

UNIT-4: QUALITY CONTROL OF CONCRETE

QUESTION1. Give the two points of comparison between volume batching and weight batching. (Win-22, Marks-2)

ANS:

Volume Batching	Weight Batching
In volume batching, measurement of materials is done by taking volume.	In weight batching, measurement of materials is done by taking weight
Gauge boxes are useful for volume batching.	Weight machine is used for weight batching.
Volume batching gives approximate measure of materials.	Weight batching gives accurate measure of materials.
Volume batching is useful for less important works where ordinary mix is used.	Weight batching is useful for more important works where standard mix is used.
Volume batching is useful for aggregates and water	Weight batching is useful for cement.
Volume batching requires less time even with unskilled labours.	Weight batching requires skilled labours and more time.

QUESTION 2. Illustrate the curing of concrete. Explain the different methods of curing of concrete. (Win-22, Marks-6) , (Win-19, Marks-6)

Ans: **Curing of concrete:** It is the process or method of keeping humidity or temperature of freshly placed concrete to ensure complete hydration of cement. Curing is the process of keeping the concrete moist and warm enough so that the hydration of the cement can take completed and concrete starts gaining required strength.

Methods of curing of concrete:

Water curing: This is the best method of curing, because it satisfies all the requirements of curing. The precast concrete items are normally immersed in curing tanks for certain duration. Pavement slab, roof slab etc. are covered under water by making small pond. Water curing can be done in following ways: Immersion, Ponding method, Spraying or fogging, Wet covering.

Membrane curing: Sometimes concrete works are carried out in places where there is acute shortage of water. Therefore lavish application of water for water curing is not possible for the reason of economy. A membrane will prevent the evaporation of water from the concrete. The membrane can be either in solid or liquid form. It is also known as sealing compound. Other membrane curing sealing compounds are: Rubber latex emulsion, emulsion of resins, varnishes etc. **Application of heat:** The development of strength is not only a function of time but also that of temperature.

Concrete subjected to higher temperature accelerates the hydration resulting in faster development of strength. Prefabricated members are normally steam cured, like sleepers, electric poles and fencing poles etc. In this curing is done by 3 ways: Steam curing- Water Vapors at 70-80°C ; Curing by infra-red radiation- infra red rays of 90-1000 ; Electrical curing- A.C. or D.C. current to produce heat.

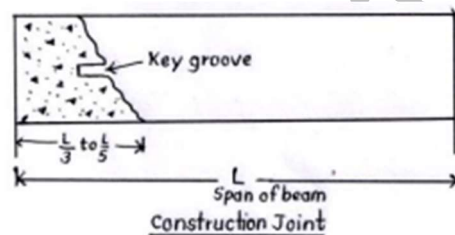
Miscellaneous method: Calcium chloride is used either as a surface coating or as an admixture. It has been satisfactorily used as a curing medium. Both of these based on the fact that calcium chloride, being a salt shows affinity for moisture. The salt not only absorbs moisture from atmosphere but also retains moisture at the surface.

QUESTION 3. Enlist the types of joints provided with neat sketch. Also state their necessity. (Win-22, Marks-6) (Win-23, Marks-6)

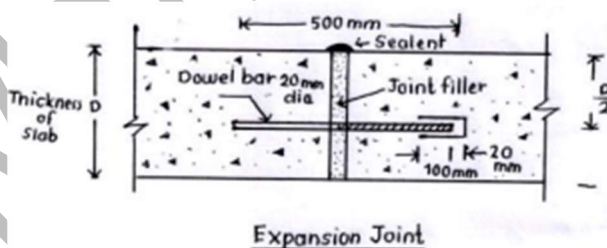
Ans: List of joints in concrete: 1. Construction joints 2. Expansion joints
3. Contraction joints 4. Isolation joints

Joints in concrete with necessity:

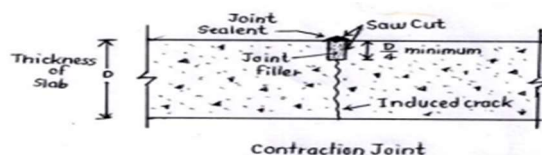
1. Construction joints: To join two stages of concreting of construction elements like beam, column, slab, beam-column junction, wall, pardi, dam, bridge etc.



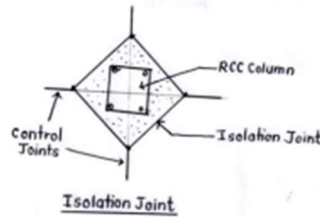
2. Expansion joints: To allow the expansion of concrete slab due to temperature increase in case of concrete road.



3. Contraction joints: To allow the contraction of concrete slab due to temperature decrease in case of concrete road.



4. Isolation joints: To isolate the construction element from remaining structure i.e. column and footing can be isolated to protect from earthquake.



QUESTION 4. Write four requirements of a good form work and draw a sketch showing c/s of formwork for R.C.C. beam. (Win-22, Marks-6), (Sum-23, Marks-4), (Win-23, Marks-4)

Ans: **Requirements of a good form work:**

1. A good formwork should be strong enough to carry the weight of concrete without bulging.
2. It should be easy to erect and dismantle on site.
3. It should be reusable for no. of times to achieve economy.
4. It should be easily available to avoid delay.
5. It should give uniform and smooth finishing after removal.
6. It should be leak-proof with perfect joints.
7. It should be durable with lesser wear and tear.

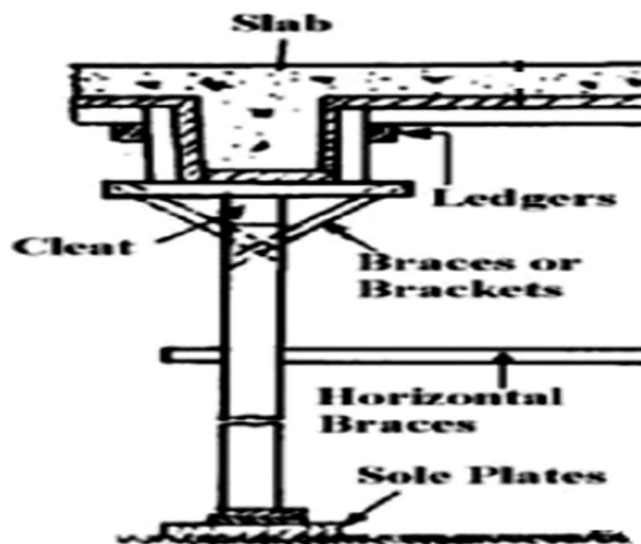


Fig. : C/S of Formwork for R.C.C. Beam

QUESTION 5. Enlist any two methods of transportation of concrete. (Win-19, Marks-2)

Methods of transportation of concrete: There are three methods of transportation of concrete listed below.

1. **Manual method-** Transportation through the hands of labour in the ghamela, wheel barrow.
2. **Semi-manual method-** Transportation using belt conveyor, skip and hoist arrangement.
3. **Mechanical Method-** Transportation using truck, dumper, RMC vehicle.

QUESTION 6. State the requirement of good form work and state the stripping time of form work as per IS 456-2000. i) Slab ii) Beam iii) Column with labelling on sketch (Win-19, Marks-6)

Ans: **Requirement of good form work:**

1. It should be strong enough to resist the weight of concrete, workers and machinery.
2. It should be economical compared to total cost of construction.
3. It should be possible to use the formwork for more number of times.
4. It should give smooth finish and shape to concrete faces.
5. It should be possible to erect and dismantle the formwork very easily.
6. It should be easily and locally available.
7. It should be rigid enough to retain its shape without any deflection.

Stripping time of form work as per IS 456-2000.

i) Slab: 1. Soffit formwork – 3 days

2. Span up to 4.5m – 7 days

3. Span more than 4.5m – 14 days

ii) Beam: 1. Soffit formwork for beam – 7 days

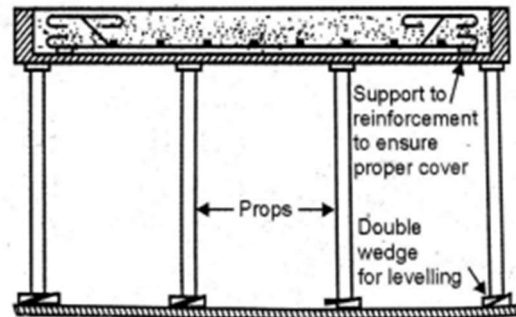
2. Beam and arch of span up to 6m – 14 days

3. Beam and arch of span more than 6m – 21 days

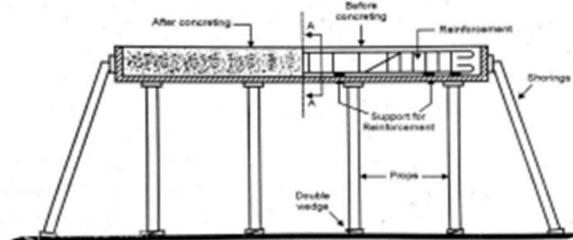
iii) Column: Vertical formwork – 16 to 24 hours

Form work for the following:

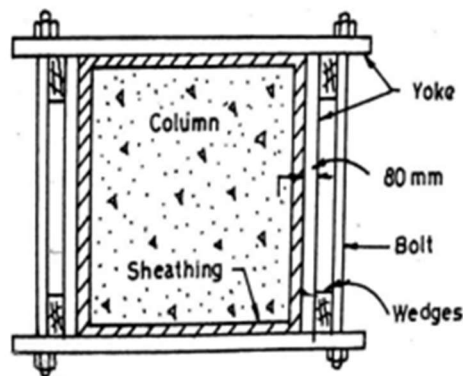
i) Slab



ii) Beam



iii) Column



QUESTION 7. Explain the procedure for joining old and new concrete work, also state any two material used for filling joints (Win-19, Marks-6)

Ans: **Procedure of joining old and new concrete:**

When new concreting is done in continuation with old concrete after a gap of some days, months or even years, then the new and old concrete must have a strong bond with each other. Hence some points should be kept in mind for joining old and new concrete.

Procedure: 1. Cleaning: The old concrete surface is first thoroughly cleaned with wire brush. Loose material if any, should be clean first.

2. Chiseling: The old concrete surface is made rough by denting it with a chisel for a strong bond with new concrete.

3. Application of cement slurry or paste with some admixtures: The surface is then wetted with rich cement slurry. Sometimes an admixture has to be added to give additional strength to the joints. Then fresh concrete is placed over the old concrete.

4. Providing overlap: To give homogeneity to the reinforcing bars, overlap is provided and the overlap portion is bound tightly with high tensile wire.

Material used for filling joints: 1. Asphalt, tar, bituminous materials 2. Fibre and fibre products 3. Sponge rubber 4. Cork 5. Polymer 6. Thermoplastic and thermo-col 7. Glass

QUESTION 8 State the need for water proofing. (Sum-23, Marks-2)

Ans: The importance and need for waterproofing is enumerated below

- 1- It reduces possible damage to structure.
- 2- It reduces permeability.
- 3- It Increases the durability and strength.
- 4- It prevents the spoiling of paint and appearance of the building.

QUESTION 9 State the precautions to be taken during transportation and placing of concrete in formwork. (Sum-23, Marks-4)

Ans: **Precautions to be taken during transportation**

1. Keep the least possible distance between mixing plant and construction site by establishing the mixing plant nearest to site as far as possible.
2. Avoid atmospheric interaction of concrete by covering it with polythene cover when it is transported through open trucks or dumpers
3. During transportation , wastage of concrete should not takes place.
4. Select the higher w/c ratio for longer transportations and also maintain humid (moist) conditions around concrete(i.e. in case of RMC vehicles)
5. Use retarding admixtures in concrete to avoid early hardening of concrete.

Precautions to be taken while placing of concrete:

1. While placing of concrete, the mixture should reach at all corners uniformly and not intensively at one place.
2. Placing thickness for mass concrete should be less than 30-45 cm and for RCC work should be less than 15-30 cm.
3. Before placing of concrete the formwork joints should be checked to avoid bleeding.

4. Concrete mixture should not be dropped from the height more than 1 m.
5. Before placing of concrete, oiling to inner face of formwork should be done.
6. Flow of placing of concrete should be continuous and joints should be left at appropriate position.

QUESTION 10 Define compaction. State various types of vibrators used and explain with neat sketch poker vibrator. (Win-16, Marks-4)

Ans: Compaction: - It is the process to remove air voids from concrete mixture to produce dense and compacted concrete, called as compaction.

Types of vibrators i) Needle or Poker vibrator ii) Screed board vibrator iii) Form vibrator iv) Platform vibrator v) Table vibrator vi) Vibratory roller

Poker vibrator

The poker or needle vibrator has a vibrating needle operates on petrol or diesel engine as shown in fig.1 above. It gives 12000 cycles of vibration per minutes, which is useful to compact column and deep beams. Pocker vibrator is used to compact concrete internally by immersing it in concrete.

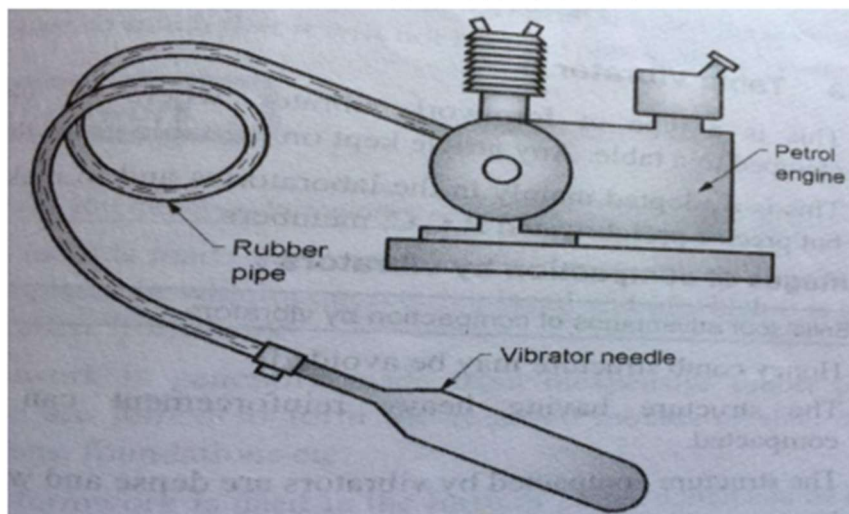


Fig. Poker vibrator