IQRA NATIONAL UNIVERSITY, PESHAWAR
Department of Civil Engineering
Final Term Exam (Summer-2020)

CE-125 Concrete Technology **Total Marks (50)**
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Q1: Compare internal and external vibration of concrete. (20)

ANSWER:

Vibration is imparted to the concrete by mechanical means. This causes temporary liquefaction so that air bubbles come to the top and are expelled.

INTERNAL VIBRATION:

- Internal vibration is vibrating the concrete from within the formwork
- The most commonly used technique of concrete vibration.
- Vibration is achieved by eccentric weights attached to a shaft. The needle diameter varies from 20 mm to 75 mm and its length varies from 25 cm to 90 cm.
- The use of absorptive linings to form is helpful in this respect.
- The frequency range adopted is normally 3500 to 5000 rpm.
- The vibrator head is immersed in the wet concrete.
- If there are re-bars in the floor, internal vibrators are useful in helping consolidate the concrete against the steel.
- The reason for use of this is because the main work of the so-called vibrator head is carried out inside the concrete. The vibrator head is kept in the freshly mixed (green) concrete in order to consolidate the concrete.
- Also, in any slab that is 8 inches thick or more, internal vibrators should always be used so that the full thickness becomes uniformly consolidated.

EXTERNAL VIBRATION:

- This is adopted where internal vibration can't be used due to either thin sections or heavy reinforcement.
- External vibration is less effective and it consumes more power compared to the internal vibration.
- The formwork also has to be made extra strong when external vibration is used.
- External concrete vibrators attach, via a bracket or clamp system, to the concrete forms.
- There are a wide variety of external concrete vibrators available and some vibrator manufacturers have bracket or clamp systems designed to fit the major brands of concrete forms.
- One of the reasons for cautioning against the use of internal vibrators is concern over segregation and the possibility that this may happen if workers use internal vibrators to move piles of concrete into position.
- The external vibrator beats the pneumatic vibrator by miles on construction sites.
- The work with external vibrators is both economically and technically a better solution. They require less maintenance, have less downtime and qualitatively provide better results.
- External concrete vibrators are available in hydraulic, pneumatic or electric power.
- They also have a lower energy consumption as they can be immediately put into operation after being switched on and a stand-by operation is not required.

Q2: What are the advantages and disadvantages of using ready-mixed concrete? (10)

ANSWER:

Ready mixed concrete is mixed offsite to a client's exact specifications, and is then delivered to the site where it is needed. The primary advantages of using ready mix concrete include:

- a high quality product lower costs
- an eco-friendly process
- and saving time for your business

ADVANTAGES OF USING READY MIX CONCRETE

High Quality Product
The construction industry is built on using the most robust, high quality materials. When it comes to concrete, it is important to balance the water-cement ratio perfectly, and also to make sure the aggregates used are properly graded.

Lowers Costs
It's the aim of any project to save the pennies, and that's where ready mix can help. Instead of individually purchasing each raw material separately, going down the route of ready mix means.

Saves Time
Time is of the essence in the construction world. Choosing a ready mixed option can avoid delays caused by erecting and dismantling any onsite mixing equipment.

Eco-Friendly Process
Any type of concrete is an eco-friendly option, thanks to the readily-available nature of the key components.
Also using Ready Mix Concrete gives:

- No compelling reason to store development materials at the site.
- Work related with the creation of cement is wiped out, accordingly lessening work cost.
- Air and Noise contamination at the place of work is diminished.
- Wastage of fundamental materials at the site is kept away from.
- Lessen the time required for development.
- No deferrals in finishing significant activities like developing dams, streets, spans, burrows, and so on.
- Economy in the utilization of crude materials brings about protection of characteristic assets.
- Consistent quality
- Faster speed of construction
- Less requirement of monitoring
- Saving on labor employment
- Less wastage

DISADVANTAGES OF USING READY MIX CONCRETE

Following are the disadvantages of ready-mix concrete:

- Requires huge initial investment.
- Not suitable for small projects (less quantity of concrete is required).
- Need an effective transportation system from the batching plant to the job site.

- Labor should be ready at the site to cast the concrete in position without any delay to avoid slumps in the mixture.
- Concrete has limited time and should be used within 210 minutes of batching the plant. Traffic jam or breakdown of the vehicle can create a problem.
- The materials are batched at a central plant, and the mixing begins at that very plant. So the travelling 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.
- 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..
- 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.
- The transit time from the time of preparation of concrete to the delivery site, will result in loss of workability. This will demand for additional water or admixtures to maintain the workability as per the specification. At site, the QA/QC engineer is supposed to check the workability through slump test before using it for construction.
- Traffic during the transit of concrete can result in setting of concrete. This will hence require addition of admixtures to delay the setting period. But unexpected traffic is a great problem.
- The formwork and placing arrangement must be prepared in advance in large area as the concrete can be bought in larger amounts.

Q3: What are the nondestructive testing methods? (20)

ANSWER:

NDT (NON-DESTRUCTIVE TESTING)

NDT stands for Non-Destructive Testing. It refers to an array of inspection methods that allow inspectors to evaluate and collect data about a material, system, or component without permanently altering it.

"Nondestructive testing is the life blood of a well-run facility. NDT techniques and repeatable results depend on highly trained technicians with experience and integrity. Industrial NDT methods and interpretation of results are performed by certified professionals.

METHODS OF NON-DESTRUCTIVE TESTING

Here are the eight most commonly used NDT techniques:

1. VISUAL TESTING (VT)
Visual Non-Destructive Testing is the act of collecting visual data on the status of a material. Visual Testing is the most basic way to examine a material or object without altering it in any way.

2. ULTRASONIC TESTING (UT)
Ultrasonic Non-Destructive Testing is the process of transmitting high-frequency sound waves into a material in order to identify changes in the material's properties.

3. RADIOGRAPHY TESTING (RT)
Radiography Non-Destructive Testing is the act of using gamma- or X-radiation on materials to identify imperfections.

4. EDDY CURRENT (ELECTROMAGNETIC) TESTING (ET)
Eddy Current Non-Destructive Testing is a type of electromagnetic testing that uses measurements of the strength of electrical currents (also called eddy currents) in a magnetic field surrounding a material in order to make determinations about the material, which may include the locations of defects.

5. MAGNETIC PARTICLE TESTING (MT)
Magnetic Particle Non-Destructive Testing is the act of identifying imperfections in a material by examining disruptions in the flow of the magnetic field within the material.

6. ACOUSTIC EMISSION TESTING (AE)
Acoustic Emission Non-Destructive Testing is the act of using acoustic emissions to identify possible defects and imperfections in a material.

7. LIQUID PENETRANT TESTING (PT)
Liquid Penetrate Non-Destructive Testing refers to the process of using a liquid to coat a material and then looking for breaks in the liquid to identify imperfections in the material.

8. LEAK TESTING (LT)
Leak Non-Destructive Testing refers to the process of studying leaks in a vessel or structure in order to identify defects in it. Inspectors can detect leaks within a vessel using measurements taken with a pressure gauge, soap-bubble tests, or electronic listening devices, among others

THE END
