M.E. Civil Engineering - First Year - Second Semester, 2018

Advanced Concrete Science and Technology (SE)

PART-I

Time: Three Hours

Full Marks 100
(60 marks for 1st part)

Use a separate Answer-Script for each part
Draw neat sketches wherever necessary.

Answer question no 1 and any one from rest.

I.S codes and Handbooks are not allowed in the examination hall

1. a) Describe the behavior of concrete under fire at different temperature ? What are the tests are be made for afire affected concrete structures

b) What are the main differences between the fracture surfaces of normal strength and high strength concrete? Draw stress- strain diagram of normal strength and high strength concrete?

c) Compare the stress – strain diagrams of cement paste, aggregate and the concrete.

d) The consultant of a particular site at Jaipur decided to stop the important concreting work during summer months as the day time temperature is quite high – Explain the reason and provide some solutions to resume the work.

e) What are the differences between gel pore and capillary pores in cement concrete ?

f) Discuss the role of curing temperature on the strength of concrete.

g) What are the main characteristics of ITZ in concrete? How can you improve the microstructure of ITZ?

h) Discuss the effect of different factors affecting the rate of hydration of concrete in brief .

i) What type of chemical admixture would you recommend for concreting in a) hot weather b) cold weather?

j) Name the tests that are generally used for the microstructure study of the concrete?

k) What are the advantages and disadvantages of using carbon fibres sheets as repairing material ?

l) Suppose a new wall is to be constructed on a existing reinforced concrete beam. How will you place the carbon fibre strip / sheet of uni-directional fibre to improve its capacity? Show through sketches.

4+3+3+3+3+3+3+2+3+4+4+5 =40

2 a) Describe a suitable test method for passing ability of self compacting concrete mentioning its acceptance criteria.

b) What is geo-polymer concrete? Name the ingredients normally used in geo-polymer concrete? What are the advantages and disadvantages of geopolymer concrete over conventional concrete? 10+10

3 a) Describe the test method for flexural toughness of fibre reinforced concrete. Define toughness.

b) The mix design of concrete of grade M35 is as follows : Cement = 440 Kg/m^3 Coarse Aggregat =1040 Kg/m^3 fine aggregate = 800 Kg/m^3, water – cement ratio = 0.36 . Temperature of both coars and fine aggregates are 45 ^{0} C, temperature of cement is 30^0 C and that of mixing water is 28^0 Assume the aggregates are dry. The specific heat of cement and aggregate is 0.22cal/gm/^{0} C What w be the temperature of freshly mix concrete? If the temperature of mixing water is 10^0 C, what will b temperature of freshly mix concrete? 10+10

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PART-II

Time: Three Hours

Full Marks 100
(40 marks for 2nd part)

Use a separate Answer-Script for each part

[No code or handbook is allowed]

No. of questions	Part II (Answer Any four of the following questions.)	Marks (4X10=40)
1) a)	Write a short note on dry process and wet process of shot-crete.	5
b)	Write a note on fiber reinforced concrete?	5
2) a)	Write a short note on silica fume concrete.	5
b)	Write a short note on accelerator.	5
3)	Write a short note on high performance concrete.	10
4)a)	Write down the chemical reaction taken pace in fly ash cement.	5
b)	Write down the chemical composition of fly ash cement.	5
5)a)	Write down the relevant code(s) of fly ash cement. What are the stipulations written in is 456-2000 code about this fly ash cement?	3
b)	Write down the effect of high volume of fly ash on properties of fresh concrete	7