This question paper contains 3 printed pages.

3048 *Your Roll No.* .....

MEC **J**

Paper— CE.503

MATERIAL SCIENCE AND TECHNOLOGY

Time : 3 hours ***Maximum Marks*** : **100**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt any five questions.
All questions carry equal marks.

1. (*a*) How is the fineness of cement determined? What is gel pores? **10**

   (*b*) What are the different types of cement? Discuss the properties of each and their application. **10**

2. (*a*) What is fineness modulus of aggregate? Explain its significance with a suitable example. **10**

   (*b*) Enumerate the various impurities in water having deleterious effects on concrete. Explain Indian standard guidelines for the mixing water. **10**

3. (*a*) Discuss superplasticizer-cement compatibility. What do you mean by dosing and redosing of superplasticizer? **10**

   (*b*) How is the workablity of concrete determined by

slump test? Discuss the factors affecting workability. 10

4. (*a*) Calculate the gel space ratio and theoretical strength of a sample of concrete made with 460 gm of cement with w/c ratio as 0·54 for following conditions:—

(*ii*) on full hydration

(*iii*) on 75% hydration. 10

(*b*) The strength of a fully matured concrete sample is found to be 45 N/mm^2. Determine the strength of identical concrete at age of 14 days when cured at an average temperature of 25°C in day and 8°C in night. The maturity coefficients are as follows:

A=32 and B=54. 10

5. (*a*) What are the advantages of non-destructive test? Explain ultrasonic pulse velocity test. 10

(*b*) What is distribution of strength of concrete? How is the standard deviation of cube strength estimated? Explain with example. 10

6. (*a*) Discuss following points with respect to fly ash concrete:

(*i*) Hydration of fly ash

(*ii*) Strength development of fly ash concrete

(*iii*) Durability of flyash concrete. 3+3+4=10

(*b*) Discuss following behaviours of concrete in brief:

(*i*) Elasticity

(*ii*) Shrinkage

(*iii*) Creep. 3+3+4=10

7. (*a*) What is plastic deformation? Discuss the factors affecting it. 10

(*b*) Explain stress strain behaviour of mild steel. Discuss the effect of strain hardening. 10

8. Write short notes on any *four*:

(*a*) Thermal properties of concrete

(*b*) Theories of failure

(*c*) Brittle and ductile fracture

(*d*) Segregation and bleeding

(*e*) Concreting in cold and hot weather

(*f*) XRD and SEM techniques. 5×4=20

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