UNIT-II
STRENGTH AND DURABILITY OF CONCRETE

PART-A

1. How can use prevent the effect of freezing and thawing in concrete?

Concrete can be restricted from frost action, damage of the structure by the entrainment of air. This entrainment of air is distributed through the cement paste with spacing between bubbles of no more than about 0.4mm.

2. Write any two tests for assessment of frost damage? The frost damage can be assessed by several ways:
   i) Assessment of loss of weight of a sample of concrete subjected to a certain number of cycles of freezing and thawing is one of the methods
   ii) Measuring the change in the ultrasonic pulse velocity or the damage in the change in the dynamic modulus of elasticity of specimen is another method.

3. How does a concrete structure get affected by heat?
   Heat may affect cone and as a result of:-
   - the removal of evaporable water
   - the removal of combined water
   - alteration of cement past
   - alteration of aggregate
   - change of the bond between aggregate and paste

4. How can you control cracks in a structure?
   - Use of good coarse aggregates free from clay lumps
   - Use of fine aggregate free from silt, mud & organic constituent.
   - Use of sound cement.
   - Provision of expansion & contraction joint.
   - Provide less water-cement ratio.

5. Define aggregate splitting?

This phenomenon occurs most frequently when hard aggregates are used in concrete. The thermal stresses except close to corners are predominantly compressive near to the heated surface. This stress causes the aggregate to split in this direction and the fractures may propagate through the mortar matrix leading to deterioration.

6. What the factor affecting chemical attack on concrete?
   - High porosity
   - Improper choice of cement type for the conditions of exposure
   - Inadequate curing prior to exposure
   - Exposure to alternate cycles of wetting and drying

7. Write the methods of corrosion protection?
   - Corrosion inhibitors

- corrosion resisting steels
- coatings for steel
- Cathodic protection

8. List out some coating for reinforcement to prevent corrosion?
   - Organic coating
   - Epoxy coating
   - Metallic coating
   - Zinc coating

9. Define corner reparation?

This is a very common occurrence and appears to be due to a component of tensile stress causing splitting across a corner. In fire tests, corner separation occurs most often in beams and columns made of Quartz aggregate and only infrequently with light weight aggregates

10. List any four causes of cracks?
    - Use of unsound material
    - Poor & bad workmanship
    - Use of high water-cement ratio
    - Freezing & thawing
    - Thermal effects
    - Shrinkage stresses

10. What are the types of cracks?
    i) Class-1: Cracks leading to structural failure
    ii) Class-2: Cracks causing corrosion
    iii) Class-3: Cracks affecting function
    iv) Class-4: Cracks affecting appearance

12. What changes occur, when hot rolled steel is heated to 500^{o}c?

At temp of 500^{o}c-600^{o}c the yield stress is reduced to the order of the working stress and the elastic modulus is reduced by one-third. Bars heated to this temp virtually recover their normal temperature.

13. List out the various types of spalling?
    i) General or destructive spalling
    ii) Local spalling which is subdivided as
        - aggregate splitting
        - comer separations
        - surface spalling
        - Sloughing off

14. List some faults in construction planning?
    - Overloading of members by construction loads
    - Loading of partially constructed members

- Differential shrinkage between sections of construction
- Omission of designed movement joints

15. Define corrosion?

The gradual deterioration of concrete by chemically aggressive agent is called "corrosion"

16. Give some examples for corrosion inhibitors?

i) Anodic inhibitors
ii) Cathodic inhibitors
iii) Mixed inhibitors
iv) Dangerous & safe inhibitors

17.Define effective cover?

The cover to reinforcement measured from centre of the main reinforcement up to the surface of concrete in tension is called "Effective cover"

18.Define corrosion inhibitor?

Corrosion inhibitor is an admixture that is used in concrete to prevent the metal embedded in concrete from corroding.

19.What are the operations in quality assurance system?

- Feed back to Auditing
- Review line
- Organization

20. List the various components of quality control.

Five components of a quality (control) assurance system are:

- Standards
- Production control
- Compliance control
- Task and responsibilities and
- Guarantees for users

PART-B

1. Explain in detail about quality assurance.

2. Describe the various components of quality control.

3. Discuss in detail about the thermal properties of concrete.

4. Elaborately explain about the effect of temperature on concrete.

5. Explain the various corrosion protection methods.