Title of Course:	**:**	**Concrete Technology (2 + 2)**			
Course Code	**:**	CT 134			
Semester	**:**	2nd			
Technology	**:**	Civil Engineering Technology			
Effective	**:**	21 – Batch and onwards			
Pre-requisite	**:**	Nil			
Co-requisite	**:**	Nil			
Assessment	**:**	**Theory**		**Practical**	
	:	20% Sessional Work, 20% Mid Semester Examination 60% Final Written Examination		40% Sessional Work, ----------, 60% Final Lab. Examination	
Credit Hours/week	**:**	**Th**	2	**Pr**	2
Minimum Contact Hours	**:**	**Th**	32	**Pr**	96
Marks	**:**	**Th**	50	**Pr**	100

After Completing the Course, each student will be able to:

Sr. No.	Theory/ Practical	CLO	Taxonomy Level	PLO
1	Theory	**Explain** various properties of concrete and its ingredients and effects of various factors on concrete	C2	1
2	Theory	**Design** concrete mixes considering various parameters using standard guidelines	C6	3
3	Practical	**Perform** laboratory tests on concrete and its ingredients	P3	3

Relevant Program Learning Outcomes (PLOs):

The course is designed so that students will achieve the following PLOs:

1	Engineering Technology Knowledge:	√	7	Environment and Sustainability:	
2	Problem Analysis:		8	Ethics:	
3	Design/Development of Solutions:	√	9	Individual and Team Work:	
4	Investigation:		10	Communication:	
5	Modern Tool Usage:		11	Project Management:	
6	The Engineering Technologist & Society:		12	Lifelong Learning:	

OBJECTIVES:

- To develop an understanding of the composition and behavior of plain concrete.
- To understand various methods of proportioning of constituent materials for a required concrete quality.
- To analyze the problems of transportation, pouring, bleeding of concrete.

- To understand methods of curing and compaction and factors affecting strength of concrete.
- To know the benefits of testing of concrete and to understand the procedure of quality control.

COURSE OUTLINE:

- **Concrete Properties and Its Behavior:**
  Properties of aggregates, cement and concrete, properties of fresh and hardened concrete, strength, elastic behavior, shrinkage and creep and durability to chemical and physical attacks. Methods of testing concrete cylinders and cubes in compression. Effects of impurities in water and in aggregates on the performance and durability of plain and reinforced concrete. Effect of water/cement ratio upon workability and strength of concrete.

- **Mix Design:**
  Requirements of cube cylinder strength, workability, and aggregate size. Prescribed mix, design mix and the effect of varying proportions of the component parts. Procedure for design of concrete mix (ACI, British Standard Specifications and Road Note No.4). Laboratory and site testing for assessing the quality, performance and strength of a design mix.

PRACTICAL WORK TO BE CARRIED OUT:

1) To learn about Material Testing Lab and HSE (Health, Safety and Environment Measures)
2) To find organic impurities and water absorption of aggregates
3) To determination of specific gravity and bulk densities of aggregates, aggregate gradations.
4) To perform sieve analysis of coarse aggregate.
5) To cast specimens for varying w/c ratio and bulk densities, slump test and casting 6" cubes and cylinders.
6) To measure effect of w/c ratio on strength of concrete (compressive strength test on cubes and cylinders).
7) To determine soundness of cement by Le-Chatelier's apparatus
8) To prepare test specimens from hand mixed, machine mixed and hand compacted concrete.
9) To perform compression tests on specimens as (5) above and making comparisons.
10) To compare strength of cube and cylinder.
11) To perform concrete Mix design by ACI 211.1-91 method.
12) To cast beam specimens and test the specimen of cubes and cylinders.
13) To perform modulus of rupture test on beam specimens.
14) To determine effects of Admixture - Accelerator, Retarder, Super Plasticizer
15) To perform nondestructive testing - Rebound Hammer test.
16) To perform an open-ended lab.

RECOMMENDED BOOKS:

1) Properties of Concrete by A. M. Neville; Wiley John & Sons. (Latest Edition).
2) Concrete Design by Zahid Ahmad Siddiqi, Help Civil Engineering Publishers, Lahore, 2009. (Latest Edition).
3) Design of Concrete Structures by H. Nilson, McGraw-Hill. (Latest Edition).
4) Reinforced Concrete - Design & Behavior by C. K. Wang &Salmon (Latest Edition).
5) Structural Concrete Theory and Design. By M. Nadim Hassoun & Akthem Al

Manaseer. (Latest Edition).

Approval:	Industrial Advisory Board	Res No. 5(d)	Dated: 01/04/2021
	Board of Studies	Res.No. 3.4	Dated: 10/04/2021
	Board of Faculty	Res.No. : 1.5	Dated: 19/07/2021
	Academic Council	Res.No. : 100.18	Dated: 24/08/2021

Title of Course:	**:**	**Materials and Methods of Building Construction (2 + 2)**			
Course Code	**:**	CT 144			
Semester	**:**	2nd			
Technology	**:**	Civil Engineering Technology			
Effective	**:**	21 – Batch and onwards			
Pre-requisite	**:**	Nil			
Co-requisite	**:**	Nil			
Assessment	**:**	**Theory**		**Practical**	
	:	20% Sessional Work, 20% Mid Semester Examination 60% Final Written Examination		40% Sessional Work, ----------, 60% Final Lab. Examination	
Credit Hours/week	**:**	**Th**	2	**Pr**	2
Minimum Contact Hours	**:**	**Th**	32	**Pr**	96
Marks	**:**	**Th**	50	**Pr**	100

After Completing the Course, each student will be able to:

Sr. No.	Theory/ Practical	CLO	Taxonomy Level	PLO
1	Theory	**Describe** different materials and their characteristics used in building works.	C2	1
2	Theory	**Apply** different methods used in building construction	C3	3
3	Practical	**Perform** various laboratory and field test of materials.	P3	4

Relevant Program Learning Outcomes (PLOs):

The course is designed so that students will achieve the following PLOs:

1	Engineering Technology Knowledge:	√	7	Environment and Sustainability:	
2	Problem Analysis:		8	Ethics:	
3	Design/Development of Solutions:	√	9	Individual and Team Work:	
4	Investigation:	√	10	Communication:	
5	Modern Tool Usage:		11	Project Management:	
6	The Engineering Technologist & Society:		12	Lifelong Learning:	

OBJECTIVES:

- To develop an understanding of the properties, uses and behavior of the building materials, standards for material quality, various tests on materials.
- To develop the basic understanding of construction techniques and methods of building construction with particular reference to R.C. work, brick work, flooring, damp-proofing, roofing and stairs.

COURSE OUTLINE:

- **Bricks, Blocks and Tiles:**
  Manufacture of bricks/blocks and its classifications, standard tests of bricks/blocks and characteristics of good bricks/blocks, process of manufacture of tiles, Ceramic materials.

- **Stones:**
  Characteristics of good quality stones, dressing of building stones, properties and uses of common construction stones used in Pakistan. Location of stone queries in Pakistan.

- **Lime, Cement and Timber:**
  Test and uses of lime. Methods of manufacture and storage of cement in different conditions. Classification and grading of sand and its bulking, cement sand mortars used for building construction. Characteristics, properties and performance of Pakistani timber used in construction. Seasoning and preservation of wood. Use of plywood, hard board and chipboard in construction.

- **Paints and Varnishes:**
  Types of paints, Composition, preparation and application of paints, plaster, varnishes and distempers in building works.

- **Metals:**
  Manufacture, characteristics and uses of Ferrous and Non-Ferrous metals and their alloys. Composition and uses of mild steel, cast iron, brass and aluminum in buildings.

- **Glass and Plastics:**
  Composition, varieties, properties and uses of glass, plastics, laminates and adhesives in constructions. Properties and uses of asphalt, bitumen, rubber, asbestos and its products, plastic pipes, reinforced plastics.

- **Methods of Construction:**

  Bonds in brick masonry and their formation in building construction, corbel, cornice, string course, parapets and slip joints. Masonry block. Stone masonry, Uses of stone in civil engineering. Use of Gabion walls. Scaffolding work design and its importance in construction work. R. B. beams, columns, lintels and slab construction in buildings. ASTM Standards and testing of bricks.

  Hand tools for construction. Foundation for walls and piers. Load bearing walls in brick and masonry construction, composite walls cavity construction, concrete framed structures panel walls, and external finishes. Reinforced concrete, materials in roof and floor construction, and floor finishes. Internal walls and partitions, surface finishes to internal walls and ceiling, doors and windows, staircases, damp proofing of walls and ceiling. Fire resistant construction. Tunnel and Cofferdams construction. Formwork for slabs, beams, columns & walls, etc. and its design. Formwork for shells. Standards, inspection & quality control of materials.

PRACTICAL WORK TO CARRIED OUT:

1) To determine the normal consistency of a given sample of cement.
2) To perform fineness test of various sands.
3) To perform sieve analysis of fine aggregates.
4) To perform fineness test of Cement.
5) To prepare cement mortar for different water cement ratios.
6) To prepare cement concrete for different grades.
7) To perform compaction factor test of cement concrete
8) To determine of initial and final setting time of cement.
9) To identify standard sizes of brick and blocks.
10) To determine water absorption of a brick and stone.
11) To determine water content in coarse and fine aggregates.
12) To determine efflorescence of brick.
13) To determine compressive strength of brick/block.
14) To perform impact test of different civil engineering materials.
15) To perform soundness, hardness and toughness tests for various civil engineering materials.
16) To perform open-ended lab.

RECOMMENDED BOOKS:

1) Materials of. Construction by R. C. Smith and C. K. Andres, ISBN: 0070585040, McGraw Hill. January 1987 (Latest Edition).
2) Fundamental of Building Construction: Material and Methods, by Edward B. Allen, (Latest Edition).
3) Building Construction Vol. I to Vol. IV by Mckay (Latest Edition).
4) Building Construction by Mitchall (Latest Edition).
5) Building Construction by Huntington (Latest Edition).
6) Civil Engineering Materials by Neil Jackson (Latest Edition).
7) Construction Materials by P. D. Domone, University College, London (Latest Edition).

Approval:	Industrial Advisory Board	Res No. 5(a)	Dated: 01/04/2021
	Board of Studies	Res.No. 3.5	Dated: 10/04/2021
	Board of Faculty	Res.No. : 1.5	Dated: 19/07/2021
	Academic Council	Res.No. : 100.18	Dated: 24/08/2021