KINGS

COLLEGE OF ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING

Sub.Code / Name: CE 1355 CONCRETE TECHNOLOGY
Year / Sem : III / VI

Unit –I
Part-A

1. What is the common classification of aggregates?
   The most common classification of aggregates on the basis of bulk specific gravity is
   - lightweight,
   - normal-weight, and
   - heavyweight aggregates.

2. What is Lightweight aggregates?

   lightweight concrete contains aggregate that is natural or synthetic which weighs less than 1100 kg/m^3. The lightweight is due to the cellular or high internal porous microstructure, which gives this type of aggregate a low bulk specific gravity. The most important aspect of lightweight aggregate is the porosity. They have high absorption values, which requires a modified approach to concrete proportioning.

3. Define Heavyweight aggregates.

   Heavyweight concrete contains aggregates that are natural or synthetic which typically weigh more than 2,080 kg/m^3 and can range up to 4,485 kg/m^3. Heavy weight aggregate is most commonly used for radiation shielding, counterweights and other applications where a high mass-to-volume ratio is desired.

4. Define Aggregate.

   Aggregates are defined as inert, granular, and inorganic materials that normally consist of stone or stone-like solids. Aggregates can be used alone (in road bases and various types of fill) or can be used with cementing materials (such as Portland cement or asphalt cement) to form composite materials or concrete.

5. Mention the Classification of aggregate In accordance with size.

   Coarse aggregate: Aggregates predominately retained on the No. 4 (4.75 mm) sieve. For mass concrete, the maximum size can be as large as 150 mm.

   Fine aggregate (sand): Aggregates passing No.4 (4.75 mm) sieve and predominately retained on the No. 200 (75 µm) sieve.

6. Mention the Classification of aggregate In accordance with source.

Natural aggregates: This kind of aggregate is taken from natural deposits without changing their nature during the process of production such as crushing and grinding. Some examples in this category are sand, crushed limestone, and gravel.
Manufactured (synthetic) aggregates: This is a kind of man-made materials produced as a main product or an industrial by-product. Some examples are blast furnace slag, lightweight aggregate (e.g. expanded perlite), and heavy weight aggregates (e.g. iron ore or crushed steel).

7. What are the properties of Aggregate?
Moisture conditions
The moisture condition of aggregates refers to the presence of water in the pores and on the surface of aggregates.
Density and specific gravity

Density (D): weight per unit volume (excluding the pores inside a single aggregate)
SolidVweightD= Bulk density: the volume includes the pores inside a single aggregate.

7. Give the Grading of aggregates.
Grading - size distribution
The particle size distribution of aggregates is called grading. The grading determine the paste requirement for a workable concrete since the amount of void requires needs to be filled by the same amount of cement paste in a concrete mixture.

8. Define Fineness modulus of aggregate.
To characterize the overall coarseness or fineness of an aggregate, a concept of fineness modulus is developed.
To calculate the fineness modulus, the sum of the cumulative percentages retained on
a definitely specified set of sieves needs to be determined, and the result is then divided by 100. The sieves specified for the determination of fineness modulus are No. 100, No. 50, No. 30, No. 16, No. 8, No. 4, 3/8", 3/4", 1.5", 3", and 6".

9. Define Fineness modulus for blending of aggregates.
Blending of aggregates is undertaken for a variety of purposes, for instance, to remedy deficiencies in grading. The fineness modulus of blended aggregates can be calculated if the values for the component aggregates are known.

10. What are the Physical Quality requirements Of aggregates.
These requirements can be divided into five distinct groups as follows:
- Absorption;
- Abrasion resistance;
- Soundness;
- Restrictions on deleterious constituents; and
- Special requirements.

11. What are the Various test which are to be done on aggregates ?
Various test which are done on aggregates are listed below

- Sieve Analysis
- Water Absorption
- Aggregate Impact Value
- Aggregate Abrasion Value
- Aggregate Crushing Value

12. What is the chemical composition of cement?
Chemical composition of cement is lime, silica, alumina, calcium sulphate Iron oxide Magnesium oxide Sulphur trioxide Alkali oxides.

13 List various types of cement.

- Ordinary Portland cement
- High alumina cement
- Portland Pozzolana cement
- Quick setting cement

14. What is grade of cement? List any three grades of cement with their strengths.
Grade of cement represents the specific 28 days compressive strength. The following three grades are given along with their compressive strengths
33 Grade OPC –33 MPa
43 Grade OPC – 43 MPa
53 Grade OPC – 53 MPa

15. Give step by step method of manufacture of cement by wet process.

- Limestone is first crushed
- Mixed with clay or shale and ground
- The ground material is corrected and mixed with water
- Corrected slurry is sprayed on to the upper end of a rotary kiln
- Slurry looses moisture and forms as flakes
- Clinker forms
- Clinker is cooled and gypsum is formed

16. What is meant by proportioning of concrete?
Proportoining concrete is use of certain quantity of cement, sand and coarse aggregate and specific water cement ratio.

17. Can sea water be used for making concrete? Explain.
In general any potable water is suitable for concreting. To be specific pH of water should be between 6&8. Sea water contains sodium chloride whose pH does not fall in the above limit.

18. What is meant by curing of concrete?
In order to prevent the loss of water from the surface due to evaporation or otherwise it has to be retained for which certain measures are taken which is called curing.

19. What is mean by controlled concrete?

Controlled concrete is made by selecting the required ingredients of concrete. And finding their relative proportions with the aim of producing an economical concrete of certain strength and durability.

20 What is a slump test?

It is the most commonly used method of measuring consistency of concrete. This test can be conducted in the field or in laboratory. This test is not suitable for very wet or dry climate.

10. What is meant by hydration of cement?

Cements used for making concrete have the property of reacting chemically with water in an exothermic process called hydration that results in water treatment products.

21. What are the two process of manufacturing of cement?

- Wet process
- Dry process

Part - B

1. Describe the importance of the quality of water used for concreting.
2. How does increasing the quantity of water influence the properties of fresh and hardened concrete?
3. Classify the various concrete chemical based on their use.
4. Distinguish between plasticizers and superplasticizers.
5. Explain in detail of any three tests for Fresh Concrete.
6. Explain in detail of any three tests for Hardened Concrete.
7. List the different types of workability aids.
8. What are the various factors which affect the workability of concrete?
9. Describe the hydration reaction of important Bogue compounds indicating the products of hydration.
10. What are the stages of transformation of fresh concrete to hardened concrete?
11. Describe the process of manufacture of cement by wet process.
12. Describe the process of manufacture of cement by dry process.
13. Explain in details the various specifications of concrete.
14. Explain in detail of any three tests for aggregates.
15. Explain in detail of any three tests for cement.

UNIT – II
Part-A

1. Mention the Properties of concrete at Early Ages .
   - Workability
   - Slump Loss
   - Segregation/Bleeding
   - Plastic Shrinkage
   - Time of Set
   - Temperature
2. What are the Causes of bleeding and segregation?
   - Improper slump
   - Excessive amount of coarse aggregate
   - Lack of fines
   - Inappropriate placing and compacting

3. What are the Methods for Control of Bleeding?

- Reduction of water
- Introduction of fines and air
- Proper Compaction (too much compaction Causes bleeding)

3. Define Workability

Effort required manipulating a concrete mixture with a minimum of segregation. It is not a fundamental property of concrete

- consistency (slump) --> how easy to flow
  cohesiveness --> tendency to bleed andsegregate.

4. Is Concrete Really Elastic?

- In a word, yes. But the elasticity is a way to characterize the mechanical response of the material body for applied stresses that stay within the linear regime. Very large stresses, which are high enough to fracture the material, cause non-linear deformations.
- These values vary greatly depending on the overall makeup of the concrete mixture. Many of the non-fracture-related mechanical properties of concrete are characterized by the elastic moduli.
- For example, in many buildings the stiffness of the structure, made up of reinforced-steel concrete beams, is more important than the strength of the structure. The stiffness of the structure is directly related to the stiffness of the concrete, which is a function of its elastic moduli.

5. Why is Elastic Moduli Important for Concrete?

- The elastic moduli prediction code is set up to compute the elastic moduli of an arbitrary material. As long as the microstructure can be represented by a 3-D digital image, and the individual phase elastic moduli are known, the program can be used to compute the overall moduli.
- The overall elastic moduli are functions of the microstructure as well as of the elastic moduli of the individual chemical phases in the cement paste. These can be as many as 20 or 30, since cement paste by itself is a chemically complex material.

6. Define concrete Expansion and shrinkage.

Concrete has a very low coefficient of thermal expansion. However, if no provision is made for expansion, very large forces can be created, causing cracks in parts of the structure not capable of withstanding the force or the repeated cycles of expansion and contraction. The coefficient of thermal expansion of Portland cement concrete is 0.000008 to 0.000012 (per degree Celsius) (8 to 12 microstrains/°C)(8-12 1/MK)

7. Define Shrinkage cracking

Shrinkage cracks occur when concrete members undergo restrained volumetric changes (shrinkage) as a result of either drying, autogenous shrinkage or thermal effects. Restraint is provided either externally (i.e. supports, walls, and other boundary conditions) or internally (differential drying shrinkage, reinforcement).

8. Define Plastic Shrinkage cracking

Plastic-shrinkage cracks are immediately apparent, visible within 0 to 2 days of lacement, while drying-shrinkage cracks develop over time. Autogenous shrinkage also occurs when the concrete is quite young and results from the volume reduction resulting from the chemical reaction of the Portland cement.

9. Define Tension cracking

Concrete members may be put into tension by applied loads. This is most common in concrete beams where a transversely applied load will put one surface into compression and the opposite surface into tension due to induced bending. The portion of the beam that is in tension may crack. The size and length of cracks is dependent on the magnitude of the bending moment and the design of the reinforcing in the beam at the point under consideration. Reinforced concrete beams are designed to crack in tension rather than in compression. This is achieved by providing reinforcing steel which yields before failure of the concrete in compression occurs and allowing remediation, repair, or if necessary, evacuation of an unsafe area.

9. Define Creep.

Creep is the permanent movement or deformation of a material in order to relieve stresses within the material. Concrete that is subjected to long-duration forces is prone to creep. Short-duration forces (such as wind or earthquakes) do not cause creep. Creep can sometimes reduce the amount of cracking that occurs in a concrete structure or element, but it also must be controlled. The amount of primary and secondary reinforcing in concrete structures contributes to a reduction in the amount of shrinkage, creep and cracking.

10. What is setting?

- **Setting** is the stiffening of the concrete after it has been placed. A concrete can be 'set' in that it is no longer fluid, but it may still be very weak; you may not be able to walk on it, for example.
- Setting is due to early-stage calcium silicate hydrate formation and to ettringite formation. The terms 'initial set' and 'final set' are arbitrary definitions of early and later set; there are laboratory procedures for determining these using weighted needles penetrating into cement paste.

11. What is Hardening?

- Hardening is the process of strength growth and may continue for weeks or months after the concrete has been mixed and placed. Hardening is due largely to the formation of calcium silicate hydrate as the cement continues to hydrate.
- The rate at which concrete sets is independent of the rate at which it hardens. Rapid-hardening cement may have similar setting times to ordinary Portland cement.

12 How the concrete strength has measured?

Measurement of concrete strengths:Traditionally, this is done by preparing concrete cubes or prisms, then curing them for specified times. Common curing times are 2, 7, 28 and 90 days. The curing temperature is typically 20 degrees Centigrade. After reaching the required age for testing, the cubes/prisms are crushed in a large press. The SI unit for concrete strength measurement is the Mega Pascal, although 'Newtons per square millimetre'

13. What are the Factors affecting concrete strength?

There are many relevant factors; some of the more important follow:

- Concrete porosity
- Water/cement ratio
- Soundness of aggregate:
- Aggregate-paste bond
- Cement-related parameters

14. Define Concrete porosity.

voids in concrete can be filled with air or with water. Air voids are an obvious and easily-visible example of pores in concrete. Broadly speaking, the more porous the concrete, the weaker it will be. Probably the most important source of porosity in concrete is the ratio of water to cement in the mix, known as the 'water to cement' ratio. This parameter is so important it will be discussed separately below.

15. Define Water/cement ratio**.**

- This is defined as the mass of water divided by the mass of cement in a mix. For example, a concrete mix containing 400 kg cement and 240 litres (=240 kg) of water will have a water/cement ratio of 240/400=0.6.
- The water/cement ratio may be abbreviated to 'w/c ratio' or just 'w/c'. In mixes where the w/c is greater than approximately 0.4, all the cement can, in theory, react with water to form cement hydration products. At higher w/c ratios it follows that the space occupied by the additional water above w/c=0.4 will remain as pore space filled with water, or with air if the concrete dries out.

16. What do you mean by Soundness of aggregate?

If the aggregate in concrete is weak, the concrete will also be weak. Rocks with low intrinsic strength, such as chalk, are clearly unsuitable for use as aggregate.

Part -B

1. Explain how you would determine the various elastic moduli for concrete.
2. Explain the significance of quality control.
3. What are the reasons for the cracking of concrete and how does it affect durability?
4. What do you understand by carbonation of concrete? How is it tested?
5. What are the various types of chemical attacks encountered by concrete?
6. What precautions can be taken to ensure good quality concrete in coastal structures?
7. What are the physical deteriorating influences on concrete?
8. How does freeze-thaw damage occur?
9. Explain the factors which influence corrosion?
10. What is cathodic protection and when is it applied?
11. What physical tests could be done to confirm the efficiency of the epoxy joint?
12. Write short notes on the following: Acid attack
13. Write short notes on the following: Sulphate attack
14. Write short notes on the following: Alkali attack
15. Explain the methods of reinforced concrete repair techniques.
16. Explain the importance of weathering of concrete.

Unit –III

Part- A

1. Define Concrete Durability.

"Durability of concrete is the ability of concrete to withstand the harmful effects of environment to which it will be subjected to, during its service life, without undergoing into deterioration beyond acceptable limits".

2. Define concrete mix design.

Concrete mix design is defined as the appropriate selection and proportioning of constituents to produce a concrete with pre-defined characteristics in the fresh and hardened states.

3. what are the factors influencing the selection of materials?

The selection and proportioning of materials depend on:

- the structural requirements of the concrete
- the environment to which the structure will be exposed
- the job site conditions, especially the methods of concrete production, transport, placement, compaction and finishing
- the characteristics of the available raw materials

4. Write the Factors Influencing Consistency.

The consistency of fresh concrete depends on many factors, the main ones being:

- Water Content (kg/m3)
- W/c Ratio
- Fineness Modulus of the Aggregate
- Use of Water Reducers (Plasticizers / Super plasticizers)
- Type and shape of Aggregate
- Entrained Air Content

5. What are the Factors affecting Strength of Hardened concrete?

The strength of hardened concrete depends on many factors, the main ones being:

- W/C Ratio
- Strength of the Cement
- Type and shape of Aggregate
- Entrained Air Content

6. What are the sequence of steps should be followed in ACI method?

- determine the job parameters - aggregate properties,
- maximum aggregate size, slump, w/c ratio, admixtures,
- calculation of batch weight, and
- adjustments to batch weights based on trial mix.

7. What are the of the principal properties of "good" concrete?
   - cement
   - w/c ratio
   - aggregate
   - cement paste and aggregate
   - mixing
   - placement and handling of
   - fresh concrete
   - curing

7. Mention the Maximum aggregate size to be used in Mix Design as per ACI.

- Maximum size should not be larger than 1/5 the minimum dimension of structural members, 1/3 the thickness of a slab,or 3/4 the clearance between reinforcing rods and forms. These restrictions limit maximum aggregate size to 1.5 inches,

8. What are the Requirements of concrete mix design as per BIS?

- The minimum compressive strength required from structural consideration
- The adequate workability necessary for full compaction with the compacting equipment available.
- Maximum water-cement ratio and/or maximum cement content to give adequate durability for the particular site conditions
- Maximum cement content to avoid shrinkage cracking due to temperature cycle in mass concrete

9. Give the types of concrete mixes.

- Nominal Mixes
- Standard mixes
- Designed Mixes

10. Define Nominal Mixes

In the past the specifications for concrete prescribed the proportions of cement, fine and coarse aggregates. These mixes of fixed cement-aggregate ratio which ensures adequate strength are termed nominal mixes. These offer simplicity and under normal circumstances, have a margin of strength above that specified. However, due to the variability of mix ingredients the nominal concrete for a given workability varies widely in strength.

11. Define Standard mixes

The nominal mixes of fixed cement-aggregate ratio (by volume) vary widely in strength and may result in under- or over-rich mixes. For this reason, the minimum compressive strength has been included in many specifications. These mixes are termed standard mixes.

IS 456-2000 has designated the concrete mixes into a number of grades as M10, M15, M20, M25, M30, M35 and M40. In this designation the letter M refers to the mix and the number to the specified 28 day cube strength of mix in N/mm^2. The mixes of grades M10, M15, M20 and M25 correspond approximately to the mix proportions (1:3:6), (1:2:4), (1:1.5:3) and (1:1:2) respectively.

12. What is Designed Mixes?

In these mixes the performance of the concrete is specified by the designer but the mix proportions are determined by the producer of concrete, except that the minimum cement content can be laid down. This is most rational approach to the selection of mix proportions with specific materials in mind possessing more or less unique characteristics. The approach results in the production of concrete with the appropriate properties most economically. However, the designed mix does not serve as a guide since this does not guarantee the correct mix proportions for the prescribed performance.

13 .What are the Factors affecting the choice of mix proportions ?

The various factors affecting the mix design are:

- Compressive strength
- Workability
- Durability
- Maximum nominal size of aggregate
- Grading and type of aggregate
- Quality Control

Part-B

1. Explain the Design Procedure for IS method of Concrete Mix Design.
2. Describe about the Sampling and Acceptance criteria
3. Write any one procedure for determining concrete mix design
4. Design the concrete mix for grade M20 with suitable conditions. Find the quantities of constituents of the mix for a bag of cement.
5. Explain the factors that influence the choice of mix design.
6. Explain in detail about the statistical quality control and acceptance criteria of concrete.
7. Describe the procedure in adopting ACI method of concrete mix design.
8. Describe the procedure in adopting IRC method of concrete mix design.
9. Design the concrete mix for grade M30 with suitable conditions. Find the quantities of constituents of the mix for a bag of cement.
10. Design the concrete mix for the following data: characteristic compressive strength = 20MPa, maximum size of aggregate = 20mm (angular), Degree of workability = 0.9 CF, Degree of quality control = good and type of exposure = severe. Water absorption by CA = 0.5% and moisture content in FA = 2.0%. Assume any suitable missing data.

11. Explain the procedure of selection of constituent materials of concrete.
12. Describe the recent trends in concrete mix design.
13. Design the concrete mix for the following data: characteristic compressive strength = 35MPa, maximum size of aggregate = 20mm (angular), Degree of workability = 0.9 CF, Degree of quality control = good and type of exposure = severe. Water absorption by CA = 1% and moisture content in FA = 1.5%. Assume any suitable missing data.

Unit – IV

Part-A

1. Define Aerated Concrete

   Aerated concrete (AAC), also known as autoclaved cellular concrete (ACC) or autoclaved lightweight concrete (ALC),[1] was invented in the mid-1920s by the Swedish architect and inventor Johan Axel Eriksson.[2][3] It is a lightweight, precast building material that simultaneously provides structure, insulation, and fire and mold resistance. AAC products include blocks, wall panels, floor and roof panels, and lintels

2. What is the general use of Shotcrete?

   While most shotcrete placed is the traditional dry-mix and wet-mix shotcrete, the Use of specialty shotcretes has become common. The addition of accelerators, fibers, and silica fume can provide shotcrete with significantly enhanced performance.

3. What is meant by No fine concrete?

   - Concrete produced from a mix of solid or porous (mainly uniform-fraction) gravel or crushed stone, a binder (portland cement or slag portland cement), and water. The absence of sand in the mix and the limited consumption of cement (not more than 280 kg/m^3) account for the honeycomb structure of the concrete, the reduced density, and the low heat conduction.
   - The compressive strength of concrete with solid fillers does not exceed 10 meganewtons per sq m (MN/m^2), or 100 kilograms-force per sq cm (kgf/cm^2), at a density of up to 2,000 kg/m^3; for concrete with porous fillers it is 7.5 MN/m^2 (75 kgf/cm^2) at a density of up to 1,600 kg/m^3. The heat conduction is 0.29-0.9 watts per m per degree Kelvin, or 0.25-0.85 kcal per (meter per hour per degree Centigrade).

   - No-fines concrete is used mainly for erecting cast or large-block exterior walls of buildings in regions rich in local gravel or rock for crushed rock in the absence of other inexpensive wall materials. Walls made from this type of concrete are plastered on both sides to prevent air

drafts. No-fines concrete made from a porous filler *(keramzit* gravel or sifted slag) is also used as an insulating material in the sandwich enclosing structures of buildings.

4. What do you mean by Fibre Reinforced Concrete?

   Fiber-reinforced concrete (FRC) is concrete containing fibrous material which increases its structural integrity. It contains short discrete fibers that are uniformly distributed and randomly oriented. Fibers include steel fibers, glass fibers, synthetic fibers and natural fibers – each of which lend varying properties to the concrete. In addition, the character of fiber-reinforced concrete changes with varying concretes, fiber materials, geometries, distribution, orientation, and densities.

5. Define ferro-cement.
   The term ferro-cement implies the combination of ferrous product with cement. Generally this combination is in the form of steel wires meshes embedded in a portland cement mortar. Wire mesh is usually of 0.8 to 1.00 m diameter steel wires at 5 mm to 50 mm spacing and the cement mortar is of cement sand ratio of 1:2 or 1:3. 6 mm diameter bars are also used at large spacing, preferably in the corners. Sand may be replaced by baby jelly. The water cement ratio used is between 0.4 to 0.45

6. What is self-compacting concrete?
   Self-compacting concrete is a non-segregating concrete that is placed by means of its own weight. The importance of self-compacting concrete is that is maintains all concrete's durability and characteristics, meeting expected performance requirements.

7. State the effects of concrete in cold weather
   - Slower Strength Gain
   - Cracking
   - Freezing
   - Extended Setting Times

8. What are the functions of formwork?
   Formwork is a classic temporary structure in the sense that it is erected quickly, highly loaded for a few hours during the concrete placement, and within a few days disassembled for future reuse. Also classic in their temporary nature are the connections, braces, tie anchorages, and adjustment devices which forms need.

9. Define hot weather concreting.
   Hot weather may be defined as any period of high temperature in which special precautions need to be taken to ensure proper handling, placing, finishing and curing of concrete. Hot weather problems are most frequently encountered in the summer, but the associated climatic factors of high winds and dry air can

occur at any time, especially in arid or tropical climates. Hot weather conditions can produce a rapid rater of evaporation of moisture from the surface of the concrete, and accelerated setting time, among other problems.Generally high relative humidity tends to reduce the effects of high temperature.

.

10. Define cold weather concreting.

Concrete placed during cold weather will develop sufficient strength and durability to satisfy intended service requirements only if it is properly produced, placed and protected. ACI 306 "Cold Weather Concreting" defines cold weather concreting as a period when for more than three (3) consecutive days, the following conditions exist:

- The average daily air temperature is less than 5°C (40°F) and,
- The air temperature is not greater than 10°C (50°F) for more than one-half of any 24 hour period.

11. What are the methods used for consolidating concrete?

Consolidation is the process of removing entrapped air from freshly placed concrete. Several methods and techniques are available, the choice depending mainly on the workability of the mixture, placing conditions, and degree of air removal desired. Some form of vibration is usually employed.

12. What are the uses of polymer concrete?

Polymer concrete may be used for new construction or repairing of old concrete. The adhesion properties of polymer concrete allow patching for both polymer and cementitious concretes. The low permeability of polymer concrete allows it to be used in swimming pools, sewer pipes, drainage channels, electrolytic cells for base metal recovery, and other structures that contain liquids. It can also be used as a replacement for asphalt pavement, for higher durability and higher strength.

13. What are the advantages of using high-strength concrete?

Concrete is defined as "high-strength concrete" solely on the basis of its compressive strength measured at a given age.

14. What are the various parameters affecting the strength of concrete?

Many factors influence the rate at which the strength of concrete increases after mixing.

1.Concrete porosity: voids in concrete can be filled with air or with water. iscritical.

2.Cement-related parameters: many parameters relating to the composition of the individual cement minerals and their proportions in the cement can affect the rate of strength growth and the final strengths achieved.

Part –B

1. What are the various methods of underwater construction? Explain.
2. What are the effects of cold weather concreting and hot weather concreting?
3. How can high-strength concrete be classified? Explain.
4. List the differences between polymer – impregnated concrete, polymer – modified concrete, and polymer concrete.
5. What are the various quality control tests done to ensure good performance of polymer concrete?
6. What are the basic properties of fibre – reinforced concrete which can be advantageously made use of in the design of structural elements?
7. In what way can the behavior of FRC can be used for seismic – resistant design?
8. Explain in detail the method of design of light weight concreting.
9. Describe the procedure of mass concrete.
10. Describe the procedure of Shotcrete.
11. Describe the procedure of Grouting.
12. Explain the properties of polymer Impregnated Concrete.
13. Describe the method of manufacturing of high density concrete.
14. Explain the design aspects of aerated concrete.
15. Explain the various methods of polymer concrete.

Unit – V
Part-A

1. What is batching of concrete?

   Batching is the process of measuring concrete mix ingredients by either mass or volume and introducing them into the mixer. To produce concrete of uniform quality, the ingredients must be measured accurately for each batch

2. Define weigh batching.

   Weigh batching is defined as measuring the constituent materials for mortar or concrete by weight.

3. What is volume batching?

   Volume batching is defined as the measuring of the constituent materials for mortar or concrete by volume.

4. What is the use of chute in concreting?

   Concrete chutes put your concrete where you want it. Maintain quality and strength and eliminate segregation. Get your concrete forming work done faster with our concrete cement chutes. Many different sizes and lengths available for your job and the are light weight aluminum and easy to handle.

5. What are belt conveyors?

A **conveyor belt** (or **belt conveyor**) consists of two or more pulleys, with a continuous loop of material - the conveyor belt - that rotates about them. One or both of the pulleys are powered, moving the belt and the material on the belt forward. The powered pulley is called the drive pulley while the unpowered pulley is called the idler. There are two main industrial classes of belt conveyors; Those in general material handlingsuch as those moving boxes along inside a factory and bulk material handlingsuch as those used to transport industrial and agricultural materials, such as grain, coal, ores, etc. generally in outdoor locations.

6. Define mixing time of concrete.

The various components of a mix are proportioned so that the resulting concrete has adequate strength, proper workability for placing and cost effective. To achieve such properties the mixing should such that it produce an intimate mixture of cement, water, fine and coarse aggregate and suitable admixture of uniform consistency throughout each batch. The average strength of concrete increases with an increase in mixing time as it improves uniformity of mix.

7. What is retempering?

Retempering is typically done to restore concrete slump back to specified limits. The practice is known to result in some loss of strength which is proportional to the amount of water added. Whenretempering of concrete is done only to restore slump as per ACI 116 definition, it causes a loss incompressive strength of 7 to 10 percent, but it can be much higher depending on the amount of retempering water added

8. State any two uses of wheel barrow.

Wheelbarrow is a small hand-propelled vehicle, usually with just one wheel, designed to be pushed and guided by a single person using two handles to the rear or by a sail to push the ancient wheelbarrow by wind. The term "wheelbarrow" is made of two words: "wheel" and "barrow." "Barrow" is a derivation of the Old English "bearwe" which was a device used for carrying loads

9. What is hoist?

Hoist or **winder**[1] is used to raise and lower conveyances within the mine shaft. Modern hoists are normally powered using electric motors, historically with direct current drives utilizing solid-state converters (thyristors), however modern large hoists utilize alternating current drives that are variable frequency controller

10. Define revibration.

Vibration done some time after the concrete has been placed and consolidated is known as revibration. When properly done, revibration can be beneficial. It is most effective when the running vibrator will just barely sink from its own weight and energy, which may in some circumstances be several hours after casting. Revibrated concrete may be considerably stronger and more free of bugholes than

ordinary concrete, but care must be taken, especially with architectural concrete, not to allow the vibrator to penetrate into a layer of hardened concrete below

11. What is surface treatment of concrete?

Concrete curing membranes and other products to enhance the concrete surface.

- Ease of formwork release
- Producing exposed aggregate finishes
- Enhanced curing of freshly placed concrete

12. Define curing.

The process in which an adhesive undergoes a chemical reaction and becomes a solid. Curing requires pressure, heat, UV light, water, or some other means to initiate the chemical reaction and form the bonded joint.

PART B

1. Explain the role of formwork in the quality of concrete construction.
2. What type of equipment is used for placing concrete? In what way does this equipment avoid segregation during placing?
3. Describe the various aspects of pumping concrete.
4. What are the precautions to be taken while adopting the steam curing method?
5. Describe the method of slipform paving and state its advantages.
6. What are the advantages of using ready mixed concrete instead of site mixed concrete?
7. What are the properties of materials used for mass concrete?
8. Explain the batching process of concrete.
9. Explain in detail the control facilities of concrete jobs.
10. What are the methods of transportation of concrete? Explain any 5 of them.
11. Explain finishing method in concrete surfaces.
12. Describe the method of steam curing.
13. Explain the method of pumping of concrete.
14. Describe the compaction method of concrete.
15. Explain the various methods of batching in concrete.
16. Explain transportation and placing procedure in concrete.