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Total Number of Pages: 1

M.TECH  
CEPE102/ GEPE106

**1st Semester Regular/Back Examination – 2014**

**ADVANCED CONSTRUCTION MATERIALS**

**BRANCH(S): STRUCTURAL & FOUNDATION ENGINEERING, STRUCTURAL ENGINEERING, GEOTECHNICAL ENGINEERING**

**Time: 3 Hours**

**Max Marks: 70**

**Answer Question No.1 which is compulsory and any five from the rest.  
The figures in the right hand margin indicate marks.**



- Q1 Answer the following questions: (2x10)
- a) Explain the water cement ratio.
  - b) What is meant by hardened concrete?
  - c) Justify the use of admixtures in concrete.
  - d) How heating affects the strength and stiffness of concrete?
  - e) How can you repair cracks in concrete structures?
  - f) What is polymer foam? What is its use?
  - g) How do you express the rheological or flow equation of fresh concrete?
  - h) State the composition of an OPC.
  - i) Justify the use of silica fume in making concrete.
  - j) Name a few moisture barriers.
- Q2 Write short notes on (10)
- (i) Shrinkage of concrete
  - (ii) Admixtures in concrete
  - (iii) Properties of hardened concrete
  - (iv) Tests on concrete
- Q3 It is required to proportion a concrete mix for use in a 250 mm thick pavement with mean 28-day flexural strength of at least 4.50 MPa and a slump of the order of 25-50 mm. The coarse aggregate value is well-shaped having nominal maximum size of 37.5 mm, specific gravity of 2.64, dry rodded mass of 1600 Kg/m<sup>3</sup>, moisture content = 9.0 percent, and absorption = 0.5%. Whereas the fine aggregate to be used has fineness modulus = 2.60, specific gravity = 2.66, moisture content = 5 %, absorption = 0.68%, the available Portland cement has specific gravity of 3.15. The other stipulations are: (10)
- i. Air content = 4.0 - 6.0 percent
  - ii. Maximum allowable water-cement ratio = 0.45
  - iii. Minimum cement content = 340 Kg/m<sup>3</sup>
  - iv. Density of water = 1000 Kg/m<sup>3</sup>.
- With all these data, proportion the concrete.
- Q4 a) How industrial wastes are useful in making concrete? Discuss their influence on the physical and mechanical properties and durability of concrete. (5)
- b) Discuss on the mechanical and deformational behaviour and microstructure of hardened concrete. (5)
- Q5 a) Discuss the use of various sealants and adhesives for concrete works. (5)
- b) How concreting is done under extreme weather conditions? Discuss in detail. (5)
- Q6 a) Discuss the factors affecting the rheological properties of concrete. How can you measure the rheology of concrete by modified slump test? (5)
- b) What do you mean by elastomeric bearings and resilient seating? Discuss in brief. (5)
- Q7 a) How do you monitor the quality control measures for concrete through inspection and testing? Discuss with sketches in brief. (5)
- b) What is ready mix concrete? How do you go for trial mixes? Discuss on the classification and use of ready mix concrete. (5)
- Q8 Write Short Notes on the following; (5 x 2)
- a) Creep and shrinkage of concrete
  - b) Justification of design mix
  - c) Mechanism of fiber-matrix interaction
  - d) Sulphur concrete
  - e) Nuclear concrete