Government College of Engineering, Amravati

(An Autonomous Institute of Government of Maharashtra)

Fourth Semester B. Tech. (Civil Engineering)

Summer – 2016

Course Code: CEU404

Course Name: Concrete Technology

Time: 2 Hrs. 30 Min. **Max. Marks: 60**

Instructions to Candidate

1) All questions are compulsory.
2) Assume suitable data wherever necessary and clearly state the assumptions made.
3) Diagrams/sketches should be given wherever necessary.
4) Use of logarithmic table, drawing instruments and non-programmable calculators is permitted.
5) Figures to the right indicate full marks.
6) Due credit will be given to references made to IS codes.
7) Due credit will also be given to the overall neatness and cleanliness.

1. Using IS : 10262 – 2009, it is required to design a M40 grade pumpable concrete mix having basic slump of the order of 80 – 100 mm. Available grade 43 Ordinary Portland Cement (OPC) having specific gravity of 3.15 conforms to IS 8112 and the fly ash having specific gravity of 2.2 conforms to IS 3812 (Part I). The concrete mix is to be used for a reinforced concrete structure to be subjected to severe exposure conditions during its service life. The crushed (angular) coarse aggregate available at the site is of nominal maximum sizes of 20 mm with a specific gravity of 2.72 and **12**

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water absorption of 0.5 percent. Whereas, the available fine aggregate has fineness modulus of 2.80 (grading zone – I of IS 384), specific gravity of 2.70, and moisture absorption of 1.0 percent. The other stipulations are:

- Standard deviation : 5 MPa
- Air content : 4.0 % to 5.0 %
- Maximum allowable free water cement ratio : 0.45
- Minimum cement content: 320 kg/ m^3
- Maximum cement content (IS : 1343 – 2012) : 450 kg/m^3
- Chemical admixture type : Superplasticizer conforming to IS 9103
- Density of water : 1000 kg/ m^3

2. a) Write a short note on mixing of concrete with respect to : (i) Type of mixers & their nominal mixed batch capacity in litres (ii) Recommended mixing time corresponding to capacity of mixers in m^3 (iii) Merits and demerits of any one type of mixers. **6**

   b) Write methods of curing of concrete. Write detailed note on steam curing. **6**

3. Solve any **TWO** of the following

   a) What is workability? How workability is measured by using Vee-Bee consistency test? Draw neat sketch. **6**

   b) Write a short note on "Permeability of Concrete". Draw neat graph showing variation of compressive strength vs capillary porosity and permeability coefficient vs capillary porosity. **6**

   c) State the functions of admixtures for production of concrete. Write a short note on accelerating admixture. **6**

4. Solve any **TWO** of the following.

   a) Write a short note on statistical quality control of concrete with respect to sampling and distribution of results. **6**

   b) Which are the essentials of inspection testing of fresh concrete? Write a short note on Air-Void Analysis testing of fresh concrete. **6**

   c) State Duff Abrams water-to-cement ratio law with the help of a graph. State physical properties of Portland cement. **6**

5. Solve any **TWO** of the following.

   a) In production of concrete, what is compaction of concrete? While using vibrators for compacting concrete mixes, what are the essential points one should kept in mind? **6**

   b) State the effect of impurities in water on properties of concrete. Give limits of various impurities in water for making concrete. **6**

   c) Enumerate and write short note on essential properties of aggregates for concrete. **6**

Government College of Engineering, Amravati

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Forth Semester B. Tech. (Civil Engineering)

Summer – 2017

Course Code: CEU 404

Course Name: Concrete Technology

Time: 2 hr 30 min. **Max. Marks: 60**

Instructions to Candidate

1) All questions are compulsory.
2) Assume suitable data wherever necessary and clearly state the assumptions made.
3) Diagram/sketches should be given wherever necessary.
4) Use of logarithmic table, drawing instruments and non-programmable calculators is permitted.
5) Figures to the right indicate full marks.
6) IS 10262 – 2009 and IS: 456-2000 is permitted for concrete mix design.

Q 1	**a)**	Give chemical composition of Portland cement? Explain Laboratory test on cement for i) compressive strength. ii) standard consistency.	**10**
	b)	Describe general classification of aggregate? Explain specific gravity & bulk density of an aggregate.	**08**
		OR	
	c)	What are the various types of Admixtures? Also write their functions.	**08**

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a) Design a concrete mix for following data as per IS: 10262-2009 10

I) Stipulations for proportioning

(i) Characteristics compressive strength required in the field at 28 days = 30MPa

(ii) Maximum size of aggregate (angular) = 20 mm

(iii) Type of cement:OPC 43 grade

(iv) Minimum cement content 320 Kg/m^3

(v) Maximum water cement ratio 0.45

(vi) Workability :100 mm slump

(vii) Exposure condition: *severe* (for reinforced concrete)

(viii) Type of aggregate :crushed angular aggregate

II) Test data of material

i)Specific gravity of cement = 3.15

ii) Specific gravity of coarse and fine aggregate = 2.8

iii) Water absorption for fine aggregate = 1.00%

iv) Water absorption for coarse aggregate = 0.5%

v) Free surface moisture :nil

vi) Fine aggregate : conforming to zone I

b) What are the factors influencing the choice of mix proportions? 06

OR

c) What is batching? Explain any two weigh batchers. 06

Q 3 a) What is workability of concrete? Explain measurement of workability by compaction factor test. 06

b) Write a short note on shrinkage & creep of concrete? **04**

OR

c) Explain segregation & bleeding of concrete. **04**

Q 4 **a)** What is non-destructive testing? Explain any two NDT equipments? **04**

b) Write the advantages of dry process of manufacture of OPC cement. **04**

Q 5 **a)** Explain rebound hammer test. **04**

b) Write short note on - **04**

i) Light weight concrete.

ii)Ferrocement

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