



## Module (Course Syllabus) Catalogue 2022-2023

College/ Institute	Erbil Technology College	
Department	Construction & materials technology	
Module Name	BUILDING & CONSTRUCTION MATERIALS	
Module Code	BCM115	
Degree	Technical Diploma <input type="checkbox"/>	Bachelor <input type="checkbox"/>
	High Diploma <input type="checkbox"/>	Master <input type="checkbox"/> PhD <input type="checkbox"/>
Semester	1	
Qualification	Master-Structures	
Scientific Title	Lecturer	
ECTS (Credits)	6	
Module type	Prerequisite <input type="checkbox"/>	Core <input type="checkbox"/> Assist. <input type="checkbox"/>
Weekly hours	4	
Weekly hours (Theory)	( 1 )hr Class	( 53 )Total hrs Workload
Weekly hours (Practical)	( 3 )hr Class	( 108.5 )Total hrs Workload
Number of Weeks	16	
Lecturer (Theory)	Arsalan H. Hasan	
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Lecturer (Practical)	Arsalan H. Hasan	
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Websites		

# Course Book

<b>Course Description</b>	<p>1- Understanding the construction materials types which used in construction projects ,so there is old construction materials they are have been used but they are in permanent development throughout their specifications and uses ,and there is a new construction materials used now .</p> <p>2- Understanding the properties of materials and metals generally like mechanical , thermal properties ...etc , also the effect of weather circumstances on the materials properties and their durability.</p> <p>3- The sound knowledge of this subject is necessary for every student , because without this knowledge the student or an engineer cannot predict the properties and behavior of the materials , he is going to use in the project . All the materials existing in the universe are useful in one field or more.</p>
<b>Course objectives</b>	<p>Student's understanding the construction materials properties, their manufacture methods, the new alternative materials which are existing nowadays and the new methods to manufacture them .</p> <p>Also to qualify the student to make the standard tests to know how much the materials are compatible with the specifications and to decide the ability of using it in construction on the basis of strength, safety and economy.</p>
<b>Student's obligation</b>	<ol style="list-style-type: none"><li>1- Attendance to lecture.</li><li>2- preparation and discussion.</li><li>3- Completion of four quiz at least.</li><li>4- Completion of reports, homework, seminar and project.</li><li>5- Completion of exams. For middy-term also final exam.</li></ol>

<b>Required Learning Materials</b>	<b>1- Printing lectures.</b> <b>2- Presentation by using data show.</b> <b>3- Use of white board.</b> <b>4- Conduct the laboratory tests.</b>				
<b>Evaluation</b>	<b>Task</b>		<b>Weight (Marks)</b>	<b>Due Week</b>	<b>Relevant Learning Outcome</b>
	Paper Review				
	<b>Assignments</b>	Homework	8	2-4-6	
		Class Activity	2	3-5-7	
		Report	8	2-3-4--10	
		Seminar			
		Essay	6	5	
		Project			
	Quiz		6	2-6-12	
	Lab.		14		
	Midterm Exam		16	10-11	
	Final Exam		40	15-16	
Total		100			
<b>Specific learning outcome:</b>	<b>1- The student will be conversant with the properties of construction materials and their manufacture methods and the new alternative materials and their properties</b> <b>2-The student will be able to deal with deferent tests for the construction materials to know how much they are compatible with the specifications and to decide the ability of using it in construction projects</b> <b>3- The student will be able to write test reports and specification reports ,also how he is deal with the local and foreign standard specifications for construction materials</b>				
<b>Course References:</b>	<b>1- Basic Engineering for builders by max Schwartz,2002</b> <b>2- Building materials, THIRD REVISED EDITION, S. K. Duggal, 2008.</b> <b>3- Materials of construction, Lecture notes,Dr.O.EREN,2015</b>				
<b>Course topics (Theory)</b>			<b>Week</b>	<b>Learning Outcome</b>	
<b>1- General properties and standard specification of the construction materials and their uses in building</b>			1	<b>Descriptively classify different construction materials and their engineering properties</b>	

<b>2- Clay bricks</b>	2	<b>1-Describe the manufacturing of clay brick 2-Explain the tests which can be applied to clay brick</b>
<b>3-Lime bricks and Glass bricks</b>	3	<b>1-Describe the manufacturing of lime and glass brick 2-Explain the properties of lime and glass brick</b>
<b>4- Thermo stone block</b>	4	<b>Describe the manufacturing of thermo stone block</b>
<b>5- Building stone</b>	5	<b>Descriptively classify quarry stone visible mass characteristics</b>
<b>6- Binding materials</b>	6	<b>Descriptively classify different binding materials and their engineering properties</b>
<b>7-GYPSUM</b>	7	<b>1-Describe the manufacturing of gypsum 2- Descriptively classify different gypsum and their engineering properties</b>
<b>8-Tiles</b>	8	<b>Descriptively classify different tiles and their engineering properties</b>
<b>9- Damp proofing materials</b>	9	<b>Descriptively classify different damp proofing materials, their engineering properties and their uses.</b>
<b>10-Timber</b>	10	<b>1-Analyze timber engineering characteristics 2-Explain the tests which can be applied to brick</b>
<b>11- Seasoning of timber</b>	11	<b>Descriptively classify different Seasoning of timber</b>
<b>12-Iron</b>	12	<b>1-Describe the manufacturing of iron 2-Descriptively classify different types of iron and their engineering properties</b>

Practical Topics	Week	Learning Outcome
# - Knowing the basic instruments and scales. 1- Brick water absorption test	1	1-Prepare and assemble test equipment 2-State the current, standards and instructions applicable to the testing of materials 3-Carry out Brick water absorption test
2- Efflorescence test for brick.	2	Carry out Efflorescence test for brick.
3-Brick density test	3	Carry out Brick density test
4-Compressive strength of brick	4	Carry out Compressive strength of brick
5-Fineness test for gypsum	5	1-Carry out gypsum Sampling 2-carry out Fineness test
6-Time setting test for gypsum.	6	Carry out Time setting test
7-Thermo stone density test.	7	Explain the fundamentals of density testing
8- Water absorption test for thermo stone.	8	Carry out - Water absorption test for thermo stone
9-Tile water absorption test.	9	Carry out Tile water absorption test
10- Modulus of rupture test for tile.	10	Carry out- modulus of rupture test for tile
11-Compressive strength for timber.	11	Carry out compressive strength for timber.
12- Modulus of rupture test for timber	12	Carry out- modulus of rupture test for timber

### Questions Example Design

Q1/ A bar is 300mm long and is extend by  $\delta = 0.333\text{mm}$  with a force  $P = 13 \text{ KN}$ . The bar is 50mm diameter. Determine the stress ( $\sigma$ ), strain ( $\epsilon$ ) and modulus of elasticity ( $E$ ).

(22 Mark)

Q2/ Select the correct answer for the following statements

1. The inner annual rings surround pith is known as:

(a) Heart wood (b) Sap wood (c) Soft wood

2. Quarry tile are fired at temperature of:

(a) 1193°C (b) 1293°C (c) 1093°C

3. The example of igneous rocks is:

(a) lime-stone (b) marble (c) granite

4. The activity of lime used in sand – lime brick should not be less than:

(a) 83% (b) 73% (c) 93%

5. Mastic it's consist of:

(a) Bitumen and cement (b) bitumen and fiber (c) bitumen and resin components

6. The central portion of the tree is called:

(a) heart wood (b) pith (c) inner bark

7. Stress ( $\sigma$ ) is the applied force divided by original:

(a) volume (b) strain (c) area

8. The dimension of rectangular glass brick is:

(a) 19.7\*9.6 cm (b) 19.7\*9.5 cm (c) 19.5\*9.7 cm

(24 Mark)

Q3/ (a) What difference between Natural seasoning and kiln seasoning.

(b) Draw the cross-section of exogenous tree in details.

(c) Explain the Dry-Press Process for forming clay brick.

(27 Mark)

Q4/ (a) What are the Properties of concrete bricks.

(b) What are the **sources of** dampness in buildings.

(c) State the types of metallic and non metallic materials.

(27 Mark)

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Ans.q1

substituting the values,  $A = [(3.142)(50)^2]/4 = 1963.495\text{mm}^2$

Next, find the stress  $\text{Stress} = \text{Load}/\text{Area} = 13000\text{N}/1963.495\text{mm}^2 = 6.621\text{N}/\text{mm}^2$

Then, the strain  $\text{Strain} = \text{Displacement}/\text{Length of the bar} = 0.333\text{ mm}/300\text{mm} = 0.00111$

Modulus of elasticity =  $\text{Stress}/\text{Strain} = 6.621/0.00111 = 5964.86\text{N}/\text{mm}^2$

Ans.q2

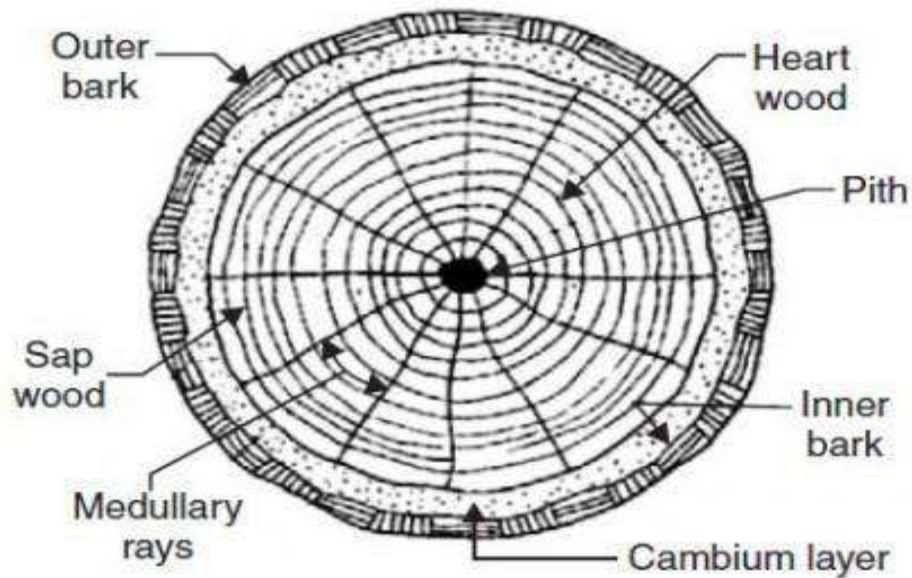
1a 2c 3c 4a 5c 6b 7c 8b

Ans.q3

a)

Kiln seasoning	Natural seasoning
1. Here the stack is put into a large oven called a 'kiln'. A kiln is an enclosed unit where heat and steam can be produced.	1. Here the stack of timber is put up on blocks in the open air. The stack is covered with a lean-to roof, raised off the ground and roofed, in order to prevent rising damp or rain from penetrating the timber stack
2. Very hot steam penetrates the timber and heats up the moisture within each board.	2. The wind passing through the sides of the stack will eventually out the timber
3. This method takes several days	3. This is a cheap way of seasoning but takes time (40-90) day
4. Moisture content reduce about (5% - 10%).	4. Moisture content reduce about (5%).

b)



**Fig. 1.7.** Cross-section of exogenous tree

c) **Dry-Press Process** - This process is particularly suited to clays of very low plasticity. Clay is mixed with a minimal amount of water (up to 10 percent), then pressed into steel molds under pressures from 500 to 1500 psi (3.4 to 10.3Mpa).

Ans.q4

a) **Properties of concrete bricks:**

1. These bricks give good bonding with plastering materials used in their construction.
2. These bricks have accurate size and shape.
3. These bricks can produced with various bearing capacity according to the cement content used in their production.
4. The weight of bricks can be controlled by varying the size of openings.

b) Dampness in building in generally due to one or more of the following causes

- Faulty design of structure
- Faulty construction or poor workmanship
- Use of poor materials in construction



c)

1. Metallic Materials

a- Ferrous metals:- like cast iron, wrought iron and steel

b- Non-ferrous metals:- like copper, nickel, aluminum, magnesium, lead and zinc.

2. Non Metallic Materials

a- Construction materials:- like stone, brick, cement, gypsum, lime, aggregate and timber.

b- Miscellaneous Materials:- like glass, plastic, rubber and asbestos.

**Extra notes:**

**External Evaluator**

**The course book prepared by my colleague is properly arranged and covers the main requirements of the lesson. The lecturing procedures are identified properly. The assessment scheme and forms of teaching are arranged in a way that the student could understand clearly. It can be said that student will be satisfied with this course book and it promises a good outcome.**

**Assistant Professor**

**Nyazi R. Maroof**

**28/10 /2022**