Advanced Concrete Technology VTU Question Paper Set

USN | | | | | | | | | | |

10CV81

Eighth Semester B.E. Degree Examination, June/July 2015
Advanced Concrete Technology

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Clearly mention the four Bogue equations used for estimating potential compound composition of Portland cement. Also mention the two basic assumptions made while developing Bogue equations. Mention its importance. **(08 Marks)**

b. Write note on interfacial transition zone in concrete. **(04 Marks)**

c. Draw typical stress – strain curves for concrete under :
i) Biaxial compression
ii) Combined compression and tension
iii) Biaxial tension, and mark salient points. **(08 Marks)**

2 a. What are plasticizers? Mention the types of plasticizers. Write brief note on electro chemical activity of super plasticizers. **(10 Marks)**

b. With sketch explain the activity of air – entraining agents. **(05 Marks)**

c. What are mineral admixtures? Explain briefly the role of i) metakaoline ii) silica fume and iii) fly ash as mineral admixtures. **(05 Marks)**

3 a. Explain briefly the steps involved in concrete mix design as per Bureau of Indian standards. **(10 Marks)**

b. Calculate :
i) Water-cement ratio to achieve f_{ck} = 20 N/mm^2 at 28 days assuming 30 samples with standard deviation 4.6 for 43 grade cement
ii) Target strength if standard deviation is 5, for f_{ck} = 20 N/mm^2. **(05 Marks)**

c. Mention the relation used for calculating volume of sand and coarse aggregate as per Indian standards, by absolute volume method. **(05 Marks)**

4 a. Explain briefly thermal diffusivity and thermal conductivity. **(05 Marks)**

b. Mention the Alkali Silica reaction. What circumstances are required for the Alkali Silica reaction(ASR) to take place? **(05 Marks)**

c. Mention the three parameters included in the concrete work specification to ensure required impermeability of concrete. **(03 Marks)**

d. Define : i) Durability ii) specific heat iii) Efflorescence. **(07 Marks)**

PART – B

5 a. Sketch a typical layout of the site for RMC plant with auxiliary. Explain any two of the auxiliary in brief. **(12 Marks)**

b. Mention the various tests performed to check the properties of fresh self compacting concrete (SCC). Explain any one of them briefly, with sketches. **(08 Marks)**

6 a. Explain briefly the behavior of fibre reinforced concrete under :
i) Tension ii) Compression iii) Flexure. **(12 Marks)**

b. What is Ferro concrete? Mention its properties with application in civil engineering field. **(08 Marks)**

7 a. Write a brief note on proportioning of light weight concrete. **(04 Marks)**

b. Explain briefly the salient high performance requirements to produce high performance concrete. **(04 Marks)**

c. What is high density concrete? Mention its properties and any four important applications. **(12 Marks)**

8 Write short notes on :

a. Pulse velocity method

b. Rheology of concrete

c. Post and pre-cracking FRC beams

d. Marsh cone test. **(20 Marks)**

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8th Sem C.V.

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Advanced Concrete Technology

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Note: 1. ***Answer FIVE full questions, selecting at least TWO questions from each part.***
2. ***Missing data may be suitably assumed.***
3. ***Use of IS: 10262 – 2009 is permitted***

PART – A

1 a. Enumerate the importance of Bogue's compounds in ordinary port land cement. **(06 Marks)**

b. Explain briefly rheology of concrete. What are the factors affecting the rheology of concrete? **(07 Marks)**

c. What are the factors affecting strength and elasticity of concrete? **(07 Marks)**

2 a. Explain the mechanism of 'deflocculation' of cement particles by super plasticizers with neat sketches. **(07 Marks)**

b. What is optimum dosage of super plasticizer? How do you determine the optimum dosage of super plasticizer? **(07 Marks)**

c. What are mineral admixtures? Explain briefly, i) Silica flume ii) G.G.B.S. iii) Fly ash. **(06 Marks)**

3 a. Explain the factors affecting the mix design of concretes. **(05 Marks)**

b. Design a concrete mix of M_{25} grade for the following data:
Max size of aggregate – 20 mm; Crushed angular
Min/max cement content – 300/450 kg/m^3; Max W/C – 0.5; Exposure condition – Moderate;
Work ability – 100 mm slump; Method of placing – pumping; Quality control – good;
Type of chemical admixture – Super plasticizer [Specific gravity – 1.14].
Assume 25% replacement of cement by fly ash.
Test data for materials:
i) Cement – OPC 43 grade IS 8112.
ii) Specific gravity of cement – 3.15
iii) Fly ash – 20% Cementations material
iv) Specific gravity of fly ash – 2.20
v) Specific gravity of coarse aggregate – 2.60
vi) Specific gravity of fine aggregate – 2.65
[belongs to zone II]
Assume any other data suitably. **(15 Marks)**

4 a. Explain the influence of w/c ratio and age on permeability of concrete. **(07 Marks)**

b. Discuss in brief alkali aggregate reaction. What precautions are necessary to minimize? **(06 Marks)**

c. What is sulphate attack? Explain briefly the methods of controlling sulphate attack. **(07 Marks)**

PART – B

5 a. What is R.M.C? Explain briefly advantages of R.M.C. **(06 Marks)**

b. Explain short crete and under water concreting. **(08 Marks)**

c. What is self compacting concrete? What are the advantages of self compacting concrete? **(06 Marks)**

6 a. What are the different types of fibres used in concrete? What factors effecting properties of fibre reinforced concrete? **(08 Marks)**

b. What is aspect ratio? How does it influence strength and toughness of FRC? **(04 Marks)**

c. What is Ferro cement? List the various applications of Ferro cement. **(08 Marks)**

7 a. Write short notes on:

i) Light weight concrete.

ii) High density concrete. **(06 Marks)**

b. What is 'High Performance Concrete' [HPC]? What are the applications of High Performance Concrete? **(06 Marks)**

c. Discuss in brief the properties of High Performance Concrete in fresh and hardened state. **(08 Marks)**

8 Explain the following:

a. Tests on hardened concrete. **(08 Marks)**

b. Rebound Hammer Test [NDT]. **(06 Marks)**

c. Pulse Velocity Test [NDT]. **(06 Marks)**

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PART – A

1 a. Enumerate the importance of Bogue's compounds in ordinary port land cement. **(07 Marks)**

b. Explain the rheology of concrete in terms of Bingham's parameter. **(07 Marks)**

c. Determine capillary porosity, total porosity and gel space ratio for a cement paste with W/C ratio 0.5 and degree of hydration 90%. **(06 Marks)**

2 a. Explain the mechanism of 'deflocculation' of cement particles by super plasticizers with neat sketches. **(10 Marks)**

b. What is optimum dosage of super plasticizer? How do you determine the optimum dosage of super plasticizer? **(06 Marks)**

c. Explain the effect of fly ash on hardened state of concrete. **(04 Marks)**

3 a. Explain the factors affecting the mix design of concrete. **(06 Marks)**

b. Using Indian standard code M20 grade method of mix design, arrive to a mix proportion for the following data [M20 grade] :
maximum size of aggregate = 20 mm
Degree of workability = 0.90 compactor factor
Degree of quality control = good
Type of exposure = mild
Specific gravity of cement = 3.15
Specific gravity of coarse aggregate = 2.65
Specific gravity of fine aggregate = 2.60
Water absorption coarse aggregate = 0.5%
Water absorption fine aggregate = 1.0%
Free surface moisture-coarse aggregate = Nil
Free surface moisture fine aggregate = 2.0%
Coarse aggregate percentage of different fractions 60% : 40%.
Fine aggregate belongs to zone II. **(14 Marks)**

4 a. Discuss permeability of concrete. **(06 Marks)**

b. Discuss in brief alkali aggregate reaction. What precautions are necessary to minimize, the same? **(06 Marks)**

c. Explain corrosion in reinforced concrete. **(08 Marks)**

PART – B

5 a. What is RMC? Explain briefly advantages of RMC. **(06 Marks)**

b. Explain shot crete and under water concreting. **(08 Marks)**

c. Mention the need for self compacting concrete. Mention its properties. What are different test methods for determining the rheology of SCC? **(06 Marks)**

6 a. What are the factors affecting properties of fibre reinforced concrete. List the various applications of fibre reinforced concrete. **(08 Marks)**

b. What are the different types of fibres used in concrete? **(06 Marks)**

c. What is Ferro-cement? List the various applications of Ferro cement. **(06 Marks)**

7 a. Write short notes on:

i) Light weight concrete

ii) High density concrete **(10 Marks)**

b. Discuss in brief the properties of high performance concrete in fresh and hardened state. **(10 Marks)**

8 Explain the following:

a. Tests on hardened concrete **(08 Marks)**

b. Rebound Hammer Test (NDT) **(06 Marks)**

c. Pulse velocity test [NDT] **(06 Marks)**

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