plastic (3%, 5%, 7%, 9% and 11%). It was concluded that the waste plastic as modified binder showed significant improvement in the Marshall stability, flow, volumetric properties and green pavement can be constructed in economical way.

Keywords

Bitumen, Modified Bituminous concrete mix, Marshall test, Pavement, Waste Plastic.

1. INTRODUCTION

India's rapid population growth has the world's second-largest population, and India's estimated total population amounted to around 1.33 billion people[1]. This massive crowd and industrial sector development adds an immense amount of non-biodegradable solid wastes to the environment. This growth involves not only livelihoods but also requires a broad network of mobility. Economic and social growth has a close connection in every nation's economy to the creation of its transport sector[2]. The nation has an overall road length of 5,603,293 km; of which 142,126 km are paved roads, as reported by the Transportation Ministry in 2013[3].

Road network is one of the most widely used by people across all modes of transport. Hence keeping the roads in good order is important. Road performance is dependent

upon the materials used. At the top layer of flexible pavement, the highest stress resistance occurs, which is why they are made primarily of bitumen from superior material. Bitumen has acted as a binding material for constructing roads and pavements for many years. Demand for bitumen has increased as a result of rapid urbanisation. Bitumen is commonly used in constructing road, mainly due to its excellent binding and waterproofing properties. The appealing properties of bitumen depend on the form and composition of the mixture. Bitumen is a viscoelastic material; hence, its strength and adhesion mechanisms are determined by loading rate and temperature. If insufficient binder is used in the mix then premature failure in the pavement can occur, such as cracks and rutting, potholes, etc. The bitumen thus needs to be modified along with innovative sustainable pavement design techniques. Due to insufficient maintenance to the pavement the situation is getting worse. One possible solution to this problem could be to improve the quality of bituminous mixtures. There are many binders available on the market to improve bituminous mix properties but the use of these binders raises overall project cost. The escalating costs of bitumen and the lack of resources motivated highway engineers to explore alternatives for road construction [4].

A common method for improving bitumen quality is to change the engineering properties of bitumen by mixing it with polymers like plastics. In addition, bitumen properties are substantially improved when combined additives are used in bitumen mixtures as opposed to unmodified bitumen[5],[6]. Waste plastic have been used in this study as an additive to base bitumen. Recycling this waste material for the development of new roads and highways will help solve environmental problems by discarding those waste materials in dumpsites. Plastics remain on site for a long time as non-biodegradable materials and cause pollution for the environment [7]. Old methods of disposing of plastic waste, such as burning and land-filling, produce different types of air, water and soil pollution[8]. A recent survey by the Central Pollution Control Board in India estimated that about 33.7 million pounds of plastic waste are generated daily, around 13.2 million pounds of which remain uncollected and pollute environment [9]. Polymer use in modified bitumen improves the efficiency of funnel asphalt paving[10],[11]. The use of recycled plastic waste polythene bags enhanced the engineering properties of bituminous concrete mix, such as toughness or fatigue life. [12]. This technique helps to develop green flexible flooring for future generations by using solid waste as a modifier to improve the engineering properties of bituminous concrete mixtures[14],[15],[16],[17].

In this study, economic mix developed with proper aggregate gradation and sufficient bitumen ratio to meet the desired mix properties of stability, toughness, resilience, skid

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Influence of slag aggregates on compressive strength of HPC

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ABSTRACT: The present study will address the issues associated with use of blast furnace slag aggregates in place of river aggregates in varying proportions for HPC. The tests were conducted by replacing river aggregates with blast furnace slag aggregates by 0%, 10%, 20%, 30% and 100%. High Performance Concrete (HPC) of M_{60} grade of concrete was designed as per ACI standards for the present experimental study. The compressive strength tests on cubes were conducted after 28 days. It was observed that the compressive strength increased by 7–10% with use of slag aggregate in different combinations. Further, when river aggregates were fully replaced with slag aggregates (100%), then average increase in compressive strength was 3%.

1 INTRODUCTION

HPC has become more popular in construction industry. Ordinary concrete is made up of four ingredients, i.e. cement, fine aggregate, coarse aggregate and water. Bentur et al [1987] studied that the compressive strength of silica fume concrete is greater than the conventional concrete. Mazloom et al [2004] observed that at 28 days the compressive strength of silica fume concrete was 21% greater than the conventional concrete. It was also observed that when the age of concrete increases the compressive strength of silica fume concrete also increase. Almusallam et al. [2004] studied the effect of silica fume on the compressive strength of concrete. It conclude that the compressive strength of steel slag aggregate concrete was more in comparison to concrete prepared with crushed lime stone aggregate. Due to increased construction activities natural river aggregate are greater in demand but due to environmental consideration mining is another issue to meet this waste materials are being use in present study for making HPC.

2 EXPERIMENTAL PROGRAM

Material used for making high performance concrete is not a special material; it is same as that required for conventional concrete. The various ingredi-

2.1 Cement

Ordinary Portland Cement (OPC) 43 Grade was used. The cement was tested as per IS: 8112-1989

2.2 Fine and coarse aggregate

River sand has been used for various mixes. Sieve analysis and physical properties of fine and coarse aggregates were tested as per IS: 383-1970.

2.3 Silica Fume

Silica Fume (SF) is a byproduct of the smelting process in the silicon and ferrosilicon industry. It is also known as micro silica.

2.4 Blast furnace slag

The blast furnace slag is the waste product of iron industry. Blast furnace slag is the nonmetallic product, consisting essentially of silicates and aluminosilicates of calcium and other bases, that is developed in a molten condition simultaneously with iron in a blast furnace. The sieve analysis and physical properties of slag satisfied the requirement of IS: 383-1980.

2.5 Superplasticizer

The superplasticizer "Viscocrete 300" was used.

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Exploring the Imageability of Urban Form in Walled City Jaipur

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Abstract— The city is an amalgamation of the utmost interactions of the built mass (form), open spaces and their spatial organization (layout) in a geographical area to obtain a holistic pattern and environment, generally based on socioeconomic conditions and lifestyle of the inhabitants, nature and character of activities and the available materials and technologies, which consequently shapes the overall form and thus image and identity of the place. The cities commonly have a large number of images based on the selective impressions of related realms of the surrounding forms assimilated by people through exaggeration of certain features and exclusion of the other based on the planning and layout of the various elements of the built forms. This paper attempts to analyze various elements of urban form (i.e. built form and unbuilt spaces) of the walled city of Jaipur which results in the formation image and identity of the city. Jaipur is a medieval city founded in 1727 to accommodate exploding population of Amber city, the capital of erstwhile Dhoondhar kingdom. It is known as Pink City for its predominantly pink/rose and complimentary colour schemes. The city has seen a huge transformation in the culture, life style, socioeconomic condition and technology over the ages, yet it is one of most accessible and functional medieval city in India. The study is based on field surveys and analysis of various literatures to ascertain the elements of urban form and overall planning of the forms, pattern and structure resulting into perception and formation of the image and identity of the walled city. The paper concludes with highlighting the problems and discrepancies in perception of the overall image and form of the city due to the urban growth and development in the present context.

Keywords- City Identity, City Image, Imageability, Medieval City, Urban Form

I. INTRODUCTION

The image of a city or its environment is an outcome of two way interactive processes between an observer and the environment. It is an assimilation of observer's filtered perceptual input of related meaning and purpose of constant interacting process based on selection, organization and endorsement, and the distinctions and relations suggested by the environment [1], [2]. Image and Form of the city is being shaped since the beginning of human settlements, and evolving continually over time as an outcome of the perception and reaction of the inhabitants and users in response to social, environmental, economic and technological developments reflecting local climate, character and identity, which supports

compact, accessible, active and healthy communities thereby bringing about changes in their life style and activities. The growth and development of a city is continuous process hence its form, character and image evolve with time, as a result of augmentation in urbanization with the shift in paradigm.

The image of a place is more than the reality and may be increasingly misleading at a time in negative or positive ways despite the considerable changes, manipulations and transformations in overall form or culture over a span of time [3]. The planners as a manipulator and transformer of physical environment and the image are primarily concerned with the extended agents of interaction, to create a common mental picture carried by large number of inhabitants, ignoring the individual differences [1], [3]. The image of the city in broader term is people's comprehension based on selective impression to simplify and generalize the pattern and system of orientation which may be organized around a set of focal points, or broken into named region, or linked by remembered routes, and seems to echo the formal types of image elements of the city categorized by Lynch as paths, land marks, edges, nodes and districts [1], [3].

Urban form in general is the physical shape and structure of the city or built environment around us. It is comprised of visual images of the cities, experiences, feelings, memories of place, thoughts and intellectual constructs anchored in the realm of art and humanities [4]. It is combination of all urban elements which includes the built-up areas & its design including character & identity, urban (street) layout & design (streetscape & urban structure), the physical layout through subdivision pattern, including public & private space, the interrelationship of activities & functions of centres or towns or open space, recreation area & green space [5], [6], [7] & [8]. It differs from place to place, and is relative to its location and function. The evolution of the urban form of Indian cities in general is an outcome of random growth of settlements over the large span of time, which in most of the cases are unguided and unplanned. Some planned intervention like Jaipur has also been commission at different times, but the tremendous change in the lifestyle of people and economic life of the city in the present times has led to transformation of the urban fabric and structure. This is because of the loss of connection between building regulations and aesthetic and environmental values

Number of books and chapters in edited volumes / books published, and papers in national/international conference

Name of the Teacher	Title of the book/chapters published	Title of the paper	Title of the proceedings of the conference	Name of the conference	National / International	Year of publication	ISBN/ISSN number of the proceeding	Affiliating Institute at the time of publication	Name of the publisher
Dr. Rajiv Chauhan	CNRE,2021	A Static and Dynamic Analysis of Multy-story Building with Floating Column & Their Buckling Behaviour		Computing, Networks & Renewable Energy	CNRE-2021	2021		IKGPTU, Main Campus	IKGPTU, Main Campus
Dr. Rajiv Chauhan	CNRE,2021	Utilization of Sunflower Husk Ash in Concrete: A Sustainable Option		Computing, Networks & Renewable Energy	CNRE-2021	2021		IKGPTU, Main Campus	IKGPTU, Main Campus
Dr Rajiv Chauhan		Laboratory investigation on the behavior of modifiedbituminous concrete mix developed using Plastic waste and Crumb Rubber	International Conference on Sustainable Development through Engineering Innovations	Proc.International Conference on Sustainable Development through Engineering Innovations	International Conference	2020		IKGPTU, Main Campus	GNDEC, Ludhiana, Punjab

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Dr Rajiv Chauhan	International Conference on Advancements in Engineering	A Comparative study on Modified Bituminousmixes using waste plastic by Wet and Dry Method	Proc. 8th International Conference onAdvancements in Engineering and Technology	Proc. 8th International Conference on Advancements in Engineering and Technology	International Conference	2020	978-81-924893-5-3	IKGPTU, Main Campus	BGIET, Sangrur, Punjab
Dr Rajiv Chauhan	International Conference on Advancements in Engineering	Laboratory Investigation on the behavior ofmodified bituminous concrete mix developed using plastic waste	Proc. 8th International Conference on Advancements in Engineering and Technology	Proc. 8th International Conference on Advancements in Engineering and Technology	International Conference	2020	978-81-924893-5-3	IKGPTU, Main Campus	BGIET, Sangrur, Punjab
Dr Rajiv Chauhan	Insights and Innovations in Structural Engineering, Mechanics and Computations	Influence on Compressive Strength of HPC by replacement of river aggregates with slag aggregates	Insights and Innovations in Structural Engineering, Mechanics and Computations	Structural Engineering and Mechanical computations in Sep 2016 at South Africa.	International Conference	2016	978-1-138-02927-9	Punjabi University, Patiala	CRC Press taylor and Francis

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Dr Md Fuzail Jawaid		Exploring The Imageability of Urban Form In Walled City Jaipur	Proceeding of 4th Annual International Conference on Architecture and Civil Engineering	ACE 2016	International Conference	2016	ISSN 2301-394X	MNIT, Jaipur	GSTF, Singapore