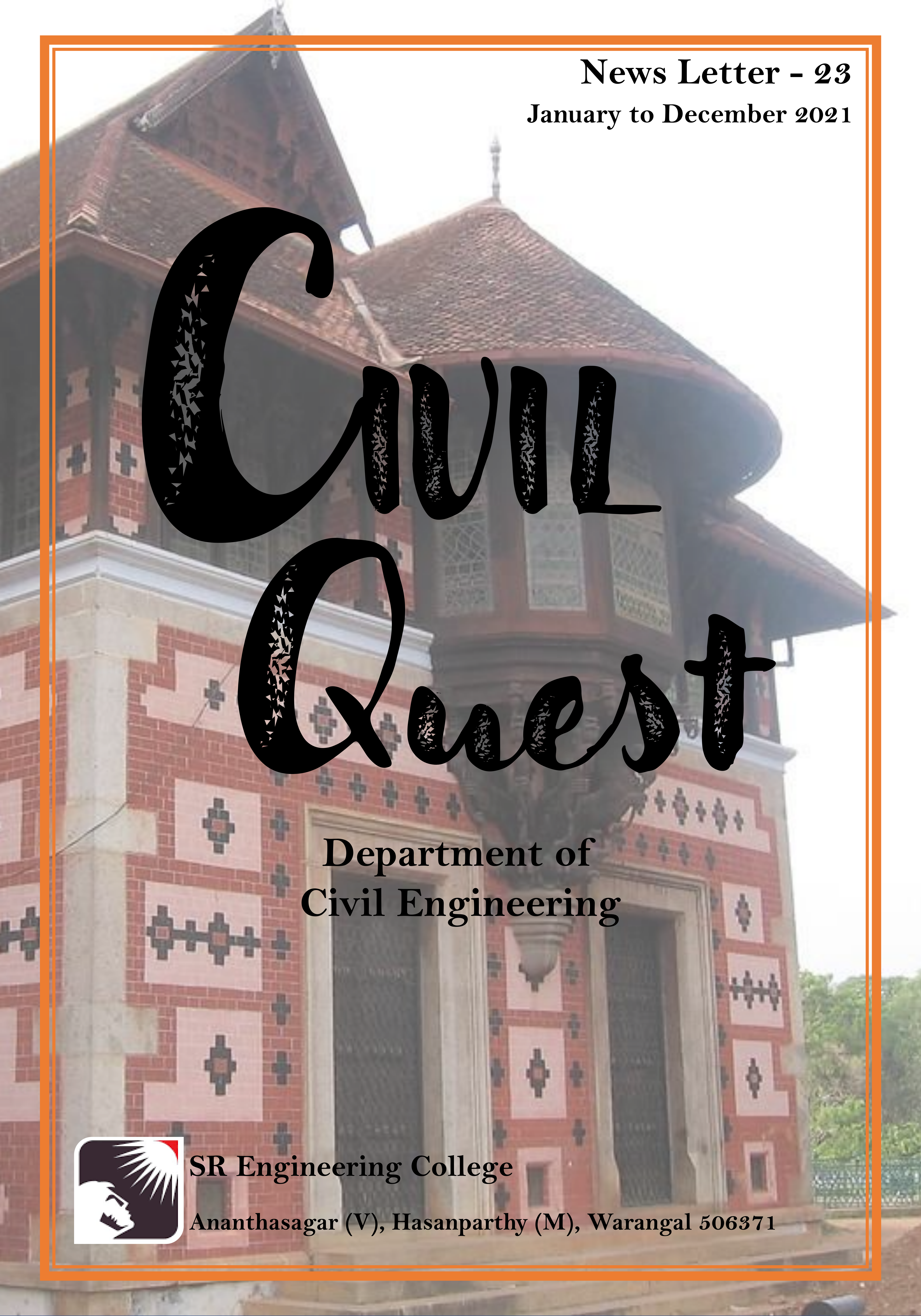

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January to December 2021

Civil Quest

Department of Civil Engineering

SR Engineering College

Ananthasagar (V), Hasanparthy (M), Warangal 506371

Vision

To be a leader in developing competent Civil Engineers.

Mission

- Build Civil Engineering knowledge in students by implementing novel educational strategies
- Develop effective instructional infrastructural resources.
- Promote interdisciplinary learning
- Contribute to the growth of Civil Engineering through community service, consultancy and research

Program Educational Objectives (PEO's)

PEOs (Program Educational Objectives) relate to the career and professional accomplishments of students after they graduate from the program. The Civil Engineering graduates from S R Engineering College, Warangal are expected to

- **Build knowledge and skill** set required for solving Civil Engineering problems
- **Create innovative technical ventures** in Civil Engineering.
- **Promote Research and consultancy activities** to solve Real world Civil Engineering problems.

Program Outcomes (PO's)

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSO's)

- Apply knowledge of mathematics, science and engineering to analyze, design and execute the Civil Engineering structures for the betterment of the society and the nation.
- Acquire the knowledge about various techniques, skills and modern Engineering tools required for the construction of Civil Engineering structures.

Publications

1. Sudharsan, N., Grant, C. B., Murthi, P., Poongodi, K., & Kumar, P. M. (2021, July). A Comparative Experimental Investigation on Laced Reinforced Concrete Beam and Conventional Beam under Monotonic Loading. In IOP Conference Series: Earth and Environmental Science (Vol. 822, No. 1, p. 012034). IOP Publishing. doi. 10.1088/1755-1315/822/1/012034

2. Poongodi, K., Revathi, P., & Murthi, P. (2021, July). Studies on Effect of Recycled Aggregate on Deflection Characteristics of RC Slab. In IOP Conference Series: Earth and Environmental Science (Vol. 822, No. 1, p. 012035). IOP Publishing. doi: 10.1088/1755-1315/822/1/012035

3. Murthi, P., Krishnamoorthi, S., Poongodi, K., & Saravanan, R. (2021). Development of green masonry mortar using fine recycled aggregate based on the shear bond strength of brick masonry. Materials Today: Proceedings. doi:10.1016/j.matpr.2021.10.501

4. Kumar, S., Murthi, P., Awoyera, P., & Gobinath, R. (2020). Impact resistance and strength development of fly ash based self-compacting concrete. Silicon (14), 1-12. doi:10.1007/s12633-020-00842-2

5. Poongodi, K., & Murthi, P. (2021). Correlation between compressive strength and elastic modulus of light weight self-compacting concrete using coconut shell as coarse aggregate. Australian Journal of Structural Engineering, 22(2), 85-95. doi:10.1080/13287982.2021.1926061

6. Yadav, G. S., & Anuradha, P. (2021). Strain investigation of infill frames using FEA package MSC NASTRAN. Advances in Engineering Software, 154, 102975. doi: 10.1016/j.advengsoft.2021.102975

7. Kumar, M. V., Alzein, R., Ganesh, A. C., Kumar, K. R., Gurumoorthy, N., & Adesina, A. (2022). Analytical investigation of the influence of various void shape and spacing on the load-bearing behavior of concrete hollow core slabs. Journal of Building Pathology and Rehabilitation, 7(1), 1-12. doi: 10.1007/s41024-021-00141-2

8. Rajesh Kumar, K., Awoyera, P. O., Shyamala, G., Kumar, V., Gurumoorthy, N., Kayikci, S., ... & Prakash, A. K. (2022). Structural Performance of Biaxial Geogrid Reinforced Concrete Slab. International Journal of Civil Engineering, 20(3), 349-359. doi.10.1007/s40999-021-00668-y

A Comparative Experimental Investigation on Laced Reinforced Concrete Beam and Conventional Beam under Monotonic Loading

Abstract: Laced Reinforced Concrete (LRC) structural elements are generally used in the defence environments where the structure encounters blast/impulsive loading. It comprises of equal number of reinforcements in both the faces of the beam with lacings as shear reinforcements bent at 450 along the plane of principal bending and fastened in position by cross rod. This paper presents the performance of LRC beam by experimental investigation and compared with conventional Reinforced Concrete (RC) beam using four point flexural load testing. Experimental results indicate that the LRC beam perform well than the RC beam considering the deformation. Failure modes could not be ascertained, since the experiments were stopped due to limitations in test set-up. At this stage, the support rotation achieved by LRC beam and RC beam is found to be 4.70 and 2.430 respectively. The LRC beam is found to be more ductile than RC beam. The structural response of LRC beam and RC beam is compared and presented.

Keywords: *Laced Reinforced Concrete, Shear reinforcement, Four po int flexural testing, Support rotation, Ductility*

Citation: N Sudharsan et al 2021 IOP Conf. Ser.: Earth Environ. Sci. 822 012034, doi: 10.1088/1755-1315/822/1/012034

Studies on Effect of Recycled Aggregate on Deflection Characteristics of RC Slab

Abstract: Substantial utilization of natural aggregates leads to the depletion of the naturally available resources. Hence an alternative approach is to utilize the recycled concrete aggregate (RCA) from the construction and demolition waste in the production of concrete and also in the prevention of dumping this waste in cultivable landfill. On the other side, codal provisions available for the predication of deflection in reinforced concrete one-way slab using effective moment of inertia (leg) were not comparable with the experimental values. Hence in the present study, it is proposed to study the load and deflection characteristics of simply supported slabs by varying the percentage of RCA content as 0 %, 50 % and 100 % under two point loading. Further, the work is extended to compare the deflection values obtained from experimental studies to the computed deflection values based on the IS 456:2000, ACI 318:2008 and BS: 8110. From the results, it is inferred that the replacement of natural aggregate with RCA does not affect the deflection characteristic of RC slab. Moreover, the computed deflection based on IS: 800, ACI and BS codal provisions does not match with the experimental deflection.

Keywords: *Recycled concrete aggregate, Deflection characteristics, Simply supported slab, Deflection, Two point loading.*

Citation: K. Poongodi et al 2021 IOP Conf. Ser.: Earth Environ. Sci. 822 012035 doi: 10.1088/1755-1315/822/1/012035

Analytical investigation of the influence of various void shape and spacing on the load-bearing behavior of concrete hollow core slabs

Abstract: The self-weight of a structure is of great importance as it directly affects the cost of the structure. With concrete slabs being one of the biggest and heaviest structural members in buildings, it is essential to devise novel ways to reduce the self-weigh of slabs without significant reduction in the load-carrying capacity. One of such solutions that can be used to reduce the self-weight of slabs is the use of hollow-core slabs. In addition to the reduction in self-weight with the use of hollow-core slabs, a reduction in the cost and workmanship associated with the production of the slabs can be achieved. In this context, this analytical study was carried out to investigate the effect of various void shapes and spacings on the load-bearing behaviour of hollow-core slabs using the Finite Element Analysis (FEA) program ANSYS. Slabs with a uniform dimension of 2600 mm × 1200 mm × 140 mm with the same reinforcement are designed with various void shapes of the same area of 1963.5 mm2 (Group 1) and spacing (Group 2). The outcome of this study showed the presence of hollows in the slabs resulted in a reduction in the load-bearing capacity of the slabs. Nonetheless, the use of elliptical void shape was found to be optimum among other shapes and increasing the void spacing to 120 mm can be used to increase the capacity of the slabs. On a positive note, the presence of voids in the slabs resulted in a reduction in self-weight in the range of 9.2%–15.1%..

Keywords: *Hollow core slabs, Finite element analysis (FEA), Finite element analyzing software ANSYS, Self-weight reduction.*

Citation: Kumar., et al 2021, J Build Rehabil 7, 4 , doi: 10.1007/s41024-021-00141-2

Impact Resistance and Strength Development of Fly Ash Based Self-compacting Concrete

Abstract: The development of self-compacting concrete using alternative materials is expanding in recent years due to the technical and economic benefits of the mixture. This study focuses on the structural and compositional behavior of sodium hydroxide (NaOH)-activated fly ash based self-compacting concrete (SCC). Fly ash was partially replaced with Ordinary Portland Cement from 0–30%. The tests performed on concrete samples include workability, strength, microstructural, and impact resistance. The results showed that activated fly ash reduces the heat of the hydration process of the concrete mixture but enhances pozzolanic reactions, which led to increased strength properties. The addition of activated fly ash modifies the mineralogy of the concrete, as evident in strength characteristics. The best performance of the activated fly ash based SCC, in terms of strength, was found at 10–15% substitutions, which can somewhat reduce the cost of production of SCC and strength improvement advantage.

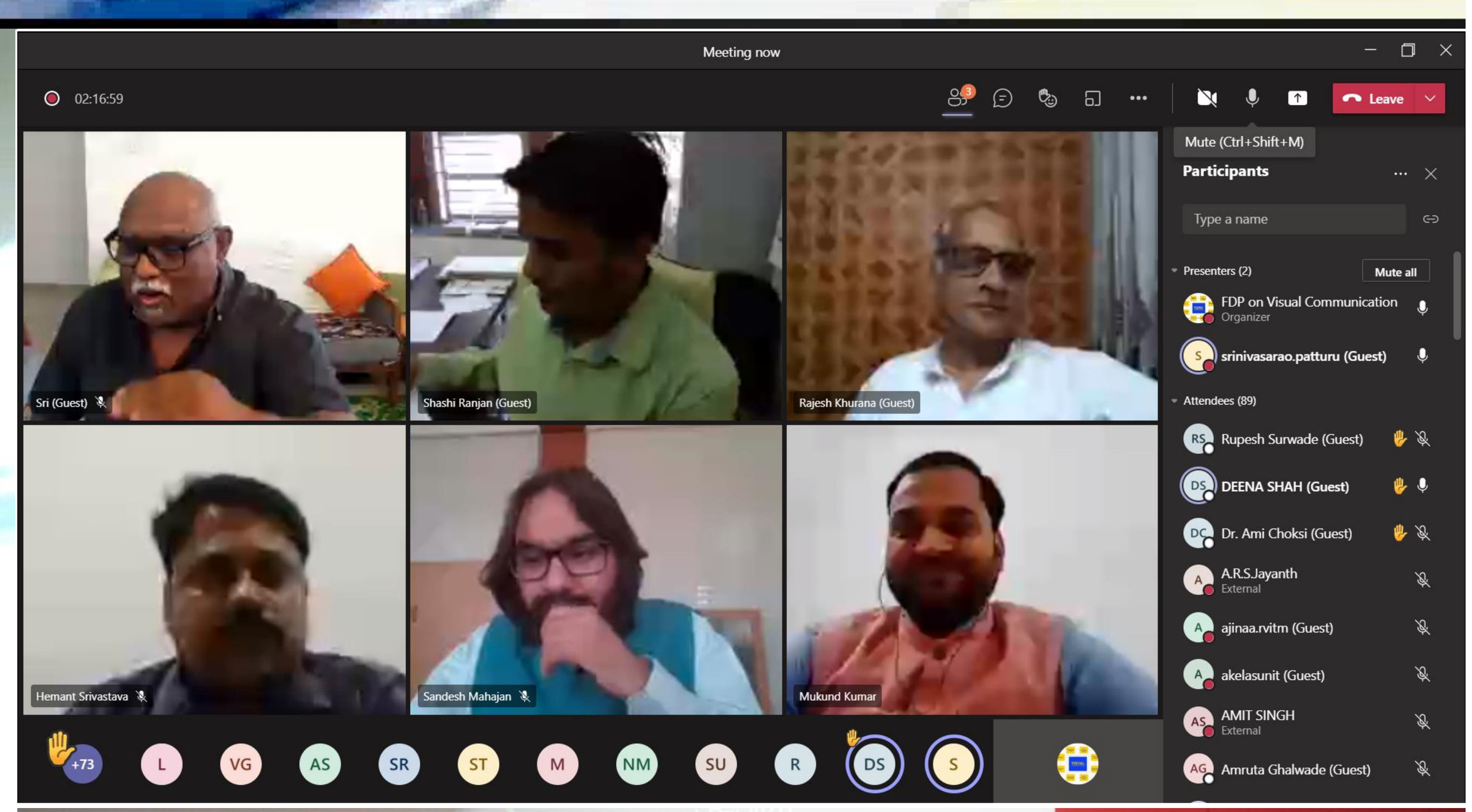
Keywords: *Activated fly ash, Pozzolan, Self-compacting concrete, Sodium hydroxide, Structural behavior*

Citation:. Kumar,, et al 2021, Silicon 14, 481–492 (2022). doi: 10.1007/s12633-020-00842-2

Departmental & Student Activities

1. Five Days Online Faculty Development Programme (FDP) on "Online FDP on Visual Communication", between 21st and 25th September 2021, Organised by the Department of Civil Engineering, Centre for Design and Sponsored by AICTE Training and Learning (ATAL) Academy.

2. Celebrated Engineers Day on 15th September 2021



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Following are few general points to remember for civil site engineers to make the construction work easier while maintaining quality of construction.

- Lapping is not allowed for the bars having diameters more than 36 mm.
- Chair spacing maximum spacing is 1.00 m (or) 1 No per 1m^2.
- For dowels rod minimum of 12 mm diameter should be used.
- Chairs minimum of 12 mm diameter bars to be used.
- Longitudinal reinforcement not less than 0.8% and more than 6% of gross C/S.
- Minimum bars for square column is 4 No's and 6 No's for circular column.
- Main bars in the slabs shall not be less than 8 mm (HYSD) or 10 mm (Plain bars) and the distributors not less than 8 mm and not more than 1/8 of slab thickness.
- Minimum thickness of slab is 125 mm.
- Dimension tolerance for cubes + 2 mm.
- Free fall of concrete is allowed maximum to 1.50m.
- Lap slices not be used for bar larger than 36 mm.
- Water absorption of bricks should not be more than 15 %.
- pH value of the water should not be less than 6.
- Compressive strength of Bricks is 3.5 N / mm^{2}.
- In steel reinforcement binding wire required is 8 kg per MT.
- In soil filling as per IS code, 3 samples should be taken for core cutting test for every 100m^2.

Density of Materials

Material	Density
Bricks	1600 – 1920 kg/m^3
Concrete block	1920 kg/ m^3
Reinforced concrete	2310 – 2700 kg/ m^3

Curing time of RCC Members for different types of cement

- Super Sulphate cement: 7 days
- Ordinary Portland cement OPC: 10 days
- Minerals & Admixture added cement: 14 days

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