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Study Shape of Shear Reinforcement in Concrete Beam i.e. Lattice Shape, Triangular Shape & Conventional Shape

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Abstract: ***Beam plays most important role in Structural part of a building. Beam is main load transferring member in structure. It moves the heap of structure from superstructure to the establishment. Along these lines, the investigation of the is generally basic. In the beam there are two types of reinforcement provided. These are main reinforcement and distribution reinforcement. For more study of beam literature survey is carried out. Study is mainly focus on the shape of shear reinforcement and shear reinforcement provided in beam. Also study of swimmer's reinforcement along with beam is carried out. Study of reinforcement is carried out by experimental and analytical method. Experimental analysis is carried out by beam testing and for analytical analysis some software's to be used i.e. STAAD Pro, Ansys etc.***
Keywords: Shapes of beam, shear reinforcement, shear failure.

I. INTRODUCTION

A beam is a basic component that principally opposes loads applied on beams. Beam can move the heap of super structure to the sub structure. So as indicated by me beam is the foundation of the any structure. It ought to be solid and capacity as indicated by necessity of the structure. Being the significant part of the structure, it is the fundamental point for scientists. Be that as it may, the beam opposes the applied burden on it up as far as possible after the farthest point surpasses the avoidance happens in the beam. The all out impact of the considerable number of powers following up on the beam finishes up to produces powers and twisting minute inside the beam. These may cause inner anxieties and strains. So as indicated by me beam is the back bone of the any structure. It ought to be solid and capacity as per necessity of the structure. Being the significant segment of the structure, it is the principle point for scientists. May of the exploration completed on the beam and many are in pipe line. As we apply the load on the beam it will react accordingly. Stress induced in a beam due to application of external forces. So, tension, compression, shear zone developed in the beam. For the most part, strain emerges at the base of the beam and pressure at the highest point of the beam. To avoid these types of zone which may be dangerous for the beam we used reinforcement in the beam as the concrete good in compression and steel good in tension. To hold the principle fortification in the beam stirrups are to be utilized. Stirrups are also used as the shear reinforcement in the beam it resists the shear failure of the beam.

II. LITRATURE REVIEW

Junfei Shen et.al. (2018) [1] 'Mechanical Performance of Steel Fiber Lattice Reinforced Concrete Structure.' Right now, learn about execution of steel fiber fortified solid that review ought to be completed in grid strengthened structure. This reinforced concrete has good design capacity and it should be convenient for construction. This experience was conducted for to study the effect of fiber lattice on bearing capacity of reinforced concrete. With the help of this trial bearing limit of steel fiber must be improved.

N Kaarthik Krishna (2017) [2] 'Study on reinforced concrete beams with helical transverse reinforcement.' Right now, chips away at transverse helical fortification. In this paper both experimental analytical processes are to be carried out. This paper tells about conduct of fortified solid beam under tedious stacking by 3 flexural tests. After that this result compared with our conventional beams i.e. with rectangular stirrups. During this test deflection and cracks may observed by the author. Test result indicates that with helical transverse reinforcement result obtain are good as compared with conventional reinforcement. Also, this paper is efficient for replacing of normal reinforcement with helical reinforcement because of its ability to resist reinforce in all direction. For analytical comparison Ansys software used.

Jie Niu. Hui Leng Choo (2017) [3] 'Numerical study on load-bearing capabilities of beam-like lattice structures with three different unit cells.' The arrangement and examination of cross area structures made using included substance delivering methodology is another approach to manage make lightweight top notch parts. In any case, it is hard for specialists to pick the best possible unit cell

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for a specific capacity structure and stacking case. Right now, beam-like cross section structures with triangular crystal, square crystal and hexagonal crystal were planned, produced by SLM process utilizing AlSi10Mg and tried. The mechanical exhibitions of cross section structures with equivalent relative thickness, equivalent base territory and stature, and equivalent length for all unit cells were directed by limited component examination (FEA). It was discovered that compelling Young's modulus is relative.

Patrick Huber et. Al. (2017) [4] 'Shear behaviour of concrete beams without and with minimum shear reinforcement.' The appraisal of the shear quality of existing extension structures has become a significant point. In the initial segment of this exploration venture the impact of the tried example, the nearness of a pressure rib and the impact of a low measure of shear fortification is examined. The test beams without shear support show a huge size impact. With the nearness of stirrups, the size reliance vanishes. The normal commitment of the pressure rib to the shear quality of individuals without and with shear support couldn't be affirmed by the analyses. An examination of the test results with current structure codes demonstrated a palatable understanding. This paper shows an examination on the shear quality of fortified solid beams with and without least shear fortification.

M. Sathya (2017) [5] 'An Experimental Study on Reinforced Concrete Beam Using Triangular Shear Reinforcement' Right now examine on beam massively. A definitive point of the undertaking is to exchanging the stirrups structure in the individuals. This will lessen the volume of shear fortification steel and might be improve the heap conveying limit of the part. Six beams have been casted and the thing that matters is just in the stirrups shape and dividing. The stirrups of triangular shape are utilized on the beam. Right now, kinds of separating are given for example bit by bit expanding dividing and equivalent dispersing. The beams estimated 1200 mm long were tried. And the deflection will be evaluated then it is compared with the conventional beam. After the test performed the following conclusion may be carried out i.e. compare to normal shear reinforcement is reduces to 12.71% in triangular shear reinforcement. And also, it is observed that load carrying capacity increased in the triangular beam.

Naiem M. Asha (2014) [6] 'Optimizing the use of swimmer bars as shear reinforcement in the reinforced concrete beams.' In this paper author tells about different types of shear reinforcement in concrete beam. In this paper four different types of shear reinforcement investigated. In this paper beam shear strength and beam deflection are the two factors consider. Also, in this paper shear failure in reinforced concrete beam is taken for finding our behavior of the beam. So to avoid these cases alternatives should be taken. In this new type swimmer bar should be used. Swimmer bar is small inclined bar with it both ends are bend up horizontally for little distance and welded or bolted at top and bottom main steel reinforcement. After casting this type of beam tested in lab. After the taste result ii is observed that with the help of swimmer bar there is increase in shear strength of reinforced concrete beam. And also bolted show similar result to the welded connection.

M.Tapan (2014) [7] 'Structural Response of Reinforced Concrete Wide Beams Reinforced With Lattice Girders.' This paper outlines information from exploratory examination of fortified solid beam for example cross section braces. Which can be additionally be depicted as single direction pieces. Under the static stacking applied to the mid-range. In this author conduct test on lattice reinforced girder and normal reinforced girder and observe effect of load carrying capacity of both elements. In that load deflection behavior, crack patterns, strength and failure modes of tested beams were observed. The total 6 no of beams were tested i.e. 3 with different arrangements a 3 with other reinforcing arrangement. Tasted beam were simply supported and under static loading taste was to be carried out. Furthermore, that taste midspan avoidance were recorded utilizing dislodging transducer. In that similar pattern taste was carried out compare lattice and normal reinforced girders. In that higher resistance capacity was shown in lattice reinforced girder beams.

J. R. Figueiredo Filho (2014) [8] 'Design, manufacture and construction of buildings with precast lattice-reinforced concrete slabs.' Creator clarify about the utilization of precast cross section strengthened joist chunks in fortified solid structures has imaginative since the 1990s. Such pieces are made in two stages one is at the assembling plant or industry and other one is at site. When slab is casted this slab has certain advantage such as consumption of building materials, speed of erection, lower labour cost, simplicity, easy installation, economy. In this lattice reinforced lab difficulty is to be found that bulges form on the soffit of precast lattice reinforced slab which form sagging at that point.

Moayyad M. Al-Nasra (2013) [9] 'Shear Reinforcements in the Reinforced Concrete Beams.' This investigation centers around the utilization of various kinds of shear support in the strengthened solid beams. Four unique sorts of shear fortification are researched; customary stirrups, welded swimmer bars, blasted swimmer bars, and u-connect shot swimmer bars. Beam shear quality just as beam diversion are the primary two elements considered right now. Shear disappointment in strengthened solid beams is one of the most unfortunate methods of disappointment because of its quick movement. This sudden type of failure made it necessary to explore more effective ways to design these beams for shear. The fortified solid beams show diverse conduct at the disappointment organize in shear contrast with the twisting, which is viewed as perilous method of disappointment. The corner to corner breaks that create because of abundance shear powers are significantly more extensive than the flexural splits. The expense and wellbeing of

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shear fortification in strengthened solid beams prompted the investigation of different other options. Swimmer bar framework is another kind of shear support. It is a little slanted bar, with its the two finishes twisted on a level plane for a short separation and welded or dashed to both top and base flexural steel support. Notwithstanding the quantity of swimmer bars utilized in each slanted plane, the swimmer bars structure plane-break interceptor framework rather than bar-split interceptor framework when stirrups are utilized. A few strengthened solid beams were painstakingly arranged and tried in the lab. The consequences of these tests will be displayed and talked about. The redirection of each beam is additionally estimated at gradually expanded applied burden. This investigation introduced four unique kinds of shear support that can be utilized in fortified solid beams. New type of shear reinforcement system was used, which is swimmer bars system either bolted or welded to the longitudinal bars. There is improvement in shear quality of fortified solid beams by utilizing swimmer bars as a rule. The bolted swimmers bars through U-links showed similar results as the welded. The width and length of the breaks were seen to be less utilizing swimmer bars contrasted with the conventional stirrups framework. The bolted swimmers bars as well as the u-link bolted swimmer bars exhibit similar behavior under load compared to the traditional stirrups system.

N. M. Elbasha (2012) [10] 'A new reinforced concrete beam.' The presentation of high-quality cement and steel diminishes the size of basic individuals while having a similar burden conveying limit and a resultant saving money on development time, material, work and space. In this manner, utilizing both high quality steel and high-quality cement in development is significant for delivering a lightweight structure. High quality cement (HSC) and high-quality steel are utilized together to expand a beam's heap limit and diminish its cross segment. Utilizing these two materials to structure over-fortified beams will lessen the size, weight and costs, which is an alluring outcome, but since they need pliability, the present codes of training deny their utilization. This examination shows that flexibility can be fundamentally improved by introducing helical repression in the pressure zone. Over the most recent 20 years there has been broad research to financially use new segments to improve the nature of HSC. HSC produces littler yet more grounded auxiliary components with enormous spaces accessible. This demonstrated structures developed with HSC are lighter and practical contrasted and those built with ordinary quality solid (NSC). This examination presents ongoing data on the advantages of HSC and furthermore gives, in a word, test verification that introducing a helix with an appropriate contribute and distance across the pressure zone of beams altogether upgrades their quality and malleability. In this manner architects could unquestionably utilize HSC and helical control to configuration long and lightweight (by decreasing the beam size) fortified solid beams.

H.M.A.Mahzuz et.al. (2011) [11] 'Design of triangular reinforced concrete beam in USD.' Right now, creator tells about triangular strengthened beam. In development works utilization of rectangular fortified solid beam segment is a typical practice. Distinctive size of design advantages might be accomplished if beam shape can be changed. Right now, scientific conditions of triangular fortified beam segment are defined. Considering the beam as single fortified the whole research is done in Ultimate Strength Design (USD) framework. It is additionally accepted that elastic pressure and pressure act at underneath or more the nonpartisan hub individually. That is waist of a beam is just considered. As bowing minute and shear power are the two fundamental elements of plan of a beam along these lines' consideration has been given to find the conditions identifying with them. Toward the finish of the investigation it is seen that moderately lower measure of material is required by triangular beams than that of the regular rectangular beam.

H.M.A. Mahzuz et.al (2011) [12] 'Performance evaluation of triangular singly reinforced concrete beam.' Rectangular strengthened solid beam segment is a typical shape utilized when all is said in done development works. An alternate size of execution might be accomplished if the beam shape can be changed. Right now, adequacy of a triangular fortified beam area is supported. Right off the bat, applicable scientific conditions for configuration are created. From that point forward, essential examination is made with the current conditions for rectangular segments. Correlation is made regarding both twisting minute and shear power. The whole research is done in working pressure plan technique (WSD) thinking about the beam as separately strengthened. It is additionally expected that tractable pressure and pressure act at beneath or more the unbiased pivot, individually. That is, the waist of a beam is just considered. It is seen from the investigation that triangular RCC areas are superior to rectangular ones both as far as higher minute and shear taking capacity. It requires less steel utilization having lower solid volume also, which implies triangular area guarantees both less dead burden and financial safety.

Ingemar Löfgren (2003) [13] 'Lattice Girder Elements Investigation of Structural Behavior and Performance Enhancements.' Right now, took the investigation of the basic conduct of cross section brace component and in-situ cast solid structures. This examination depended on trial and numerical investigation. Author purpose was to gain knowledge of the structural behavior and the performance difference with the help of new material. In this property of different material deeply studied. With the help of this both load carrying capacity and stiffness is to be increased. And formation of the cracks may be reduced.

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III. OBJECTIVES

A. To find out the stress region in reinforced concrete beam.
B. To provide the lattice, triangular and conventional reinforcement at the critical region
C. To carry out the experimental stress and deflection analysis of lattice, triangular and conventional reinforced concrete beam.
D. To study modes of failure of beam in shear.
E. To study behavior of shear reinforcement in concrete beam.
F. To compare cost between conventional RCC beam and Lattice RCC beam.

IV. CONCLUSION

By studying all this literature studies, we came to conclusion that there is number of published works on reinforced concrete beam. But in compare with lattice, Triangular, Conventional shape of shear reinforcement very less work is to be done. Experimental and analytical studies are presented in all this papers, it is found that majority of research papers on shapes and Type of reinforcement in beam. However very less efforts are found on comparative study of conventional, lattice and triangular shape shear reinforcement in concrete beam by experimental and analytical.

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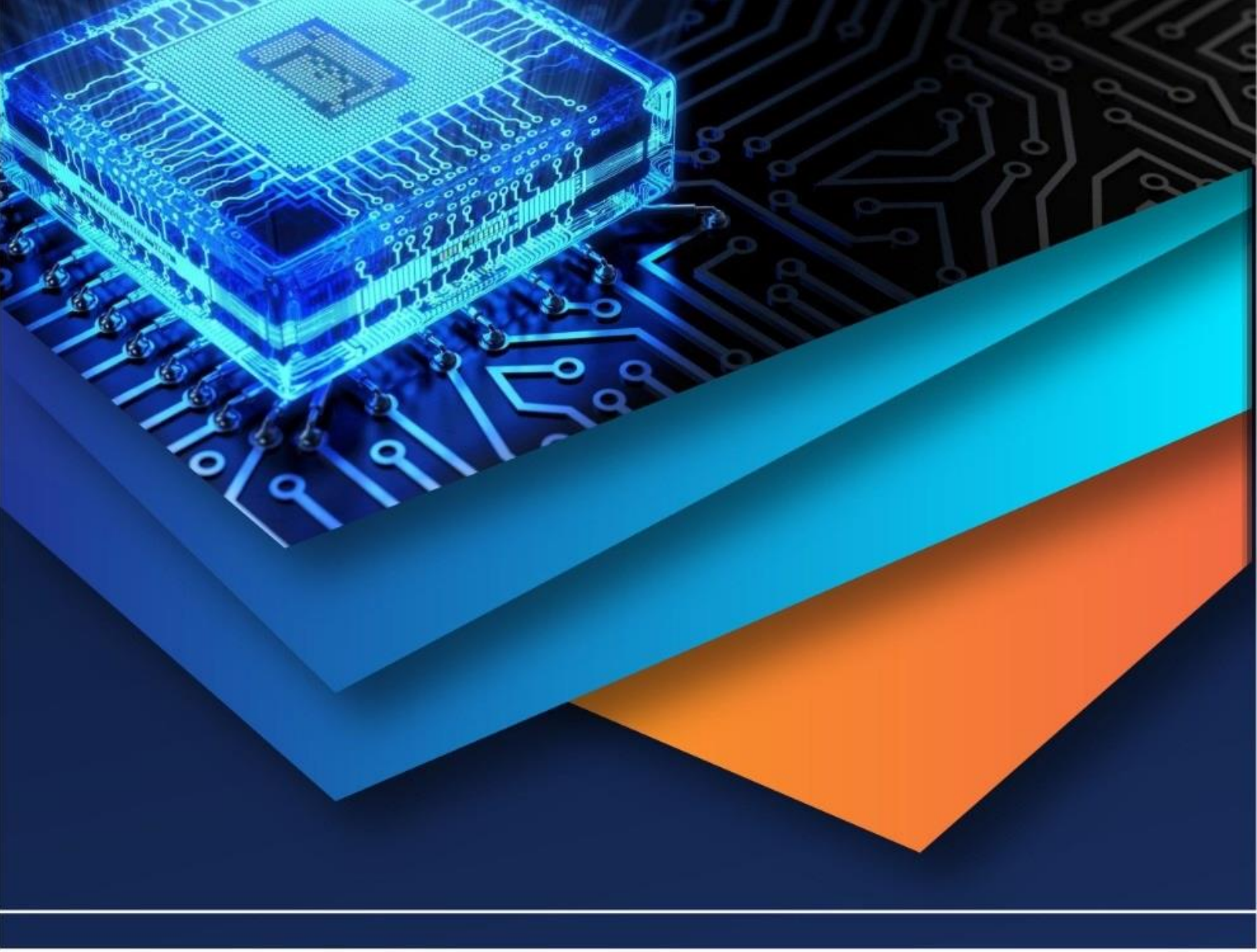

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