

## Experimental and Theoretical Study on Flexural Behaviors of Reinforced Concrete Cement (RCC) Beams by Using Carbonfiber Reinforcedpolymer (CFRP) Laminate as Retrofitting and Rehabilitation Method

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**Abstract :** This research Paper shows that materials CFRP were used to rehabilitate 9 Beams and retrofitting of 9 Beams with size (125x250x2300) mm each for M50 grade of concrete with 20% of Volume of Cement replaced by GGBS as a mineral Admixture. Superplasticizer (ForscoConplast SP430) used to reduce the water-cement ratio and maintaining good workability of fresh concrete (Slump test 57mm). Concrete Mix ratio 1:1.56:2.66 with a water-cement ratio of 0.31(ACI codebooks). A sample of 6cubes sized (150X150X150) mm, 6cylinders sized (150ΦX300H) mm and 6Prisms sized (100X100X500) mm were cast, cured, and tested for 7,14&28days by compressive, tensile and flexure test; finally, mix design reaches the compressive strength of 59.84N/mm<sup>2</sup>. 21 Beams were cast and cured for up to 28 days, 3Beams were tested by a two-point loading machine as Control beams. 9 Beams were distressed in flexure by adopting failure up to final Yielding point under two-point loading conditions by taking 90% off Ultimate load. Three sets, each composed of three distressed beams, were rehabilitated by using CFRP sheets, one, two & three layers, respectively, and after being retested up to failure mode. Another three sets were freshly retrofitted also by using CFRP sheets one, two & three layers, respectively, and being tested by a two-point load method of compression strength testing machine. The aim of this study is to determine the flexural Strength & behaviors of repaired and retrofitted Beams by CFRP sheets for gaining good strength and considering economic aspects. The results show that rehabilitated beams increase its strength 47 %, 78 % & 89 %, respectively, to thickness of CFRP sheets and 41%, 51 %& 68 %, respectively too, for retrofitted Beams. The conclusion is that three layers of CFRP sheets are the best applicable in repairing and retrofitting the bonded beams method.

**Keywords :** retrofitting, rehabilitation, cfrp, rcc beam, flexural strength and behaviors, ggbs, and epoxy resin

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