

FINAL TERM PAPER

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SUBJECT: CONCRETE TECHNOLOGY

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CONCRETE TECHNOLOGY

Q1): Compare Internal and external vibration of Concrete?

a): Internal Vibrators:

This is one of the most common and promising method used for concrete compaction. The diameter (20-180mm) and length (25-90mm) of the head of vibrator varies according to the requirement of the site.

- * Energy for compaction is supplied through oscillatory motion of vibrations.
- * Internal vibrators are used for cast-in-place pours but there are exceptions where

- Reinforcement is very intense.
- Poker can be easily be removed and moved from point to point.
- To Aid in the removal of trapped air the vibrator head should be rapidly plunged into the mix and slowly moved up and down.

The Actual completion of vibration is judged by the appearance of the concrete surface which must be neither rough nor contain excess cement paste.

Parts of Internal Vibrator are:

- 1). Motor
- 2). Flexible Shaft.
- 3). head (poker).

- Inside the head there is an unbalanced weight which rotates at high speed causing head to move in circular motion.

- * The Motor can be powered by electricity, gasoline or air.
- * Diameter of head (20mm to 180mm)

b). External Vibrators:

When heavy reinforcement is used in a construction component or if the section is very thin, it gets difficult to use an internal vibrator to compact concrete.

In such areas, concrete is vibrated externally, which in turn is much more expensive (heavy electricity consumption) and requires tightly bound formwork to bear the vibrations.

External vibration is less effective and it consumes more power as compared to the internal vibration.

External vibrators usually clamped to formwork so that form and concrete are subjected to vibrations.

- * Considerable work needed to vibrate forms.
- * Forms must be strong and tied enough to enough to prevent distortion and leakage of the grout.
- * Suitable for thin members or Pre-Cast Units.
- * Frequency range - 1000 - 5000 cycles per min.
- * Finish Quality - Good.
- * Consumes more power - less efficient than internal vibrator.

Two Categories are,

- 1). When external vibrators are attached or applied to formwork. i.e. form vibrators, vibratory screeds, rammers.
- 2). When formwork is attached to external vibrators i.e. vibrating tables, shock tables etc.

Q No. 02) :- What are the Advantages and disadvantages of using ready-mixed concrete?

Ans: Advantages:

Following are the advantages of ready-mixed concrete:

- 1). Ready Mix Concrete (RMC) allows speedy construction through programmed delivery at site, mechanized operation with consequent economy.
- 2). RMC reduces the labour cost and site supervisory cost.
- 3). RMC comes with consistency in quality through accurate and computerized control of sand aggregates and water as per mix designs.
- 4). Production of RMC helps in minimizing cement wastage due to bulk handling.

- 5). Production of RMC is relatively pollution free.
- 6). Reduce project time resulting in saving in all aspects.
- 7). Proper Control and economy in use of raw material resulting in saving of natural resources.

Disadvantages:

- 1). The materials are batched at a central point/plant, and the mixing begins at that very plant. So that travelling time from the time from the plant to the site is critical over longer distances. Some sites are just too far away, which can risk that ready mix concrete may become unusable due to setting.

Q No. 3): What are the nondestructive testing methods?

Ans: It is the method of testing existing concrete structures to assess the strength and durability of concrete structure.

- In NDT without loading the specimen to failure we can measure strength of concrete.
- Nowadays this method has become a part of quality control process.
- This method helps us to investigate crack depth, micro cracks and deterioration of concrete.
- It requires skilled and experienced persons.

Different Methods of NDT:

- 1). Rebound Hammer Method.
- 2). Penetration Method.
- 3). Pull out test Method
- 4). Ultrasonic pulse velocity Method.
- 5). Radioactive Methods.

- 2). It will generate additional road traffic. Generally, Ready Mix Trucks are large in size and may cover lot of area in the road blocking other traffic. Furthermore, access roads and site access have to be able to carry the greater weight of the ready-mixed truck plus load. (Green concrete is approx. 2.5 tonne per m^3). This problem can be overcome by utilizing so-called "mini mix" companies which use smaller $4m^3$ capacity mixers able to reach more-restricted sites.
- 3). Concrete's limited time span between mixing and curing means that ready-mix should be placed within 210 minutes of batching at the plant. Modern admixtures can modify that time span precisely, however, the amount and type of admixture added to the mix is very important.
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1). Rebound Hammer Method ::

- It is a surface hardness tester for which an empirical correlation has been established between strength and rebound number.
- The only known instrument to make use of the rebound principle for concrete testing is the Schmidt hammer, which weighs about 4 lbs (1.8 kg).
- It consists of a spring-controlled hammer mass that slides on a plunger with a tubular housing.
- The Hammer is forced against the surface of the concrete by the spring and the distance of rebound is measured on a scale.

2). Penetration Tests on Concrete ::

- The Windsor probe is generally considered to be the test means of testing penetration.
- Equipment consists of a powder-actuated gun or driver, hardened alloy probes, loaded

- cartridges, a depth gauge for measuring penetration of probes and other related equipment.
- A Probe diameter 0.25in (6.5mm) and length 3.125in (8.0cm), is driven into the concrete by means of a precision of powder charge.
- Depth of penetration provides an indication of the compressive strength of the concrete.

3/ Pull-out Tests On Concrete:

- A Pull-out test measures, with a special ram, the force required to pull from the concrete a specially shaped steel rod whose enlarged end has been cast into the concrete to a depth of 3 inches.
- The concrete is simultaneously in tension and in shear, but the force required to pull the concrete out can be related to its compressive strength.

- The Pull-out technique can thus measure quantitatively the in-situ strength of concrete when proper correlations have been made.
- It has been found, over a wide range of strengths, that pull-out strengths have a coefficient of variation comparable to that of compressive strength.

4) Ultrasonic Pulse Velocity Method:

- It is the only one of this type that shows potential for testing concrete strength in situ.
- It measures the time of travel of an ultrasonic pulse passing through the concrete.
- It consist of a pulse generator and a pulse receiver.
- Pulses are generated by shock-exciting piezoelectric crystals, with similar crystals used in the receiver.
- It can be carried out on both laboratory-sized specimens and completed concrete structures.

5). Radioactive Method of NDT:

- It can be used to detect the location of reinforcement, measure density.
- It can be used to check whether honeycombing has occurred in structural concrete units.
- Gamma radiography is increasingly accepted in England and Europe.
- The Equipment is quite simple and running costs are small, although the initial price can be high.
- Concrete up to 18 inches thick can be examined without difficulty.