

# STUDY ON FLEXURAL BEHAVIOUR OF DECK SLAB USING GFRP BARS

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## **Introduction:**

### Alternative Non Corrosive Reinforcement

- Fiber Reinforced Polymer (FRP) rebars is being used as internal reinforcement since past three decades.
- Corrosion of steel reinforcement in structural elements is a major issue for the buildings located in the coastal environmental conditions.
- Corrosion reduces the strength of RC members and leads to poor bond between the steel and concrete.
- It is estimated that India loses as much as 5-7 per cent of its Gross Domestic Product every year on the account of corrosion
- [Source: "Economic Times", International Zinc Association, June 2021]
- IBMS reported that about 6000 bridges are structurally stressed and need structural attention, and 140 of them need rehabilitation.

## **Objective:**

- To determine the flexural strength of deck slab reinforced with GFRP bars.
- To determine load deflection parameters of deck slab reinforced with GFRP bar under flexural loading.
- Develop the expression to determine the flexural strength of deck slab reinforced with GFRP bars using regression analysis.

## **Casting Of Cube Specimens:**

Cubic molds with 200 mm-side will be used to prepare the pullout test specimens. FRP bars with 1000 mm length will be used in this study. Prior to casting, Mild steel wires wrapped the FRP bars to ensure the desired bond length.

## Casting of Slabs:

The experimental program includes 3 full-size bridge deck prototypes 1200 mm width, 2000 mm length, and 200 mm thick. Two deck slab prototypes will be reinforced with different reinforcement ratios and configurations of GFRP bars, while one slab prototype was reinforced with conventional steel bars as a control.

At the completion of the above-mentioned work as per the stated methodology, the ensuring outcome will be evaluated.

## Methodology:

- Concrete Mix Design for M20 Grade.
- Casting Of Deck Slab Varying Percentage of Gfrp Bars And Steel Bars.
- Testing Deck Slab Under Flexural Loading
- Result and Discussion.

Slab	Bar Type	Transverse Direction		Longitudinal direction	
		Bottom	Top	Bottom	Top
SS	Steel Bar	10 mm @ 300 mm c/c	10 mm @ 300 mm c/c	10 mm @ 300 mm c/c	10 mm @ 300 mm c/c
GFRPS-1	GFRP (0.20%)	10 mm @ 190 mm c/c	10 mm @ 300 mm c/c	10 mm @ 300 mm c/c	10 mm @ 300 mm c/c
GFRPS-F	GFRP (0.30%)	10 mm @ 130 mm c/c	10 mm @ 300 mm c/c	10 mm @ 300 mm c/c	10 mm @ 300 mm c/c

## Results:

CODE	ULTIMATE LOAD (KN)	AVERAGE LOAD (KN)	ULTIMATE DISPLACEMENT
GFRPS-1	75.40	89.975	0.061
GFRPS-F	85.90	102.00	.074
SS	50.65	65.6	.083

## Scope for Future Uses:

- Study of the flexural behaviour pre-stressed geopolymer concrete sleepers,
- Study of the properties of geopolymer concrete precast units.
- Study of the properties of geopolymer concrete using different cheap alkaline liquids,
- Study of fatigue behaviour with different aspect ratios.