

UNIT - IIICONCRETE

Concrete is mixture of cement (or lime), sand, Bricks or stone ballast and water, which when placed in forms and allowed to cure, becomes hard.

Manufacturing process of concrete:-

The various stages of Manufacture of concrete are

- | | |
|--------------------|-----------------|
| (i) Batching | (v) Compacting |
| (ii) mixing | (vi) curing |
| (iii) Transporting | (vii) finishing |
| (iv) placing | |

Batching:-

The measurement of materials for making concrete is known as batching. There are two methods of batching.

- (i) Volume Batching (ii) Weight Batching.

Mixing:-

Thorough mixing of the materials is essential for the production of uniform concrete.

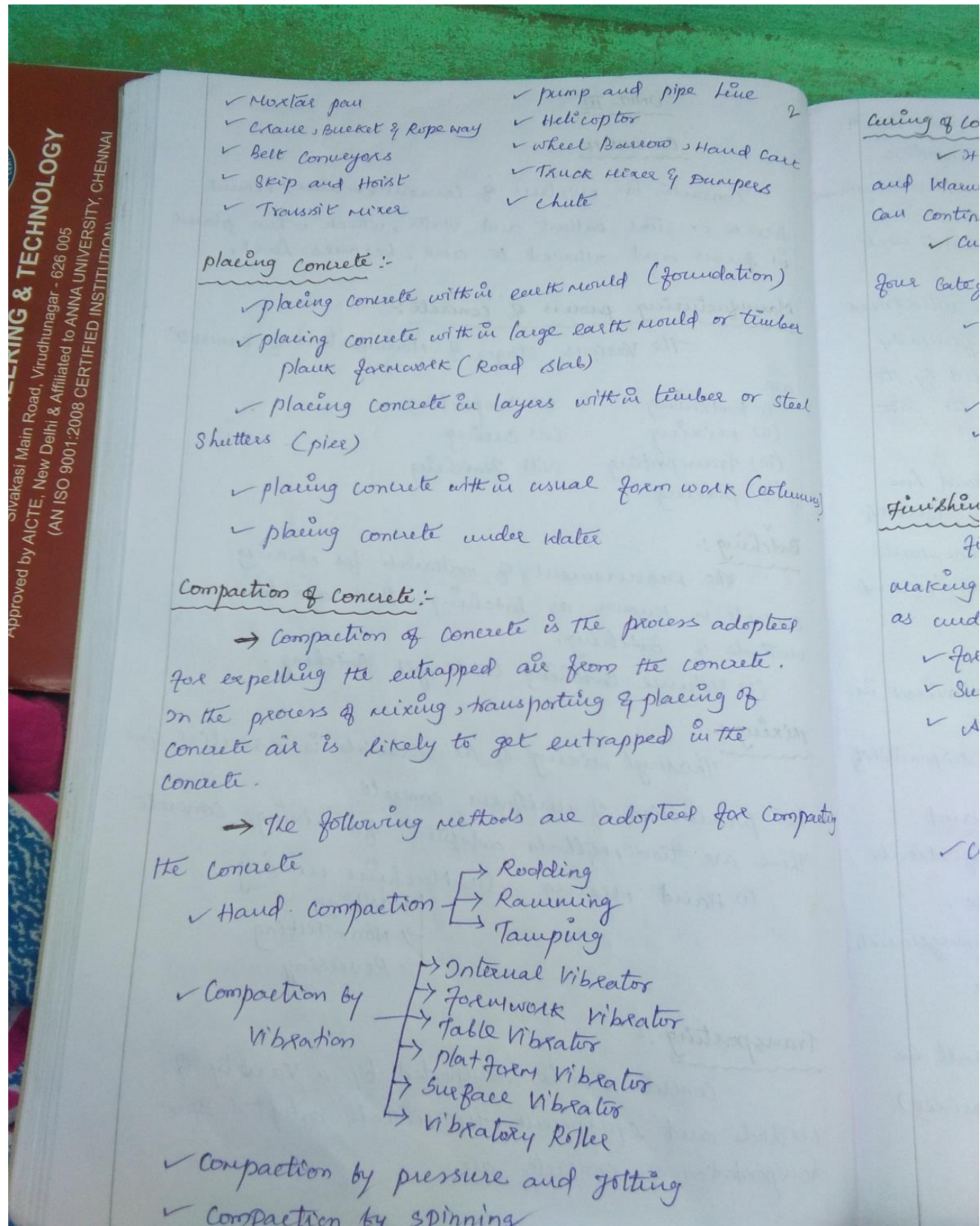
There are two methods adopted for mixing concrete

- (i) Hand mixing (ii) Machine mixing.

- Tilting
- Non-Tilting
- Reversing

Transporting:-

Concrete can be transported by a variety of methods and equipment. The methods adopted for transportation of concrete are



Curing of Concrete :-

✓ It is described as keeping the concrete moist and warm enough so that the hydration of cement can continue.

✓ Curing methods may be divided broadly into four categories

✓ Water curing

- Immersion
- Ponding
- Spraying or fogging
- Wet covering

✓ Membrane curing

✓ Application of heat

- Steam curing @ ordinary pressure
- Steam curing @ high pressure
- Curing by infra red radiators
- Electrical curing

Finishing :-

Finishing operation is the last operation in making concrete. Surface finishes may be grouped as under

✓ Formwork finishes

✓ Surface treatment

✓ Applied finishes

Exposed Aggregate - finish

Brush Hammering

Combed finish

Sand forcing

Rough cast finish

Pebble Dash

Fair face

✓ Coloured finish

→ pigment admixtures

→ chemical stains

→ paints

→ white cement

→ coloured concrete

Ready-mixed Concrete (RMC) in India :-

✓ In recent times, construction industries witnessed remarkable growth in India. The conventional methods of making concrete was found to be inadequate in quality, quantity and speed to meet the need of construction industries.

✓ In India RMC technology was introduced in early nineties. at one time it was generally thought that the quality of concrete produced by the RMC facilities will be quite superior to the site Manufactured Concrete.

✓ The Bureau of Indian standard has also brought out Ready mixed Concrete Code of Practice IS 4926-2003 to cover the requirements for the production and supply of ready mixed concrete.

Chemical admixtures :-

✓ Some of the important clauses contained in IS 4926-2003 are given below

✓ chemical admixture shall be the responsibility of the producer to establish compatibility and suitability of any admixture with other ingredients of the mix and also to determine the dosage.

✓ The purchaser should plan his arrangements so as to enable a full load of concrete to be discharged within 30 min of arrival on site. The general requirement is that concrete shall be discharged from the truck-mixer (Transit mixer) within 2 hours of the time of loading.

Sampling

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Sampling & Testing of RMC:-

✓ The point and time of Sampling shall be at discharge from the producers delivery vehicle to the site.

✓ Workability Test is to be performed when the producers delivery vehicle discharge concrete on site or when discharge the concrete into purchaser's vehicle.

✓ The purchaser may perform his own sampling and testing or may enter into an arrangement with the producer for testing. Three test specimens shall be made for each sample for 28 days testing.

Information to be supplied by the purchaser:-

✓ On Case of purchase wants to purchase a designed mix more information given in Annex given in IS 4926: 2003 should be given to the producer.

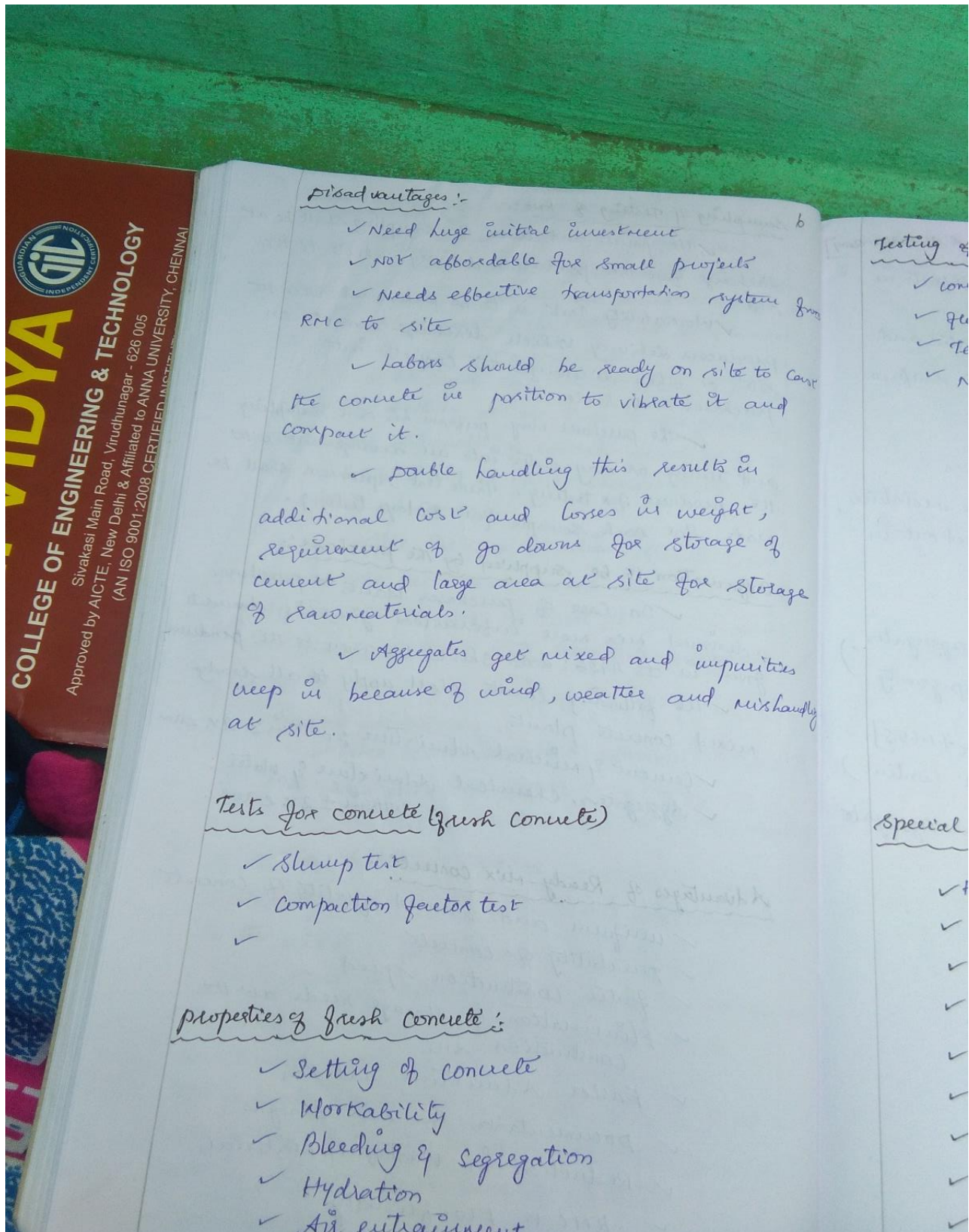
✓ The following limits shall apply to all ready mixed concrete plants

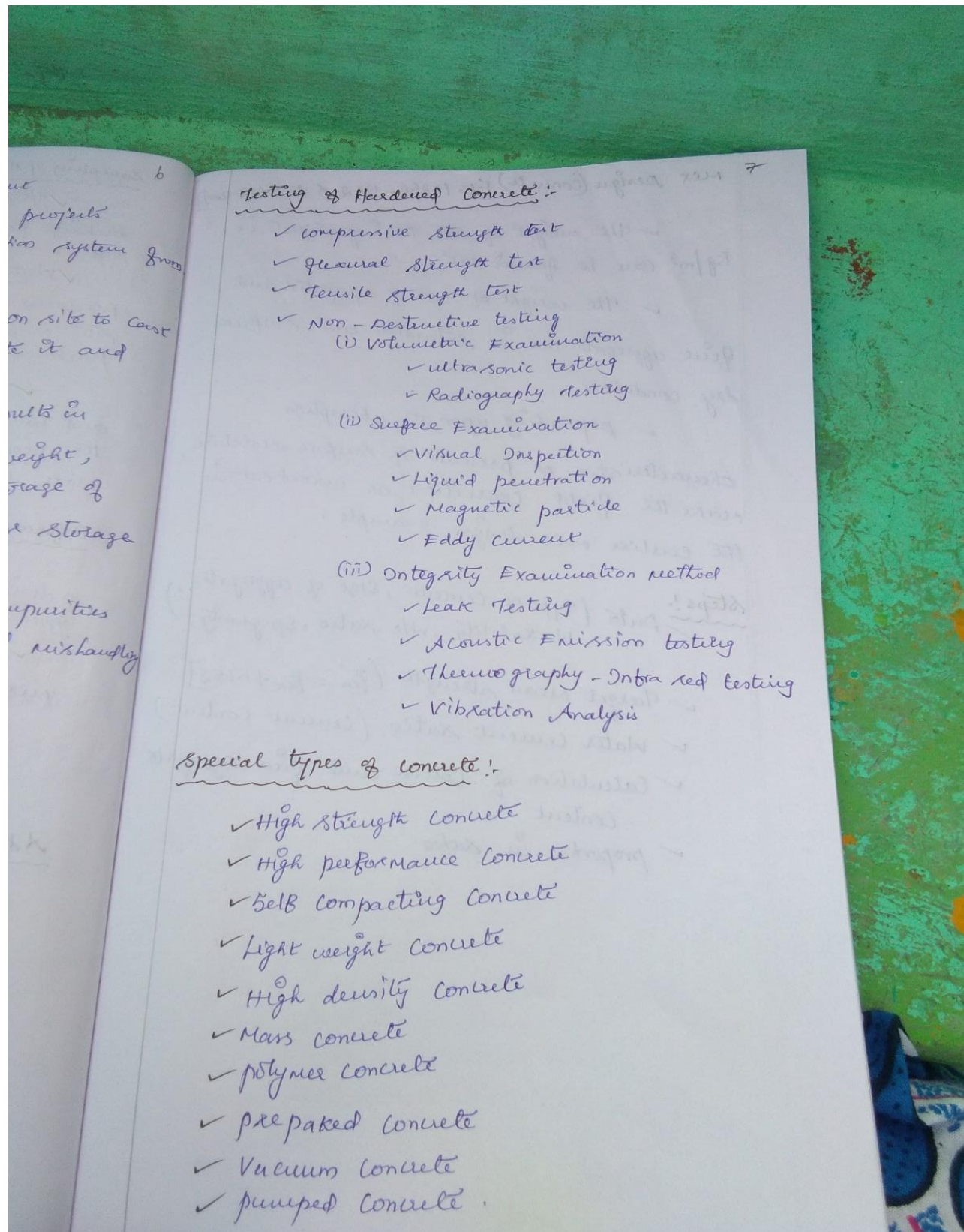
✓ Cement & mineral Admixture :- within $\pm 2\%$ error

✓ Aggregates, Chemical Admixture & water : within $\pm 3\%$ error.

Advantages of Ready-mix concrete:-

- ✓ uniform and assured quality of concrete
- ✓ durability of concrete
- ✓ faster construction speed
- ✓ Elimination of storage needs at the construction site
- ✓ Easier Admixture addition
- ✓ Documentation of mix designs
- ✓ Reduction in wastage of materials
- ✓ RMC is Eco-friendly





Mix Design (Concrete) [IS 10262 - 1982 & IS 10262-2009]

- ✓ The weight of all the ingredients in kg/m^3 can be found out
- ✓ The weight of coarse aggregates and fine aggregate are in saturated and surface dry conditions.
- ✓ Depending upon the absorption characteristic or presence of surface moisture, make the field corrections as worked out in the earlier mix design example.

Steps:

- ✓ Data (Type of cement, size of aggregates, Workability, w/c ratio, sp. gravity)
- ✓ Target mean strength ($f_{cm} = f_{ck} + 1.65s$)
- ✓ Water cement ratio (Cement content)
- ✓ Calculation of coarse and fine aggregate content
- ✓ proportion in ratio