DEPARTMENT OF CIVIL ENGINEERING: IIT DELHI
CEL 768: RECENT ADVANCES IN CONSTRUCTION MATERIALS MAJOR TEST
DURATION: 2 hours IInd Semester 2007-2008 Max. marks:=50
DATE:- 29-4-08 TIME:- 8.00-10.00 A.M. Venue- IV 323

Draw neat sketches wherever necessary
Assume missing data suitably if required.
DRAW FIGURES AND SKETCHES TO ILLUSTRATE YOUR ANSWERS.

1. Consider a fiber of ultimate strength 400MPa and constant modulus of elasticity 100GPa used in a fiber reinforced concrete. The bond strength is 4 MPa and tensile strength of the concrete matrix at cracking and failure is 3 MPa. The l/d ratio of the short discrete fiber is 60 and is randomly oriented in the matrix. What will be the mode of ultimate failure of the composite, pull out or snapping of fiber? Use the above idea to determine the fiber content required doubling the moment of resistance of a rectangular section? Assume appropriate efficiency factor if required. 10
2. Define self compacting concrete, roller compacted concrete and high volume fly ash concrete and also explain their basic concept. 12
3. Draw diagrams to explain detailing measures to avoid corrosion in structural steel. How fire resistance of steel can be improved? 6
4. What are sealants? What are their desirable properties? Draw diagrams to explain possible ways of failure of sealants. State service life of different types of sealants. 6
5. Following are observed data of carbonation depth and cover depth in an RCC structure at an age of 20 years, what is the probability of finding a rebar location carbonated at 30 years of age of the structure.

Cover (mm)	15	25	21	18	30	20	19	22	26	29	18	17	16	19
Carbonation depth (mm)	20	22	18	10	25	24	21	22	18	17	23	19	5	18

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6. Draw a diagram explaining service life of R.C.C member with reference to rebar corrosion. Explain how adequate cover depth and higher grade of concrete enhance this service life in marine environment. 8

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