**YEAR 11 APPLIED TECHNOLOGY**

**WEEK 2**

**STRAND: ENGINEERING MATERIALS**

**LESSON 34: CONCRETE**

**LEARNING OUTCOME: IDENTIFY THE COMPONENTS OF CONCRETE**

Cement

* Cement, the main ingredient of concrete, is a material in powder form which, when mixed with water, sets into a hard mass.
* The raw materials in the manufacture of cement are limestone (or chalk) and clay, shale and river mud.

Storing Cement

* When water is mixed with cement a chemical action takes place and the mixture will set into a hard mass.
* Even the moisture from the air or ground will cause this to happen, so the main condition in the storage of cement is to keep it dry.
* It should be stored dry on a raised platform and, if outside, covered with a tarpaulin.

Aggregates

* Aggregate consists of stone material such as rock or crushed gravel, which is added to the cement and water to form concrete or mortar.
* Aggregate ranges in size from the finest grains, ‘sand’, called ‘fine aggregate’, to the larger material called ‘coarse aggregate’.

Water-Cement Ratio

* The proportion of water to cement, known as the water-cement ratio, is an important factor in the making of good concrete.
* If too much water is used the strength of the concrete will be lowered.
* The less water used the stronger will be the concrete. However, sufficient water is required to allow the mix to be workable.

**LESSON 35: MIXING THE CONCRETE**

**LEARNING OUTCOME: ABLE TO MIX THE CORRECT MIX OF CONCRETE**

Concrete mixing is carried out by hand or by mechanical batch mixers.

Proportions of Aggregates and Cement

* When the aggregates are proportioned by volume, it is the general practice to use one part of fine aggregate to two parts of coarse aggregate.
* The most commonly used mix by volume is **1:2:4**—one measure of cement, two measures of sand, and four measures of coarse aggregate.

Mixing by Hand

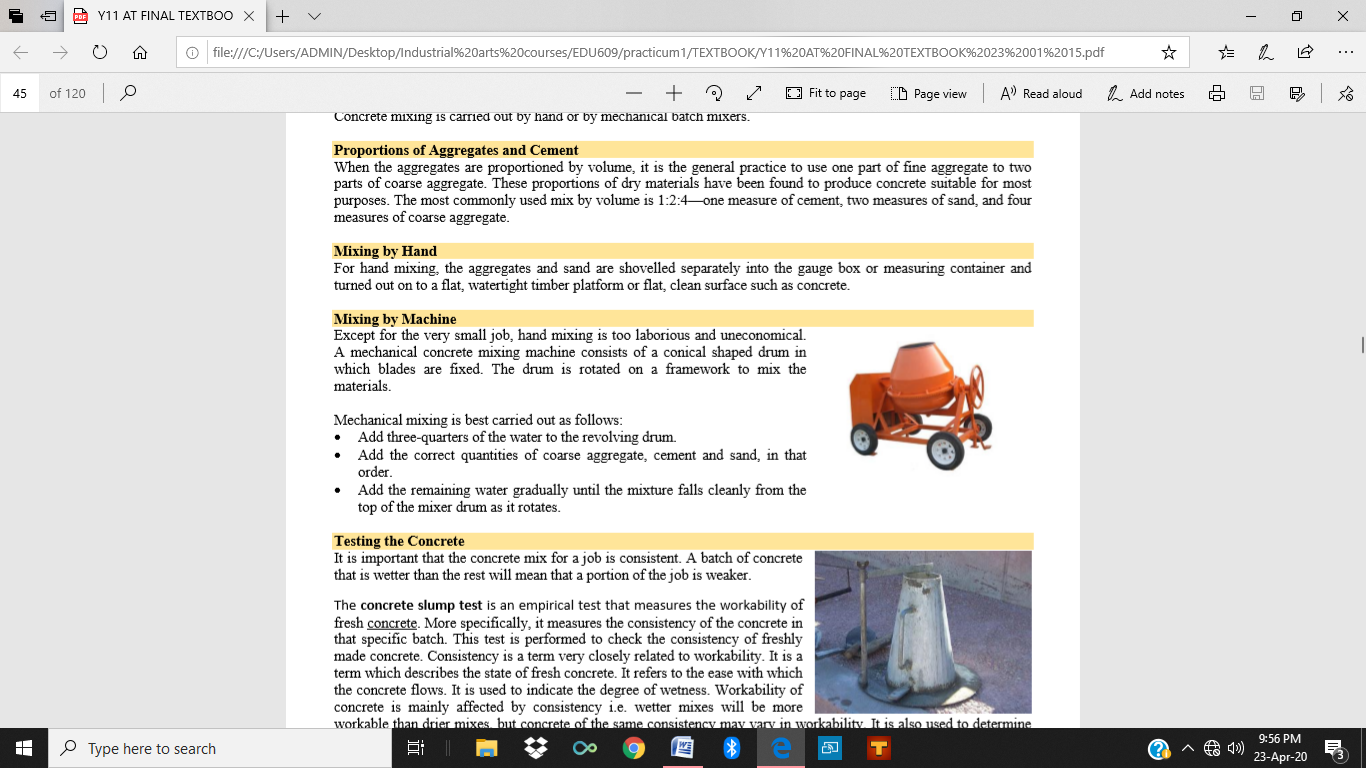
* For hand mixing, the aggregates and sand are shoveled separately into the gauge box or measuring container and turned out on to a flat, watertight timber platform or flat, clean surface such as concrete.

Mixing by Machine

* A mechanical concrete mixing machine consists of a conical shaped drum in which blades are fixed.
* The drum is rotated on a framework to mix the materials.

Mechanical mixing is best carried out as follows:

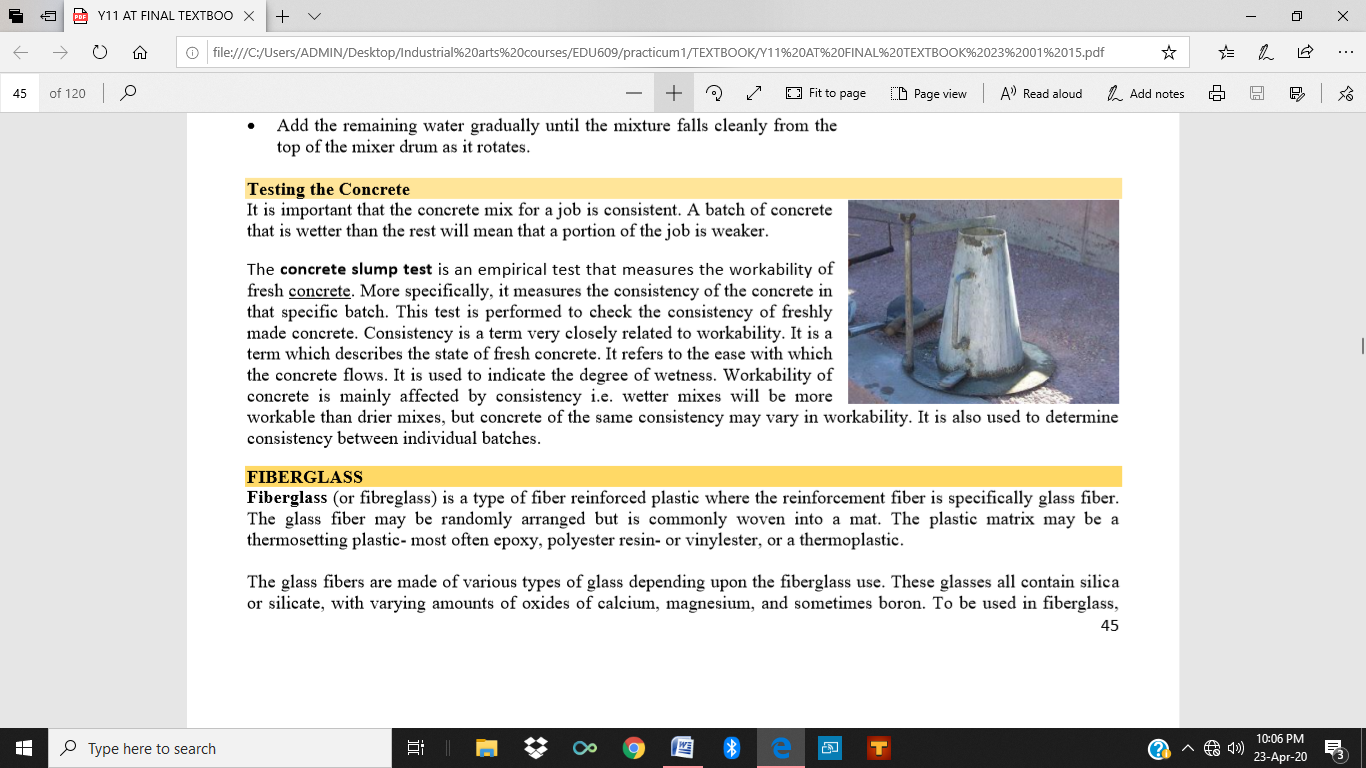
* Add three-quarters of the water to the revolving drum.
* Add the correct quantities of coarse aggregate, cement and sand, in that order.
* Add the remaining water gradually until the mixture falls cleanly from the top of the mixer drum as it rotates.



**LESSON 36: TESTING THE CONCRETE**

**LEARNING OUTCOME: UNDERSTAND THE IMPORTANCE OF TESTING CONCRETE**

* The concrete slump test is an empirical test that measures the workability of fresh concrete.
* It measures the consistency of the concrete in that specific batch. This test is performed to check the consistency of freshly made concrete.
* concrete is tested to ensure that the material that was specified and bought is the same material that was delivered to you or the job site



**LESSON 37: FIBERGLASS**

**LEARNING OUTCOME: IDENTIFY ITS COMPONENTS**

* Fiberglass is a type of fiber reinforced plastic where the reinforcement fiber is specifically glass fiber.
* The glass fiber may be randomly arranged but is commonly woven into a mat.

* The glass fibers are made of various types of glass depending upon the fiberglass use.
* These glasses all contain silica or silicate, with varying amounts of oxides of calcium, magnesium, and sometimes boron.

**LESSON 38: LEATHER**

**LEARNING OUTCOME: FIND OUT ITS USES & ORIGIN**

* Leather is a durable and flexible material created by the tanning of animal rawhide and skin, often cattle hide.
* It can be produced through manufacturing processes ranging from cottage industry to heavy industry.
* Leather is used for various purposes including clothing (e.g. shoes, hats, jackets, skirts, trousers and belts), bookbinding, leather wallpaper, and as a furniture covering.
* Upholstery is the work of providing furniture, especially seats, with padding, springs, webbing, and fabric or leather covers.



**ACTIVITY**

1. Name the cells of the softwoods and Hardwoods
2. Give the purpose of the two types of barks:
3. Outer bark –
4. Inner bark –
5. Give two differences apart from cell type between softwood and hardwoods.
6. Give the purpose of the following parts of the tree:
7. sapwood –
8. Cambium layer –
9. Pith –
10. Heartwood