



**UNIVERSITY OF TECHNOLOGY
NOWSHERA**

(SHUHADA-E-APS, UOT)

DEPARTMENT OF CIVIL TECHNOLOGY

Department of Civil Engineering

Technology

Scheme of Studies



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Scheme of Studies

1 st Semester							
S/N	Course Code	Subject	Nature	Credit Hours		Contact Hours	
				Theory	Practical	Theory	Practical
1	CT-113	Civil Engineering Drawing	Engineering Foundation	1	2	1	6
2	CT-122	Introduction to Architecture and Town Planning	Engineering Foundation	2	0	2	0
3	CS-113	Applied Mathematics-1	Natural Sciences	3	0	3	0
4	CS-122	Introduction to Computer Fundamentals	Computer Science	1	1	1	3
5	CH-112	Islamic Studies/Professional Ethics	Humanities	2	0	2	0
6	CH-122	Pakistan Studies	Humanities	2	0	2	0
7	CM-112	Occupational Health & Safety Management	Management Science	2	0	2	0
Total				13	03	13	09
Grand Total				13+03=16		13+09=22	
2 nd Semester							
S/N	Course Code	Subject	Nature	Credit Hours		Contact Hours	
				Theory	Practical	Theory	Practical
1	CT-134	Concrete Technology	Engineering Foundation	2	2	2	6
2	CT-143	Applied Mechanics	Engineering Foundation	2	1	2	3
3	CT-154	Materials and Methods of Construction	Engineering Foundation	2	2	2	6
4	CS-133	Applied Mathematics-II	Natural Science	3	0	3	0
5	CH-133	Communication Skills	Humanities/English	3	0	3	0
Total				12	05	12	15
Grand Total				12+05=17		12+15=27	
3 rd Semester							
S/N	Course Code	Subject	Nature	Credit Hours		Contact Hours	
				Theory	Practical	Theory	Practical
1	CT-214	Surveying	Engineering Foundation	2	2	2	6
2	CT-224	Quantity Surveying and Contract Documents	Engineering Foundation	2	2	2	6
3	CT-234	Soil Mechanics	Major Based Breadth	2	2	2	6
4	CT-243	Fluid Mechanics	Major Based Breadth	2	1	2	3
5	CT-254	Mechanics of Solids	Major Based Breadth	2	2	2	6
Total				10	09	10	27
Grand Total				10+09=19		10+27=37	
4 th Semester							
S.N	Course Code	Subject	Nature	Credit Hours		Contact Hours	
				Theory	Practical	Theory	Practical
1	CT-264	Transportation Engineering	Major Based Breadth	2	2	2	6
2	CT-273	Water Supply & Waste Water Management	Major Based Breadth	2	1	2	3
3	CT-283	Theory of Structures	Major Based Depth	2	1	2	3
4	CM-213	Environmental Management	Management Sciences	2	1	2	3
5	CH-213	Technical Report Writing	Humanities/English	3	0	3	0
Total				11	05	11	15
Grand Total				11+05=16		11+15=26	



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5 th Semester							
S/N	Course Code	Subject	Nature	Credit Hours		Contact Hours	
				Theory	Practical	Theory	Practical
1	CT-313	Hydrology	Major Based Breadth	2	1	2	3
2	CT-324	Reinforced Concrete Structures	Major Based Breadth	2	2	2	6
3	CT-333	Construction and Hydraulic Machinery	Major Based Depth	2	1	2	3
4	CT-343	Engineering Geology	Major Based Depth	2	1	2	3
5	CM-313	Project Management	Management Science	3	0	3	0
Total				11	05	11	15
Grand Total				11+05=16		11+15=26	
6 th Semester							
S/N	Course Code	Subject	Nature	Credit Hours		Contact Hours	
				Theory	Practical	Theory	Practical
1	CT-353	Irrigation and Hydraulic Structures	Major Based Depth	2	1	2	3
2	CT-364	Foundation Engineering	Major Based Depth	2	2	2	6
3	CT-373	Steel Structures	Major Based Depth	2	1	2	3
4	CT-3103	Project	Major Based Depth	0	3	0	9
Total				06	07	06	21
Grand Total				06+07=13		06+21=27	
6 th Semester Third Year Summer Project Work							
S/N	Course Code	Subject	Credit Hours		Contact Hours		
			Theory	Practical	Theory	Practical	
1	CT-3113	Project (Continue)	0	3	0	9	
Grand Total				0+03=03		0+09=09	
7 th Semester Fourth Year							
S.N	Course Code	Subject	Credit Hours		Contact Hours		
			Theory	Practical	Theory	Practical	
1	CT-4116	16 Weeks Supervised Industrial / Field Training (8x5=40 hrs / Week)	0	16	0	40x16=640	
Total				0	16	0	640
Grand Total				0+16=16		0+640=640	
8 th Semester Fourth Year							
S/N	Course Code	Subject	Credit Hours		Contact Hours		
			Theory	Practical	Theory	Practical	
1	CT-4216	16 Weeks Supervised Industrial / Field Training (8x5=40 hrs / Week)	0	16	0	40x16=640	
Total				0	16	0	640
Grand Total				0+16=16		0+640=640	



1st Semester

CT-113: Civil Engineering Drawing

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **explain** fundamental concepts of engineering drawing for simple objects/structures.
(C2, PLO1)
2. To **illustrate** different architectural and structural drawings and their related components
(C3, PLO1)

Course Outline:

Introduction: Principles of orthographic projection related to simple solids.

Descriptive geometry: Plane curves; Cycloids; Hypocycloid; Involute; Curves of interpenetration of solids; Development of surfaces; Isometric views.

Machine drawing: Representation of riveted joints, Screwed fastenings, Keys and cotters;

Building drawing: Introduction to architectural and structural drawings of simple buildings.

Symbols and abbreviations: Building materials; Electric and plumbing symbols and abbreviations.

Practical:

1. Draw Regular Polygons by Universal Method (with given dimensions).
2. Draw a 3-Centered Arch (with given dimensions).
3. Draw a 4-Centered Arch (with given dimensions).
4. Draw Ellipse by Focal Point Method and Parallelogram Method (with given dimensions of major and minor axes).
5. Draw Ellipse by Concentric Circle Method and Four Center Method.
6. Draw Parabolas by Offset Method and Basic Method.
7. Draw Parabolas by Parabolic Arc Method and Tangent Method.
8. Draw Isometric Views of given objects.
9. Draw Oblique Views of given objects.
10. Draw Isometric View of the given stairs steps.
11. Draw Oblique View of the given stairs steps.
12. Draw Oblique View of a Beam resting on two Columns.
13. Draw Development Drawing of a Cube and Cylinder
14. Draw Development Drawing of a Cone.
15. Draw Development Drawing of a Hexagonal Prism.



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16. Draw different forms of Rivet Heads.
17. Draw Orthographic Views of Hexagonal Bolt.
18. Draw Orthographic Views of Hexagonal Nut.
19. Draw a Plan and section of isolated and combine footing showing reinforcement also draw the Schedule of Footing.
20. Draw a four storied Building Column's elevation and cut section at each floor reducing reinforcement and cross-section of column.
21. Draw Schedule of Beam also draw Typical Elevation of Beam , showing Bottom bar, Extra bottom bar, Hanger bar, Top bar, Extra Top bar, and rings.
22. Draw single span Beam Elevation and its Section showing reinforcement using bent up bar.
23. Draw a three span RCC Beam elevation and its section showing reinforcement also develop Schedule of Beam.
24. Draw a Plan (13 X 17) and its X-section of single span RCC Slab, showing reinforcement. Short way #3@6" c/c , long way #3@9" c/c. Slab thickness 6"
25. Draw Plan and X-section of one way slab of three spans showing reinforcement.
26. Draw Plan and X-section of Septic Tank.
27. Draw a Plan of 120 sq. yard residential bungalow.

Note: Draw any 16 Drawings from the above Practical list.

Recommended Books:

1. Engineering Drawing by N.D. Bhatt (53rd Edition 2014) Charotar Publisher.
2. Drawing for Engineering By Paul Smith
3. Basics Of Engineering Drawing By Zahid Ahmad Siddique, 2nd Edition, M/S Technical Publisher Lahore.



CT-122: Introduction to Architecture and Town Planning

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **Explain** the basic concepts of Architecture and Town planning (C2, PLO1)
2. To **Use** various aspects of architecture and town planning in terms of sustainability (C3, PLO7)

Course Outline:

Architecture:

General Introduction to history of architecture. Emergence and development of Islamic Architecture. Geographical, climatic, religious, social, historical aspects of architecture. Truth, purpose and beauty. Strength, vitality, grace, breadth and scale. Proportion, colour and balance Acoustics.

Forms and Molds. Introduction to architectural standards, public toilets, circulation areas, parking, public assembly. Local architecture, arches, cavity walls, local energy efficient materials. Thermal insulation of buildings. Ceiling height, external wall thickness etc.

Town Planning:

General Definitions, trends in urban growth, objectives of town planning, modern planning in Pakistan and abroad.

Preliminary Studies. Study of natural resources, economic resources, legal and administrative problems, civic survey preparation of relevant maps.

Land Use Patterns. Location of parks and recreation facilities, zoning and its aspects, public and semipublic building, civic centres, commercial centres, local shopping centres, public schools, industrial area and residential areas.

Street Pattern. Layout of streets, road crossings and lighting. Community planning.

City Extension and Master Planning. Suburban development, neighborhood unit, satellite towns and garden cities. Introduction to master planning.

Urban Planning. Inner city urban designs, Up-gradation of square/scattered settlements.

Recommended books:

Transport And Town Planning: The City in Search of Sustainable Development, 2019, By Jean L.



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CS-113: Applied Mathematics-I

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **identify** basic mathematical functions and their properties (C1, PLO1)
2. To **apply** the concepts of differentiation and integration for solving engineering technology problems (C3, PLO1)

Course Outline:

Complex numbers, Argand diagram, De Moivre's theorem, hyperbolic and inverse hyperbolic functions. Algebra of vectors and matrices, systems of linear equations. Derivative as slope, as rate of change (graphical representation). Extreme values, tangents and normals, curvature and radius of curvature. Differentiation as approximation. Partial derivatives and their application to extreme values and approximation. Integration by substitution and by parts, integration and definite integration as area under curve (graphical representation). Reduction formulae. Double integration and its applications. Polar and Cartesian coordinates, polar curves, radius of curvature, cycloid, hypocycloid, epicycloids and involutes of a circle.

Recommended Books:

1. Calculus and analytical Geometry, 11th Edition by *Thomas Finney* John Wiley & Sons.
2. Advanced Engineering Mathematics 5th Edition by *C. R. Wylie* McGraw-Hill Education.
3. Advanced Engineering Mathematics, 8th Edition by *HT Erwin Kreyszig* TH John Wiley & Sons.



CS-122: Introduction to Computer Fundamentals

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **define** different computer components and their applications (C1, PLO1)
2. To **use** computer programming and their applications related to civil engineering technology domain (C3, PLO5)

Course Outline:

Basic terminology: computer, user, hardware, software, chip, program, Input: data, instructions (programs, commands, user responses), Output: text, graphics, video, audio, Types of computers: personal, notebook, handheld, PDA, internet appliance, server, mainframe, supercomputer, Programming languages, Machine, assembly, High-level, Key terms: VLSI, microprocessor, microcomputer, Computer Software: Terms: file, menu, font, voice recognition, FAQ, online help, wizard, software suite, single-user license, site license, application window, dialog box, clip art, cross-platform application, Application software, Word processing, Spreadsheet: cell, function, recalculation, charting, Database: record, field, query, Other: accounting software, Computer Aided Design (CAD), desktop publishing, paint/image, multimedia, web authoring, System software, Operating System (OS), Booting (startup), Cold vs. warm, BIOS, Steps in booting, Utility programs: file viewer, file compression, backup, screen saver, disk scanner, disk defragmenter, Computer hardware, System unit Terms: motherboard, chip, memory, storage, expansion slot (plug and play), port (serial vs parallel), bus (expansion bus), power supply, Central Processing Unit (CPU), Machine cycle (fetch, decode, execute, store), Memory, Volatile vs. nonvolatile, RAM vs ROM, Cache, Hard disk, Tracks, sectors, platters, RAID (mirroring and striping), Internet hard drive, Compact disks (and drives), PC Cards, Miniature mobile storage (Compact Flash, Memory Stick, Microdrive, Smart Media), Input Devices: Keyboard, Pointing Devices, Others: trackball, touchpad, pointing stick, light pen, touch screen, stylus, Handwriting recognition software, Sound, Image: Digital camera, Scanners (flatbed, optical readers), Optical readers, Optical character recognition (OCR), bar code scanner, Optical Mark Recognition (OMR), Video: Web cam, PC Video camera, Output Devices, Display device, CRT monitor, Liquid Crystal Display (LCD) – passive versus active matrix, Gas plasma monitor, Printer and its types: Impact printers, Dot-matrix printer, Line printer, Plotter, Non-impact printers, Ink-jet, Laser, data projector, fax machine (fax modem), Internet, E-commerce, Ethics and social issues, Privacy and security

Practical:

1. Basic machines organization including motherboard, memory, I/O cards, networking devices
2. Use of flow charts
3. Computer peripheral devices
4. Operating Systems
5. Microsoft Windows
6. Microsoft Office i.e. MS Word, MS PowerPoint, MS Excel
7. Office Tools & Overview of different browsers with emphasis on power point



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8. Microsoft Visio

Recommended Books:

1. Peter Norton, "Introduction to Computers", Latest Edition
2. Misty E. Vermaat, "Discovering Computers", Shelly Cashman Series, Latest edition.



CH-112: Islamic Studies / Professional Ethics

Islamic Studies

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **discuss** social and religious aspects of Islamic ethics in everyday life. (C2, PLO8)
2. To **apply** the acquired knowledge of ethical skills in work environment. (C3, PLO6)

Course Outline:

Introduction to Quranic Studies

Basic Concepts of Quran. History of Quran. Uloom-ul-Quran

Study of Selected Text of Holy Quran

Verses of Surah Al-Baqra Related to Faith (Verse No-284-286). Verses of Surah Al-Hujrat Related to Adab Al-Nabi (Verse No-1-18). Verses of Surah Al-Mumanoon Related to Characteristics of faithful (Verse No-1-11). Verses of Surah al-Furqan Related to Social Ethics (Verse No.63-77). Verses of Surah Al-Inam Related to Ihkam (Verse No-152-154)

Study of Selected Text of Holly Quran

Verses of Surah Al-Ihزاب Related to Adab al-Nabi (Verse No.6,21,40,56,57,58.). Verses of Surah Al-Hashar (18,19,20) Related to thinking, Day of Judgment. Verses of Surah Al-Saf Related to Tafakar, Tadabar (Verse No-1,14)

Seerat of Holy Prophet (S.A.W) I

Life of Muhammad Bin Abdullah (Before Prophet Hood). Life of Holy Prophet (S.A.W) in Makkah. Important Lessons Derived from the life of Holy Prophet in Makkah

Seerat of Holy Prophet (S.A.W) II

Life of Holy Prophet (S.A.W) in Madina. Important Events of Life Holy Prophet in Madina. Important Lessons Derived from the life of Holy Prophet in Madina

Introduction to Sunnah

Basic Concepts of Hadith. History of Hadith. Kinds of Hadith. Uloom –ul-Hadith. Sunnah & Hadith. Legal Position of Sunnah

Selected Study from Text of Hadith

Introduction To Islamic Law & Jurisprudence

Basic Concepts of Islamic Law & Jurisprudence. History & Importance of Islamic Law & Jurisprudence. Sources of Islamic Law & Jurisprudence. Nature of Differences in Islamic Law. Islam and Sectarianism

Islamic Culture & Civilization

Basic Concepts of Islamic Culture & Civilization. Historical Development of Islamic Culture & Civilization. Characteristics of Islamic Culture & Civilization. Islamic Culture & Civilization and Contemporary Issues



Islam & Science

Basic Concepts of Islam & Science. Contributions of Muslims in the Development of Science. Quranic & Science

Islamic Economic System

Basic Concepts of Islamic Economic System. Means of Distribution of wealth in Islamic Economics. Islamic Concept of Riba. Islamic Ways of Trade & Commerce

Political System of Islam

Basic Concepts of Islamic Political System. Islamic Concept of Sovereignty. Basic Institutions of Govt. in Islam

Islamic History

Period of Khlaft-E-Rashida. Period of Ummayyads. Period of Abbasids

Social System of Islam

Basic Concepts of Social System of Islam. Elements of Family. Ethical Values of Islam

Professional Ethics

Introduction: Definitions/Importance/Kinds. Factors/Sources of Islamic Ethics. Islamic Ethical System

Ethics in Business:

Enforcement of Ethical environment/factors. Principles & Decision Making. Islamic rules for business. Lawful and unlawful behavior in Islam

Engineering Ethics:

Scope & Aims, Theories, responsibilities. IEEE code of Ethics. Ethical code for Engineers. Ethical code for software Engineers

Moral Courage

Moral courage, its importance and how to improve? Attributes of morally courageous leaders

Relevant Case Studies: To be decided by the Teacher/Instructor.

Recommended Books:

- 1) Hameed ullah Muhammad, "Emergence of Islam" , IRI, Islamabad
- 2) Hameed ullah Muhammad, "Muslim Conduct of State"
- 4) Hussain Hamid Hassan, "An Introduction to the Study of Islamic Law" leaf Publication Islamabad, Pakistan.
- 5) Ahmad Hasan, "Principles of Islamic Jurisprudence" Islamic Research Institute, International Islamic University, Islamabad (1993)
- 6) Mir Waliullah, "Muslim Jrisprudence and the Quranic Law of Crimes" Islamic Book Service (1982)
- 7) H.S. Bhatia, "Studies in Islamic Law, Religion and Society" Deep & Deep Publications New Delhi (1989)



CH-122: Pakistan Studies

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **Describe** the genesis of Pakistan movement and its creation (C2, PLO6)
2. To **Outline** the economic, societal and ethical issues of contemporary Pakistan (C4, PLO6)

Course Outline:

1. Historical Perspective

Ideological rationale with special reference to Sir Syed Ahmed Khan, Allama Muhammad Iqbal and Quaid-i-Azam Muhammad Ali Jinnah. Factors leading to Muslim separatism. People and Land. Indus Civilization. Muslim advent. Location and geo-physical features.

2. Government and Politics in Pakistan

Political and constitutional phases: 1947-58, 1958-71, 1971-77, 1977-88, 1988-99, 1999 onward

3. Contemporary Pakistan

Economic institutions and issues. Society and social structure. Ethnicity. Foreign policy of Pakistan and challenges. Futuristic outlook of Pakistan

Recommended Books:

1. Burki, Shahid Javed. *State & Society in Pakistan*, The Macmillan Press Ltd 1980.
2. Akbar, S. Zaidi. *Issue in Pakistan's Economy*. Karachi: Oxford University Press, 2000.
3. S.M. Burke and Lawrence Ziring. *Pakistan's Foreign policy: An Historical analysis*. Karachi: Oxford University Press, 1993.
4. Mehmood, Safdar. *Pakistan Political Roots & Development*. Lahore, 1994.



CM-112: Occupational Health and Safety Management

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **Identify** various hazards of construction industry (C1, PLO1)
2. To **demonstrate** basic principles of occupational health and safety at construction site (C3, PLO1)

Course Outline:

Construction Safety: Safety and Health in the local and International Construction Industries, OSHA in the USA, Overview of Cost of Accidents, Roles of Construction Personnel in Safety, Overview of Accident Causation Theories, Ethics and Safety, Insurance and Safety, Compliance to Safety Standards.

Safety Application on the Job: Construction Safety & Health Program, Plans and Policies, Components of the Plan, Roles, Safety Rules and Regulations, Example of Safe Work Procedures, Jobsite Inspections, Accident Prevention, Medical and First Aid Facilities and Services, Protection of the General Public, Fire Protection, Substance Abuse, Personal Protective Equipment, Site Safety and Hazard Analysis, Safety Communications, Accident Reporting and Investigation, Recording Injuries and Illnesses, Training, Emergency Response.

Strategic Safety Improvement: Promoting Safety by Example, Employee Participation in Promoting Safety, Safety Training, Safety Committees, Employee and Management Participation, Incentives, Teamwork Approach to Promoting Safety, Establishing a Safety-First Corporate Culture, Total Safety and its Components, a Brief Discussion of Zero Accident Strategies, Continuous Safety Improvement.

Safety Management Techniques: Accident prevention, health and safety policy, safe systems of work, first aid provisions, health and safety training, spill response protocols, accident investigation, recording and analysis, communicating safety measures, techniques of inspection, Health and safety regulations at work place.

Recommended Books:

1. Mark Friend, Fundamentals of Occupational Safety and Health.
2. A Guide to the Control of Substances Hazardous to Health in Design and Construction. CIRIA Report 125. Thomas Telford Publications (Latest Edition)



2nd Semester

CT-134: Concrete Technology

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **Explain** the ingredients of plain cement concrete and their properties for its intended use. (C2, PLO1)
2. To **Apply** the basic knowledge of concrete materials in mix design of concrete. (C3, PLO3)

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.

Reinforced Concrete:

Mechanics of reinforced concrete and its behavior under working and ultimate loads. Basics of reinforced concrete design. Analysis and design of RC beams and columns for flexure, shear, axial load, and anchorage by ultimate strength design method. Design for diagonal tension and bond. Behavior of one-way and two-way slabs and their design.

Detailing and Fabrication of Reinforcement:

Function of reinforcement in structural concrete elements with respect to resisting tension, compression, shear and shrinkage cracking. Concrete cover to reinforcing bars and its variation in different structural elements, lapping of reinforcement, details of bar bending and preparation of schedules. Preparation of working drawings of structural elements. Introduction to different types of concrete foundations.

Practical:

1. Organic impurities and water absorption of aggregates.
2. Determination of specific gravity and bulk densities of aggregates, aggregate gradations.
3. Casting specimens for varying w/c ratio and bulk densities, slump test and casting 6" cubes and cylinders.



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4. Effect of w/c ratio on strength of concrete (compressive strength test on cubes and cylinders as (3) above.
5. Preparing test specimens from hand mixed, machine mixed and hand compacted concrete.
6. Compression tests on specimens as (5) above and making comparisons.
7. Determination of initial and final setting time for Portland cement.
8. Comparison of cube and cylinder strength.
9. Casting of beam specimens and testing specimen of 4", 6", 8" cubes and 6" cylinder.
10. Slump test on coarse & fine aggregates from different sources.
11. Modulus of rupture test on beam specimens.

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.
3. Design of Concrete Structures by H. Nilson, McGraw-Hill. (Latest Edition).
4. Reinforced Concrete - Design & Behavior by C. K. Wang & Salmon.
5. Structural Concrete Theory and Design. By M.Nadim Hassoun & Akthem Al-Manaseer. 3rd Edition



CT- 143: Applied Mechanics

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **discuss** the basic knowledge of mechanics related to system of forces (C2, PLO1)
2. To **use** fundamental concepts of kinematics to solve problems of equilibrium (C3, PLO2)

Course Outline:

Introduction to statics:

Mechanics: Basic concepts; Scalar and vector; Vector addition, subtraction and product, concept and unit of measurements of mass, force, time, space

Force system: Force: Introduction; Two-dimensional force system; Rectangular components; Law of triangle, parallelogram, moment, couple, resultants; solution of problems.

Equilibrium: Equilibrium in two dimensions; Equilibrium conditions; free body diagram; solution of problems.

Friction: Introduction; Types of friction; Laws of solid friction; Co-efficient of friction, Solution of problems

Kinematics of rectilinear and curvilinear motion: Introduction; Displacement; Types of motion; Speed, velocity, acceleration; Equation of motion under uniform acceleration; Normal and tangent acceleration, Solution of problems

Work and energy: Work, Energy, Power, Impulse; Momentum; Simple harmonic motion and free vibration.

Practical:

1. To determine the resultant of forces.
2. To study the law of moment and equilibrium conditions.
3. To determine the reaction of a simply supported beam through load cell.
4. To determine the tension in the simple cable through load cell.
5. To determine the reaction of a simply supported truss through load cell.
6. To study the projectile motion using photogate.
7. To study acceleration on an inclined plane using photogate.
8. To study Newton's second law of motion.

Recommended Books:

1. Hibler, RC. Engineering Mechanics, Prentice Hall (Latest Edition)
2. Engineering Mechanics And Dynamics by R.C.Hibbeler & Ashok Gupta, 11th Edition, Prentice Hall.
3. An Introduction to MECHANICS by David Kleppner, Robert Kolenknow Publisher: Tata McGraw – Hill Education.



CT-154: Materials and Methods of Construction

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **identify** basic civil engineering materials and their properties (C2, PLO1)
2. To **execute** the basic understanding of construction techniques and methods of building construction on sites (C3, PLO1)

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.

Aggregate: Properties of aggregates, Los Angeles Abrasion Test, crushing strength, gradation, weathering effects, T.D.S.

Water, Lime, Cement and Timber: Qualities of water used for concrete mixes. 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:



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1. Standard consistency test of cement.
2. Standard sizes of brick and blocks.
3. Determination of water absorption of a brick and stone.
4. Determination of efflorescence of brick.
5. Determination of compressive strength of brick/block.
6. Determination of moisture content of wood.
7. Determination of specific gravity of wood.
8. Fineness of Cement.
9. Fineness modulus of various sands.

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)



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CS-133: Applied Mathematics-II

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **describe** different mathematical equations. (C3, PLO1)
2. To **use** the knowledge of differential equations for solving different numerical problems (C3, PLO1)

Course Outline:

Differential equation; basic concepts and ideas; geometrical interpretation of first and second order differential equations; separable equations, equations reducible to separable form, exact differential equations, integrated factors. Linear first order differential equations, Bernoulli's differential equation.

Families of curves, orthogonal trajectories and applications of differential equations of first order to relevant engineering systems. Homogeneous linear differential equations of second order, homogeneous equations with constant coefficients, the general solutions, initial and boundary value problems, D-operator, complementary functions and particular integrals. Real, complex and repeated roots of characteristics equations. Cauchy equation, non-homogeneous linear equations. Applications of higher order linear differential equations. Ordinary and regular points and corresponding series solutions; introduction to Laplace transformation

Recommended Books:

1. Advanced Engineering Mathematics 5th Edition by *C.R. Wylie* McGraw-Hill Education
2. Advanced Engineering Mathematics, 8th Edition by *HT Erwin Kreyszig* TH John Wiley & Sons.



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CH-133: Communication Skills

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **Recognize** the importance of communicating effectively in technical writing and presentation (C2, PLO10)
2. To **Use** English Grammar skills in writing comprehensive and structurally accurate paragraphs (C3, PLO10)

Course Outline:

Characteristics of Writing at Work. Writing for your Readers, Understand and apply the purpose, problems, and processes of written technical communications in the Workplace, Writing Ethically, Achieving a Readable Style, Analyze and adapt to various technical writing situations, Designing Documents, Designing Illustrations, Understand and apply the key phases of project management communication, Create documents that are grammatically and stylistically correct and effectively anticipate the audience's, information needs, Use the concepts of technical writing to self-assess your documents and critically evaluate others' work, Meet deadlines similar to those found in technical workplaces, Create and present professional presentations, including PowerPoint slides.

Recommended Books:

1. Elizabeth Tebeaux and Sam Dragga- The Essentials of Technical Communication. 2nd Edition, Oxford University Press.
2. Ron White- Writing. Advanced. Oxford Press.
3. John Langan- College Writing Skills. 9th Edition Connect Writing.



3rd Semester

CT-214: Surveying

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **discuss** the basic concepts of land surveying and leveling. (C2, PLO1)
2. To **apply** the advanced concepts of engineering surveying using modern tool. (C3, PLO4)

Course Outline:

Introduction: Introduction to advanced surveying and its application, Triangulation, trilateration, field procedures and application, EDM, strength of figure, computation and plotting.

Theory of errors and Weights: quality of observations, weighted observations, distribution and adjustment of errors. Most probable value.

Curves: Various types of curves with application: simple circular curve, compound curves, transition curves, vertical curve and reverse curves, Design and layout of curves.

Tunnel surveying: Use of gyroscope.

Hydrographic surveying: Horizontal and vertical controls, submarine surface contours. Discharge measurement, reservoir capacity calculation.

Field astronomy: Solar and stellar observations for position and azimuth determination.

Remote sensing/satellite imagery and its applications: Introduction & applications of remote sensing in Surveying, Types of remote sensing, sensors and platforms used for remote sensing.

Use of stereoscopy and GPS.

GIS: Introduction & applications of GIS in surveying, digitizing and topographic mapping using GIS software.

Practical:

1. Study and use of conventional instruments & EDM surveying instruments.
2. Base line measurement,
3. Theodolite traversing.
4. Profile and precise leveling.
5. Curve layout (simple circular curve, reverse curve, composite curve, vertical curve)
6. Computation and plotting,
7. Field astronomy,
8. Total station/gyro station,
9. GPS based survey, integration of GPS data in GIS software, creation of contour sheet using GIS.

Recommended Books:



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1. Surveying Theory and Practice by R. E. Davis, J. Anderson, F.S. Foote, McGraw-Hill (Latest Edition).
2. Surveying by Jack C. McCormac (Latest Edition).
3. Schaum's Outline Series of Introductory Surveying by R. H. Wirshing, Roy Wirshing, Jaews R. Wirshing (Latest Edition).
4. Surveying with Construction Applications by Barry F. Kavanagh, Prentice Hall (Latest Edition).
5. Plane and Geodesic Survey Vol. I and II by David Clarck, Trans-Atlantic Publications (Latest Edition).



CT-224: Quantity Surveying and Contract Documents

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **prepare** bill of quantities and cost estimates. (CLO3, PLO1)
2. To **discuss** Tender and Contract Documents. (CLO2, PLO1)

Course Outline:

1. **Quantities:** Working out earthwork quantities for various civil engineering constructions. Calculating quantities for road embankments in plain and hilly areas and for irrigation channels. Quantities for roads, buildings, reservoirs, water supply, drainage projects, steel works and bridge construction. Estimates using computer spreadsheets
2. **Rate Analysis:** Scheduled and non-scheduled rates. Analysis of rates, abstract of costs. Significance of rate analysis and its application to market rates of material and labor. Rate analysis for various items of civil engineering works.
3. **Cost Estimates:** Systematic and logical approach to the estimating and costing of civil engineering works, rough cost & detailed estimates, bill of quantities and part bills for construction, costs and profit margins to be considered in the cost estimates. Estimates for roads, buildings, reservoirs, water supply, drainage projects, steel works and bridge construction. Estimates using computer spreadsheets.
4. **Contract Documents:** Introduction to work contracts and tendering. Types of contracts. Requirements of a specific contract, drawings necessary for a contract and those required during the execution of work. Tender documents, construction specifications, bill of quantities and other setting out data required for a contract. General conditions of contract and special conditions of contract. International conditions of contract (FIDIC).
5. Use of Computer Spreadsheets in making bill of quantities (BOQ).

PRACTICAL:

1. Workout 1:2:4 concrete for foundations, columns below plinth and plinth beams.
2. Workout 1:2:4 concrete for columns above plinth roof beams, roof slabs and projections.
3. Workout the quantities of single span and multi span beam reinforcement from given drawing.
4. Workout the quantities slab reinforcement from given drawing
5. Workout the quantities of overhead water tank concrete and its reinforcement.
6. Workout the quantities of RCC retaining wall concrete and its reinforcement.
7. Prepare material estimate for a single room complete in all respect.
8. Prepare complete estimate of a steel truss.
9. Prepare a detailed estimate of an RCC water overhead reservoir of 20,000 gallon capacity.
10. Prepare detailed estimate of a manhole.



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11. Prepare detailed estimate of a septic tank and soakage pit.
12. Prepare bill of quantity and abstract of cost for a manhole and septic tank.
13. Estimate the quantities of all necessary items of work required for 1500ft long bituminous road.
14. Estimate the cost of construction of a concrete road 24'-6" wide and one mile long for given section. The concrete will have a proportion of 1:3:6 and 0.5 % reinforcement is to be used.
15. Calculate the volume of earth work from contour map.
16. Calculate the volume of earth work for irrigation channel (i) fully in cutting (ii) partially in cutting and filling.

Recommended Books:

1. Estimating Construction Costs by R. L. Peurifoy. McGraw-Hill. (Latest Edition).
2. Contract Specifications by Daniel and W. Mead (Latest Edition).
3. Construction Scheduling, Cost Optimization and Management by H. Adeli and A. Karim. (Latest Edition).
4. MES/Pak PWD Schedule of Rates (Latest Edition).
5. WAPDA Drafting Standards (Latest Edition).



CT-234: Soil Mechanics

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **identify** soils with reference to their characteristics. (C1, PLO1)
2. To **discuss** the physical properties of soil. (C2, PLO1)

Course Outline:

Significance. Soil, rock and their types and formation. Physical properties of soil: water content, voids ratio, porosity, degree of saturation, specific gravity, unit weight and their determination, mass-volume relationships.

Soil Classification: Importance of classification tests. Atterberg's limits, grain size distribution; Classification systems.

Permeability and Seepage: Darcy's law, factors affecting permeability, laboratory and field determination of permeability. Seepage force, estimation of seepage quantity, quick sand condition, sand boiling and filters.

Compaction: Fundamentals, moisture density relationship, compaction standards, factors affecting compaction, field control and measurements of insitu density. Field compaction equipment.

Stress Distribution in Soils: types of soil stresses, stress induced due to structural loads: Westergaurd and Boussinesq's theories for stress evaluation. Pressure bulb, Stress distribution diagrams, Fadum Charts.

Consolidation: Mechanics of consolidation, Odometer test and data interpretation, primary and secondary consolidation. Normally and pre-consolidated soils.

Shear Strength: Concept, parameters, Coulomb's law, shear strength of cohesive and non-cohesive soils. Factors affecting shear strength of soil and its applications in engineering. Laboratory and field tests for determination of shear strength.

Earth Pressures: Definition, pressure at rest, active and passive earth pressures. Coulomb's and Rankine's theories. Earth pressure problems.

Slope Stability: Types of slopes, Factors affecting stability and remedies. Types of failure Methods of analysis.

Earth and Rock Fill Dams: Introduction, types of earth and rock fill dams and their components, general design considerations and typical cross-sections.

Practical:

1. Determination of moisture content of a soil sample.
2. Determination of Liquid limit of a soil sample.
3. Determination of Plastic limit of a soil sample.
4. Determination of Shrinkage limit of a soil sample.
5. Determination of Specific Gravity of a soil sample.



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6. Determination of Grain size distribution of a Fine Grain Soil by Hydrometer Analysis.
7. Determination of Permeability of soil by constant Head Method
8. Determination of Permeability of soil by falling Head Method
9. Direct shear test of a soil sample.
10. Unconfined compression test of a soil sample.
11. Tri-axial compression test of a soil sample.
12. Consolidation test of a soil sample

Recommended Books:

1. Fundamentals of Soil Mechanics by M. S. Qureshi & Aziz Akbar, A-1 Publishers, Urdu Bazar, Lahore. (Latest Edition).
2. Soil Mechanics by A. R. Jumikis (Latest Edition).
3. Fundamental of Soil Mechanics by D. W. Taylor (Latest Edition).
4. Soil Mechanics by T. W. Lambe, Robert V. Whitman, John Willey & Sons. (Latest Edition).



CT-243: Fluid Mechanics

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **Define** fundamental principles and physical properties of fluids (C1, PLO1)
2. To **use** knowledge of fluid mechanics for calculating flow in open channels and pipe networks (C3, PLO2)

Course Outline:

Introduction: Fluid mechanics, hydrostatics, kinematics, hydrodynamics, hydraulics, solids and fluids, liquids and gases, units and dimensions. **Physical properties of fluids;** Specific weight, density, specific volume, surface tension, compressibility, viscosity, units of viscosity, measurement of viscosity, Newton's equation of viscosity.

Fluid Statics: Pressure intensity and pressure head: pressure specific weight relationship, absolute and gauge pressure, measurement of pressure, Piezometer, Manometer, Pressure Transducers. Differential manometer and Bourden gauge.

Forces on submerged planes and curved surfaces and their applications. Buoyancy and floatation, Equilibrium of floating and submerged bodies.

Fluid Kinematics: Steady and unsteady flow, laminar and turbulent flow, uniform and non-uniform flow. Path line, streamlines and stream tubes, Velocity and discharge, Equation of continuity for compressible and incompressible fluids.

Hydrodynamics: Different forms of energy in a flowing liquid, head, Bernoulli's equation and its application, E.L. & H.G.L., free and forced vortex.

Flow Measurement: Orifices and mouthpieces, sharp -crested weirs and notches, pitot tube and pitot-static tube, Venturimeter, Salt velocity method, colour velocity method, Radioisotope methods.

Steady Flow through Pipes: Losses in pipe lines, minor and major losses, Darcy-Weisbach equation for major loss of head in pipes, Pipes in series and parallel, Transmission of energy through pipes, Introduction to computer aided analysis of pipe networks.

Uniform Flow in Open Channels: Chezy's and Manning's equations, Bazin's and Kutter's equation. Most economical sections for rectangular and trapezoidal channels.

Practical

1. Determination of viscosity of a given liquid using viscometer.
2. Determination of velocity through Pitot tube.
3. Determination of coefficient of discharge using venturimeter.
4. Determination of coefficient of discharge of the orifices.
5. Determination of coefficient of discharge using rectangular notch.
6. Determination of discharge using V-notch.
7. To investigate the validity of the Bernoulli's equation for steady flow of water.



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Recommended Books:

1. Fluid Mechanics for Civil Engineers by N. B. Webber, Chapman & Hall, (Latest Edition).
2. Fluid Mechanics with Engineering Applications by Dougherty, Franzine and Fennimore, McGraw Hill, New York. (Latest Edition).
3. An Introduction to Engineering Fluid Mechanics by J. A. Fox, Macmillan Company (Latest Edition).
4. Mechanics of Fluids by B. S. Massey, Wan Nost Reinhold International Rand hold Company Ltd., London (Latest Edition).
5. Mechanics of Fluids by J. W. Ireland, Bulterworth & Company, London (Latest Edition).



CT-254: Mechanics of Solids

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **explain** basic concepts of mechanics of solids. (C2, PLO1)
2. To **analyze** forces and its effects on various structural elements/materials (C4, PLO2)

course outline:

Stress & Strain: Kind of stresses and strain, Hook's law, Modulus of elasticity, Lateral & Volumetric strain, Poison's ratio, Load extension diagrams for different materials, Temperature stresses and compound bars. Principle Stress & Strain: Construction of Mohr's circle for stress & strain.

Bending Theory: Theory of simple bending, position of neutral axis, moment of resistance and section modulus, Bending and shearing stress distribution in beams; Relationship between load, shear force and bending moment.

Slope and Deflection of Beams: Relation between slope deflection and radius of curvature. Slope and deflection of a beam using Integration method.

Torque in Structural Member: Theory of torsion in circular shafts. Derivation of torsion equation and its application to solid and hollow circular cross-section. Sources of torsion in structures.

Practical:

1. To determine the compressive strength of cement.
2. To determine the Tensile strength of cement.
3. To familiarize the students about the functions of Universal Testing Machine.
4. To perform tensile test on a mild steel specimen and to determine yield strength, ultimate strength, rupture strength and percentage elongation.
5. To perform the Izod Impact Test for the given metals.
6. To perform the Charpy's Impact Test for the given metals.
7. To determine the Brinell hardness number of given specimen by Brinell hardness testing machine.
8. Torsion test on a given specimen by torsion Testing Machine.

Recommended Books:

1. Strength of Materials by Andrew Pytel Ferdinand L.Singer. Harper Collins Publishers.
2. Strength of Materials By R. K. Bansal
3. Mechanics of Materials By James M. Gere, Barry J. Goodno (Seventh Edition)
4. Mechanics of Materials By Andrew Pytel, Jaan Kiusalaas (Second Edition)



4th Semester

CT-264: Transportation Engineering

Course Learning Outcomes:

After successful completion of this course, the students will be able to:

1. To **describe** the basics of transportation engineering (C1, PLO1)
2. To **explain** the different elements of Highway Geometric Design (C2, PLO1)

Course Outline:

1. **Road Standards:** NHA, AASHTO and Road Note 31, recommendations for the design of roads regarding:

Design parameters. Cross-sectional elements of roads such as lane widths, shoulder widths, median widths, edge clearance, ROW (right of way) requirements, sight distances etc. Road layout parameters. Road camber gradient and super elevation. Vertical and horizontal alignment of road.

2. **Geometric Design:** Geometric aspects of highways, design of transportation facilities based on operational capacity, site constraints and safety considerations. Layout of circular, transition and vertical curves. Traffic surveys for design and improvement of roads.

3. **Intersections:** Factors influencing the layout of junctions and design of roundabouts, provision of junctions on single carriageway and dual carriageway sites. Parking spaces, underpasses, motorways, flyovers, motorway intersections. Widening of roads on curves.

4. **Road Drainage and Protection:** Surface and sub-surface road drainage, camber and grade for highways surface drainage and proper sub-grade for sub-surface drainage, drainage structures of the required capacity for cross drainage.

5. **Airports:** Factors affecting site selection and layout of airport with respect to geographical, aeronautical, political and economic conditions. Wheel loads of different aircrafts. Introduction to pavements and typical cross-sections. Introduction to layout of airport buildings.

6. **Railways:** Track structure, railway alignment & grades, cross section of railway tracks & their laying, points, crossing and level crossing. Modern method of laying railway tracks. Railway organization in Pakistan.

7. Mass Transit Systems

Practical:

1. To determine the C.B.R Sub grade soil for soaked sample of soil.
2. To determine the C.B.R Sub grade soil for unsoaked sample of soil.
3. To determine Resistance to degradation of small-size Coarse Aggregate by Abrasion and Impact in the LOS ANGLES machine.
4. To Determine Specific Gravity and Absorption of Course Aggregate.
5. To Determine Penetration grade of bituminous materials.
6. To Determine flash and fire points By Cleveland Open Cup.



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7. To Determine Softening Point of Asphalt (Bitumen) and tar by Ring and Ball apparatus.
8. To Determine Impact Value of Aggregates.
9. To Determine the Flakiness index and Elongation Index.
10. Float Test Bituminous Material.
11. To Determine Viscosity of Asphalt by Vacuum Capillary Viscometer.
12. To Determine Specific Gravity of Semi Solid Bituminous Materials by Pycnometer.
13. To Determine Ductility of Bituminous Materials
14. Exercises to calculate the quantities of materials required for various types of pavements and various sections of highways.
15. Exercises for provision of transition curves and re-alignments of curves.
16. Performing standard and modified Proctor test.
17. Find field density by core cutter and sand replacement method.
18. Performing standard penetration test.
19. Demarcation of road alignment on a given contour map.

Recommended Books:

1. Highway Engineering by C. H. Oglesby, Russell G. Hicks. ISBN: 047102936X. John Willey & Sons. (Latest Edition).
2. A Policy on Geometric Design of Highways & Streets AASHTO Staff, ISBN: 1560510013. (Latest Edition).
3. Hand Books of Highway Engineering by Baker (Latest Edition).
4. Railways, Bridges and Tunnels by S. K. Sharma (Latest Edition).
5. Roads, Railways, Bridges and Tunnels by Deshpande Antia and Shahna (Latest Edition).
6. Highway Design Manual, Highway Department, Govt. of the Punjab (latest edition)



CT-273: Water Supply and Waste Water Management

Course Learning Outcomes:

After successful completion of this course, the students will be able to:

1. To **discuss** water supply, waste water systems and environmental issues in context of quality and treatment (C2, PLO1)
2. To **Design** components of waste water treatment plant with respect to different kinds of pollution (C6, PLO3)

Course Outline:

1. **Introduction:** Water supply and wastewater collection systems and their importance with respect to human health. Water borne diseases. Types of impurities and their affects on human health standards, WHO standards. Study of water treatment plant
2. **Estimation of Water Demand:** Water consumption. Components of water consumption. Factors affecting consumption. Fire demand. Variations in demand: average daily consumption maximum daily consumption and peak hourly consumption. Commonly used values of water consumption. Local design guidelines. Design period: factors affecting design period. Commonly used design period and local criteria. Population forecasting: mathematical and graphical methods of forecasting population. Population density.
3. **Source of Water:** Ground and surface source. Selection of water sources with respect to quantity and quality considerations.
4. **Collection and Distribution of Water:** Intake structure: reservoir, river and canal intakes. Methods of water distribution. Components and layout of water distribution system. Storage capacity of overhead reservoirs. Use of Hazen William formula for the design of water distributions systems. Hardy Cross method. Use of microcomputers in design. Types of pipes and their use in water distribution. Pipe joints, service connection. Valves and fire hydrants. Construction of water distribution systems. Disinfections of old and new pipes. Water waste surveys and tracing of leakages. Pipes in series and parallel, head losses, major losses minor losses.
5. **Estimation of Wastewater Quantities:** General considerations. Classification of sewage and sewer systems. Combined and separate sewer systems. Estimation of sanitary sewage quantities. Estimation of storm flow: the rational method, runoff coefficients, Intensity-Duration Frequency relationships. Study of waste water treatment plant
6. **Design of Sewer Systems:** Layout of sewers. Sewer appurtenances: manholes, drop-manholes and storm water inlets. Design criteria for sanitary and storm sewers. Self-cleansing velocity. Use of Manning's Equation for the design of sanitary and storm sewers. Construction of sewers: types of beddings, joints and laying of sewers. Sewer testing. Sewer cleaning equipment.

Practical:

1. Forecasting population of various cities using different methods.
2. Detailed study of different types of valves.
3. Detailed study of different pipe material and joints for water supply and sewerage.



3. Design of a transmission main.
4. Design of water distribution system for a housing scheme.
5. Design of a sanitary sewer system.
6. Design of storm sewer system.
7. Preparation of drawings for different bedding of sewers.
8. Preparation of working drawings for manholes, drop manholes and storm water inlets.
9. To determine the Bio-chemical Oxygen Demand of waste water sample.
10. To determine the amount of suspended solids in drinking water and waste water samples by photometric method.
11. Determination of volatile suspended solids (MLVSS) in waste water samples by gravimetric method.
12. To determine the turbidity of continuous flow by Low Range Turbid meter.
13. Determination of oil and grease by Partition- Gravimetric method in wastewater.
14. Determination of ortho-phosphate in water and wastewater sample by Ascorbic acid method.
15. To determine the concentration of Nitrate and Lead in different water samples by ion Selective electrode.

Recommended Books:

1. Water Supply and Sewerage by E. W. Steel and L. J. McGhee. McGraw Hill, New York. (Latest Edition).
2. Water and Wastewater Technology by M. J. Hammer, John Wiley & Sons. New York, (Latest Edition).
3. Wastewater Engineering: Collection and Pumping of Wastewater by Metcalf and Eddy. McGraw-Hill, New York, (Latest Edition).



CT-283: Theory of Structures

Course Learning Outcomes:

After successful completion of this course, the students will be able to:

1. To **apply** the knowledge of the basic concepts of structural analysis. (C3, PLO1)
2. To **analyze** the determinate structures and trusses. (C4, PLO2)

Course Outline:

Determinacy of Structures: Static stability and determinacy of structures.

Analysis of Determinate Structures; Common types of trusses, analysis of truss by method of joints. Analysis of frames.

Moment Distribution Method: Concept, stiffness and carry-over factors, distribution factors, analysis of continuous beams and frames without sideway.

Influence lines: Concept of influence lines, influence line diagrams for statically determinate beams and its application. Maximum shear force and bending moment for moving loads.

Rotation and Deflection: Rotation and deflection of beams by Unit Load Method Moment- Area Method and Conjugate beam method.

Beams and frames under complex loading: Bending moment and shear force diagrams for statically determinate beams and frames under complex loading.

Practical:

Practical work will be based on above theory Design Class.

Recommended Books:

1. Structural Analysis by R.C.Hibbler. Prentice Hall. 6th Edition.
2. Theory of Structures by J. C. McCormac. Harper & Colins Publishers
3. Statically Indeterminate Structures by C. K. Wang, McGraw-Hill (Latest Edition).



CM-213: Environmental Management

Course Learning Outcomes:

After successful completion of this course, the students will be able to:

1. To **discuss** various techniques and methods of waste water management (C2, PLO1)
2. To **examine** sources and types of pollution along with mitigation measures (C4, PLO7)

Course Outline:

1. Introduction to solid waste, classification of solid waste. Collection methods, transfer and transportation of solid waste, type of equipment, recycling, reuse and disposal of solid waste, BOD and COD.
2. Sewage treatment and disposal: Primary, secondary and tertiary treatment
3. Air pollution: Introduction to air pollution, sources of air pollution, its effects, classification and control. Introduction to EIA functions of Environmental Pollution Council, role of provincial EPAs, Environmental Protection Act, 1977, National Environmental Quality Standards.
4. Introduction to noise pollution and its mitigation measures.
5. Environmental health and safety.

Practical:

1. To determine the Bio-Chemical Oxygen Demand of waste water sample.
2. To determine the amount of suspended solids in drinking water and waste water sample by photometric method.
3. To determine the amount of settle able solids in waste sample.
4. To determine the turbidity of continuous flow by Low Range Turbid meter.
5. To determine the amount of volatile suspended solids (MLVSS) in waste water sample by gravimetric method.
6. Determination of Oil and Grease by Partition – Gravimetric Method in wastewater
7. Determination of the impact of discharges on the surface water (river, canal etc)
8. Composition of solid waste (percentage)
9. Energy Value.
10. Moisture content.
11. Nox and Sox by hand meters.
12. Carbon monoxide by hand meters.

Recommended Books:

1. Introduction to Environmental Engineering by Peavy (McGraw-Hill)
2. Environmental Engineering by Mckenze (McGraw-Hill)
3. Environmental Profile of Pakistan by IUCN.



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CH-213: Technical Report Writing

Course Learning Outcomes:

After successful completion of this course, the students will be able to:

1. To **explain** different types of technical reports (C2, PLO1)
2. To **demonstrate** technical report writing skills, concisely effectively for personal, academics and research purposes (C3, PLO10)

Course Outline:

Essay writing: Descriptive, narrative, discursive, argumentative. Academic writing: How to write a proposal for research paper/term paper. How to write a research paper/term paper (emphasis on style, content, language, form, clarity, consistency). Technical Report writing. Progress report writing. Technical document creation with tools and technique to improve quality. Structure, layout and writing style for various technical documents for both print and digital media. Document review process and assessment of written report and documents. Technical Communication Basics, A General Definition of Technical Communication, Major Traits of Technical Communication, Globalization and Cultural Awareness. The Technical Communication Process. An Overview of the Process, Planning Document, Drafting and Finishing Document, Editing. The Uses of Visual Aids, Planning the Mechanism Description, Writing the Mechanism Description. The Elements of a Formal Report, Planning the Recommendation Report, Drafting the Recommendation Report, Planning the Feasibility Report, Writing the Feasibility Report. Writing the Internal Proposal, Planning the Manual, Writing the Manual, Making an Effective Presentation.

Recommended Books:

1. "Technical Report Writing Today" by Daniel Riordan, 10th Edition
2. "Technical Writing and Professional Communication", Leslie Olsen and Thomas Huckin, 2nd Edition



5th Semester

CT-313: Hydrology

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **explain** different components of a hydrological cycle (C2, PLO1)
2. To **apply** principles of hydrograph and routing to estimate floods and water level respectively. (C3, PLO4)

Course Outline:

Introduction: Hydrology, hydrological cycle and the hydrological equation, practical uses of hydrology, importance of hydrology.

Meteorology: The atmosphere and its composition, relative humidity, dew point and their measurement devices, Saturation deficit, Solar radiations as a source of heat, adiabatic changes and the lapse rate, air temperature, seasonal and diurnal variation of air temperature, The general circulation of wind system, the monsoon and western disturbances, Measurement of air temperature, relative humidity, radiation, sunshine and atmospheric pressure.

Precipitation: Type of precipitation, factors necessary for the formation of precipitation, measurement of precipitation, interpretation of precipitation data.

Evaporation and Transpiration: Factors affecting evaporation, measurement of evaporation, evapo-transpiration.

Stream flow: Water stage and its measurement, selection of site for stage record, selection of control and metering section, methods of measurement of stream flow, interpretation of stream flow data.

Runoff: Factors affecting runoff, estimating the volume of storm runoff.

Hydrograph: Characteristics of hydrograph, components of hydrograph, hydrograph separation, estimating the volume of direct runoff, introduction to unit hydrograph concept, S-curve.

Floods and their estimates: Introduction to floods, causes of floods, methods for the estimation of floods, flood estimation from past flood marks, Rational formula, empirical formulae, using unit hydrograph method and flood frequency analysis.

Ground Water Flow: Introduction, sources and discharge of ground water. Water table and artesian aquifer. The Thieme and Theis formula and its application to aquifer tests.

Practical

1. Determination of velocity and discharge using current meter.
2. Determination of velocity and discharge using floats.
3. Study of the barometer.
4. Study of the rainfall gauge.
5. Measurement of wind velocity.



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6. Measurement of humidity.
7. Measurement of atmospheric temperature.

Recommended Books:

1. Hydrology for Engineers by Linsley, Kohler and Paulhus. McGraw- Hill, New York, 1982 (Latest Edition).
2. Handbook of Applied Hydrology by Chow, McGraw Hill, New York (Latest Edition).
3. Introduction to Hydrology by Viessman, Lewis and Knapp. Harper and Row, New York (Latest Edition).



CT-324: Reinforced Concrete Structures

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **describe** the basics and behavior of reinforced concrete. (C2, PLO1)
2. To **design** various structural reinforced concrete elements/members and formulate structural drawings of design details (C6, PLO3)

Course Outline:

Principles of Reinforced Concrete. Basic concepts of reinforced concrete; basic concepts of working stress method and ultimate strength method.

Slabs. Analysis of one-way and two-way slabs with general discussion of other slab system; Design for flexure and shear.

Columns; Analysis of section in pre compression; Design of short columns under pure compression and with eccentric loading.

Beams; Analysis and design of prismatic singly reinforced, doubly reinforced and T-beams section in flexure, shear by using ultimate strength design method.

Detailing. Preparation of working drawings of structural elements. Details of bar Bending and preparation of schedules.

Staircase. Design of staircase of different types spanning both horizontally and vertically.

Joints. Introduction to columns and beam joints

Practical: Practicing problem of slabs, beams, columns

Recommended Books:

1. Design of Concrete Structures by H. Nilson, McGraw- Hill.
2. Reinforced Concrete – Design & Behavior by C. K. Wang & Salmon.
3. Reinforced Concrete by J-Faber and F. Meed; Chapman & Hall.
4. Reinforced Concrete design by Keneth Leet (Latest edition)



CT-333: Construction and Hydraulic Machinery

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **identify** different construction machinery used in construction industry. (C1, PLO1)
2. To **discuss** the application of various machinery used in the field of construction. (C2, PLO5)

Course Outline:

Brief Discussion on Use, Productivity and Economics of Equipment for Heavy Construction Operations, including; Tractors, Dozers, Scrapers, Motor Graders, Power Shovels, Off-Road Haulers, Front-End Loaders, Backhoes, Draglines, Trenchers, Rock Drilling Equipment, Crushers, Conveyors.

Impulse Turbine: Introduction, types of Impulse turbines, Pelton Wheel and Turgo Turbine; their main components and functions, work done by the Pelton wheel, specific speed.

Reaction Turbine: Introduction, types, Francis reaction turbine and Kaplan turbine, main components and their functions. Cavitation and Pitting. Governing of turbines. Similarity laws and factors for turbo machines.

Pumps: Introduction and types of pumps.

Centrifugal pump: classification, main components and their functions. Work done by the Centrifugal Pump. Maximum suction lift of the pump, Specific Speed, Shut-off head and Normal discharge of the pump.

Reciprocating pump: Introduction, types, single and double acting pinups, indicator diagram, acceleration head, maximum suction head and use of air vessels.



CT-343: Engineering Geology

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **define** the basic knowledge of geology and geological process (C1, PLO1)
2. To **discuss** the role of geology in the Civil Engineering Structures and other geological phenomenon such as Landslides, Glaciers, Volcanoes etc (C2, PLO1)

Course Outline:

1. Introduction. Introduction to Geology. Importance of Geology in civil engineering projects. Sedimentary, igneous and metamorphic rocks. Volcanic activity. Internal structure of the Earth. Engineering and physical properties of rocks. Identification of common rock forming minerals.

2. Geology in Civil Technology. Role of geology in selection of sites for dams, reservoirs, tunnels and other important civil engineering projects, such as highways, airfield and bridges.

Ground subsidence: Mining subsidence due to alteration of fluid levels. Methods of avoiding mine collapses. Introduction to blasting. Geological survey for tunneling, lining of tunnels. Brief introduction to local geology.

3. Structural Geology. Introduction to structural Geology and plate tectonics.

Land-sliding and its causes. Introduction to Hydrogeology: wells, springs, streams and ground water conditions. Causes of glaciers and their types

4. Introduction to Earthquake Engineering: Introduction, Earthquake magnitude & intensity, importance of ground conditions, Nature of seismic forces, Factors affecting the severity of seismic forces, retrofitting its objectives, approaches & Techniques

Practical:

1. To study physical properties of minerals.
2. To identify minerals on the basis of physical properties.
3. Prepare data sheet for mineral identification.
4. To study rock types and their classification.
5. To differentiate between different types of rocks.
6. To identify and classify igneous, plutonic and volcanic rocks.
7. Prepare data sheet for identification of igneous rocks.
8. To Study sedimentary rocks.
9. To differentiate between different types of sedimentary rocks.
10. Prepare data sheet for identification of sedimentary rocks.
11. To study Metamorphic rocks.
12. To identify and classify metamorphic rocks.
13. Prepare data sheet for identification of metamorphic rocks.



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14. Study and interpretation of a geological map
15. To draw a geological cross section from a geological map.

Recommended Books:

1. A Geology for Engineers, Blyth, F G H 7th Arnold International student edition.
2. Principles of Engineering Geology and Geotechnics, Krynine, DP 1st Edition McGraw-Hill International edition.
3. Geology and Tectonics of Pakistan by Kazmi and Jan (Latest Edition)
4. Earthquake resistant design of structures by Pankaj Agarwal and Manish Shrihande published by Prentice Hall of India.
5. Seismic Design for Architects by Andrew Charleson ISBN: 978-0-7506-8550-4



CM-313: Project Management

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **define** the basic principles of Project Management. (C1, PLO1)
2. To **apply** the knowledge of project management on site. (C3, PLO11)

Course Outline:

1. Introduction to management: History of management, management functions, organizational structure, types of organizations, organizational hierarchy, properties of narrow and wide organizations
2. Production Processes: Types of production, scale of production, selection of technology, input requirements, capacity utilization, productivity basic concepts, classification, quantitative measurement, productivity improvement.
3. Project Management: Properties of projects, project life cycle, project network analysis, resource requirements, monitoring and control, computer tools.
4. Inventory Management: Inventory replenishment, economic lot size, re-order point, safety stock level, JIT, computer tools.
5. Human Resource Management: Management styles, psychological types, recruitment and training, job evaluation, performance appraisal, motivation and incentives.

Recommended books:

1. Babcock d. L. Managing engineering and Technology, Prentice Hall, UK.
2. Zuberi M. H. Industrial management, Rabbani Printing Press, Lahore.
3. Bateman T. S. and Snell S. A. Management: building competitive advantage. Times Mirror Higher Education Group, USA.
4. Spinner M. Elements of project management. Prentice Hall, UK.



6th Semester

CT-353: Irrigation and Hydraulic Structures

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **design** Irrigation Channels by using different approaches (C5, PLO3)
2. To **explain** different hydraulic structures (C2, PLO1)

Course Outline:

Irrigation: Definition and types of irrigation. Merits and demerits of irrigation. Indus basin irrigation system. Design of irrigation channels. Regime (Empirical) Methods for design of irrigation channels. Semi Empirical Approaches. Rational methods for design of irrigation channels. Comparison of various methods.

Canal Irrigation: Elementary concept about canal head works. Selection of their site and layout. Weirs and barrages. Various components and functions.

Dams: Types of Storage Dams. Forces on Dams. Design of Gravity Dams. Reservoir Engineering. Regulation of Storage Reservoirs.

Hydro Power Engineering

Water Logging and Drainage: Soil salinity, water logging their environmental impact & assessment. Introduction to Drainage and Drainage system.

Practical

1. Design of channels in alluvial soil.
2. Study of canal fall.
3. Study of outlet.
4. Study of a barrage on pervious foundation.
5. Determination of loss of total head in converging and diverging flow.
6. Measurement of velocity with pitot tube in a closed conduit.
7. To determine the discharge in orifice under varying head.
8. Study of Hydraulic Jump.
9. To study flow channel (by Hydraulic Bench)
10. To study flow over weir (by Hydraulic Bench)

Recommended Books:

1. Irrigation and Hydraulic Structures (Theory, Design and Practice by Dr. Iqbal Ali, Institute of Environmental Engineering & Research, NED WET, Karachi (Latest Edition).
2. Irrigation Canals by Iqtidar H. Siddiqi (Latest Edition).
3. Fundamentals of Irrigation Engineering by V. B. Piryani (Latest Edition).



CT-364: Foundation Engineering

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **apply** the skills related to bearing capacity and settlement evaluation of soils. (C3, PLO1)
2. To **design** different foundations. (C5, PLO3)

Course Outline:

Definitions: Foundation, contact pressure, allowable bearing capacity, total and differential settlements, permissible settlement.

Foundation Types: Shallow foundation, deep foundation. Choice of foundation, type and depth of foundation, foundation design requirements. Foundation design geotechnical design and structural design.

Shallow Foundation: Types of shallow foundation, Design of Isolated and combined footing.

Deep Foundations: Piles, caissons, piers, well foundation. Types of piles, pile capacity, pile group, proportioning of pile cap. Function of piles and their uses. Negative skin friction (down drag).

Lateral Earth Pressure: Rankine's & coulomb's Theories of Lateral earth pressure; analysis of earth retaining structure, Types of retaining wall.

Slope stability

Practical:

1. Boring log with SPT values up to 30 ft.
2. Plate load test.

Recommended Books:

1. Foundation Analysis and Design by J. E. Bowles, 5th Edition, McGraw-Hill. ISBN: 0070068739. January, 1996.
2. Foundation Engineering by Ralph B. Peck, W.E. Hanson, Thomas H. Thorn burn; John Willey & Sons, (latest Edition).
3. Foundation Design and Construction by Michael. J. Tomlinson; Longman Publishing Group. ISBN: 058222697X. January 1996.
4. Foundation Design by W. C. Teng; Prentice Hall. ISBN: 0133298051.
5. Geotechnical Engineering: Foundation Design by John. N. Cernica, John; Willey & Sons. ISBN: 0471308870. January 1994.
6. Principles of Pavement Design by E. J. Yoder and M. W. Witezak,



CT-373: Steel Structures

Course Learning Outcomes:

After successful completion of this course, the students will be able:

1. To **explain** the different components of steel's structures (C2, PLO1)
2. To **design** different members of steel's structures (C5, PLO3)

Course Outline:

Introduction; Steel properties, design loads and load factors; Types and shapes of structural steel members; specifications and design codes, safety factors

Tension members; Design and analysis of tension member.

Flexural members; Design of laterally supported and unsupported beams; deflection check

Compression members; Design and analysis of axially and eccentrically loaded short and long columns

Connections; Types of high strength bolts and rivets; Friction and bearing type connections; Continuous beam to beam and beam to column connection.

New Design Codes; Introduction to LRFD method (load resistance factor design)

Practical:

Practical will be based on Design Class.

Recommended Books:

1. LRFD Steel Design by William T. Segui; PWS Publishers. ISBN:053493353X. (Latest Edition)
3. Steel Structures by Z. A. Siddiqi, M. A. Chaudhry and M. Ashraf, Civil Engineering Series Publishers (Latest Edition).
- 3 RFD Steel Design Aids in SI Units by Z. A. Siddiqi, M. A. Chaudhry & M. Ashraf; Civil Engineering Series Publishers.



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CT-3103 & CT-3113: Project

Objectives:

To develop the ability of exercising the analysis and design of construction / highway projects.

Course Outline: The project involves survey, analysis and design of Civil Engineering project. The student is in close consultation with department faculty will complete the project using Library, Computer or Laboratory facilities. Progress reports and a comprehensive written report are required.

Note:

The student(s) to undertake project during 6th semester and its following summer. 06 credit hours academic work be undertaken as follows: -

- Three credit hours work during 6th Semester under the guidance of departmental faculty. The work that entails supervised work entails problem analysis, timeline & Schedule, Literature Review, conceptual / Actual design, design validation and material selection.
- Three credit hours during summer where student(s) will work independently and may seek guidance from the concerned Faculty / Project Supervisor. The independent working of student(s) entails Manufacturing / Fabrication (Economical Prototype / Model production if required), Assembly, test & Trials and logging of results, Report writing and presentation.



7th & 8th Semester

CT-4116 & CT-4216: Supervised Industrial / Field Training

7th Semester		
CT-4116	16 weeks supervised industrial / field training	(Annexure - A)
8th Semester		
CT-4216	16 weeks supervised industrial / field training	(Annexure - A)

ANNEXURE-A

Background:

Industrial Training refers to students' work experience in an engineering-practice environment to familiarize themselves with professional engineering practices prior to graduation as BSc engineering Technologist. The training curriculum consists of **32 weeks of continuous industrial/field training @ 8 hours working / day and 5 working days a week**. BSc Engineering Technology Student shall undergo this Industrial Training during the 7th and 8th semester after he/ she **has passed all subjects up to 6th semester**. This Training covers a range of activities, such as design implementation, production processes, laboratory, on-site field works and maintenance. It also serves as a mechanism to integrate engineering practices and the curriculum to achieve the overall Program Outcomes and Graduate technologists attributes. Whereas, it provides exposure to engineering processes at a practical level; helps developing professional skills required by an undergraduate technologists it also offers opportunity to the prospective employer to assess potential of the probable future employee.

Credit Hour: The term "Credit Hour (Cr.Hr)" refers to a unit of academic credit during a semester. Each credit hours defined as "one contact hour per week" for the theory class and "3 contact hours per week" for the laboratory work.

Contact Hours: (Theory / Lecture): One (1) contact hour per week for each credit hour of Theory/Lecture. **Contact Hours (Practical):** Three (3) contact hours per week for each credit hour of laboratory work.

Objectives

Through the Industrial Training, students will be able:-

- To apply engineering knowledge learned in classroom environment in real industrial situations;
- To expose to professional engineering practices in the industries.
- To understand the role and responsibilities and code of ethics that BSc Engineering Technologists should uphold.
- To develop awareness about general workplace behaviors and build interpersonal skills.
- To prepare professional work records and reports.
- To build rapport and network with probable future employers to increase employability.

Obtaining Industrial Placement



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During 7th and 8th semester BSc Technology students will be undergoing continuous Industrial Training of 32 weeks. This training will be arranged by HEI's, mainly in the leading Industry and must have MOU on training of Technologists. The designated Training Administrator of HEI may complete all necessary documentation within 12 weeks prior to the commencement of the training and subsequently issue Training Schedule of 32 Weeks to help students undergo training in 7th and 8th semester on due time.

Student's Responsibility

- a. BSc Engineering. Technology Students MUST get enrolled for the Industrial Training during 6th semester and before commencement of 7th semester.
- b. The students will have to undergo continuous training of 32 credit hours. *One week's training @ 8 hours daily for 5 days per week will be counted as 1 credit hour.* Accordingly $16 \text{ weeks/semester} \times 5 \text{ working days / week} \times 8 \text{ hours/ Day} = 640 \text{ Contact hours/ semester}$ Or 1280 contact hours in 7th and 8th semester.
- c. Trainees will maintain a daily Log Book, duly signed by the Training supervisor at site, Training Administrator appointed by HEI and the Student himself.
- d. Students must observe safety & security rules of the Organization where they receive Training.
- e. Student must wear specified working dress during training.
- f. All rules and regulations of the organization will be observed.
- g. Trainees must observe working Timings of the Training Organization.

Trainees are allowed to avail 10 days leave during Training period of 32 weeks in total and only 1 day leave will be granted at a time. The leave shall only be availed to cater for any emergency, with prior sanction from the training Administrator. Leave will be treated as loss of training hours and required to recoup in any case. And any leave availed on discretion will be treated as absent, liable to disciplinary action. Public holiday and leaves should not be counted as working hours.

HEI's Training Administrator Visit

HEI's Training Administrator will pay off and on visits throughout the industrial training period. The students and the training organization will be informed about the date and time of the visit. Discussions will be held with the onsite training supervisor(s) as well as the students during the visits.

The purposes of the Training Administrator's visit to the training places are as follows:-

- a) To ensure that the training organization is providing suitable training to the students that they need.
- b) To obtain feedback on training program, students' performance and training progress through discussion with training supervisor(s).
- c) To make courtesy visits and establish industrial relations between the HEI and the industries/ Fields where would be Technologists receive training.
- d) To discuss the possibility of students' job placement with the training organization.
- e) To survey for new industries as potential training placement in the future.

IMPORTANT NOTE!



a) Students are **NOT ALLOWED** to change placement during the training period with particular organization. However, written permission may be sought from training Administrator, if prior confirmation of newer placement of the student is available. And the student does not suffer loss of training hours due to this changeover.

b) After getting a written permission from the Training Administrator, a fresh approval should be applied for the new placement.

Daily Training Logbook

All the training activities need to be recorded on daily basis. This logbook is to portray :-

- a) A reflection of the student's learning and experience during the industrial training;
- b) Training records and evidences of supervised training and reference of participation of Student, On the job Trainer and HEI's training Administrator.
- c) Part of professional practice in engineering profession where incidence and evidence are recorded in proper documentation.
- d) Source of reference to prepare the Industrial Training Report. The log book must be submitted together with the Industrial Training Report.
- e) Students must get it signed, on daily basis, by the On the Job Trainer.

Industrial Training Report

An industrial training report will be submitted upon completion of training. The report must describe student's learning and development in technical knowledge, engineering practices and professional skills acquired through the practical experience. The industrial training report should also reflect student's ability in communicating skills understanding of engineering practices.

Students should seek advice from their "On the job Trainer" at site, to ensure that no confidential materials are included in the report. The report shall be submitted to the Training Administrator. The student should be able to present a copy of the report to the prospective employer, as a complement for their Cooperation. Any references made in preparation of the report should be recognized using standard referencing formats.

Student should refer to the Industrial Training Report Template as given in Appendix A and guideline given here under in preparing the report. The Daily Training Logbook should be submitted together with the report.

Guideline for Preparation of Industrial Training Report

Students, under the guidance of supervisor, need to properly document their experience and learning during the industrial training in the form of report. A properly prepared report can portray their practical experience precisely in an orderly manner.

The report has to be prepared according to the format and the guidelines below :-

1. Contents and Format of the Report

a) Table of Content

This section of the report should consist of:

- b) Headings
- c) Sub-headings



d) Page numbers

Every appendix requires a title and each page need to be numbered accordingly.

b) Background/Profile of the Training Organization

Brief and concise description of the organization in which the student is undertaking the industrial training. The main items are:

1. Backgrounds/profile of the organization
2. Vision and Mission
3. Organogram.
4. Title and position of the supervisor in charge
5. Other necessary information only (not more than three pages)

c) Schedule of duties performed as Trainee

This section should be a brief description of the time, duration and types of duties performed during the training. The description must follow the schedule of the training i.e. in chronological order (for 32 weeks). The days when the student was not on duty must be properly recorded with cogent reasons.

d) Working Experience

In this section, the student must fully describe the industrial training experience gained. Some suggested areas to be discussed include but not limited to:

- a. Project (s) carried out, if any .
- b. Supervisory works
- c. Problems encountered
- d. Problems solving process or approach
- e. Hands on skill acquired.
- f. How productivity can be further enhanced.
- g. Quality Management system in place.
- h. Safety at work.

e) Conclusion and Future Recommendations

Student should provide an overall discussion in this section and arrive at a conclusion with regards to the industrial training undergone. Contents may include:

1. Types of major work performed
2. Comments on whether the training objectives are met
3. Suggestions / Recommendations

f) References

A complete list of the references used in the report must be included according to standard referencing format.



g) Appendix

Appendixes are additional information considered appropriate to support the main text. A copy of the letter of permission from the Training organization must be attached in the appendix. Other suggested appendixes are:

1. Investigation/project report during the industrial training
2. Technical drawings, so far these are not secret documents or proprietary etc.

2. Others

a. Figures /Tables

All figures, tables and similar contents must be captioned / labeled and mentioned in the main text.

b. List of Notations and Symbols

If the report contains notations and symbols, the full definition must be given when each notation or symbol first appeared in the main text. The list of notations and symbols with the full definitions can be placed after 'Tables of Contents'.

Every appendix must have a title and be mentioned in the main text where appropriate. All page numbers for appendixes must be continual from the main text.

DO NOT include irrelevant materials, e.g. brochures from the organizations, or any publicity materials in the report.

Note on Good Practice: Students are advised to start writing the industrial training report soonest, after beginning of the training period to ensure a timely completion and submission of the report.

a. General Report Format

The report has to be typewritten on white A4 size paper, with 12-point font size, Times New Roman font type and line spacing of 1.5 throughout the report. The report has to be properly ring-bound with transparent plastic sheets attached to the front cover. A sample of report template is available in Appendix A.

The format for the front cover should be as shown in Appendix A.

IMPORTANT NOTE!

Students are NOT ALLOWED to change the form / template in any way.

b. Abstract/Preface

This section of the report should consist of brief description of the following.

1. Activities of the Organization
2. Summary of the report
3. Acknowledgement

An abstract should be limited to a maximum of two (2) pages only.

Industrial Training Assessment

The industrial training performance assessment will be based on

1. On the Job Trainer' Report (20%)



2. Training Advisor report through visit or survey (10%)
3. Industrial Training Report (50%)
4. Viva voce (20%)

A total of minimal 50% marks must be achieved in order to be considered passing the industrial training during 7th & 8th semesters.

Students are advised to give a serious consideration in writing their report. The report must be in good quality and portray all industrial experience and knowledge gained. The report **MUST NOT be in the form of short note and figurative form. If the report is not satisfactory, the students may be advised to rewrite the report until it is deemed satisfactory.**

Completion of Industrial Training

Upon completion of a 32 weeks continuous training period, a confirmation letter to this effect **MUST** be obtained from the training organization / probable employer. The confirmation letter needs to be submitted to the Industrial Training Administrator, together with the On-the-Job Trainer's Report form, Student Feedback form and Industrial Training Report for grading.

*****Student should submit hard copy to the Industrial Training Administrator for evaluation***

Upon approval and evaluation of Industrial Training report of the students, the Training Administrator, must organize viva voce examination of the students, carrying 20 marks weightage, as under: -

- i) Non-technical Subjects: 30 %
- ii) Technological subjects: 70 %

Breadth: 30%

Depth : 40 %

Subsequent upon successful completion of the Industrial Training of 32 weeks, a confirmation letter will be included in student's file, as evidence of a successfully completed industrial experience. And to this effect a Training Certificate will also be issued by the Training Organization and countersigned by the HEI's Training Administrator.

Administration

All Administrative matters regarding BSc Technologists placement for Training in various industrial units offering free of cost training facilities, will be handled by the Administrator Industrial Training and maintain records of placement, approvals and training programs devised by respective units & others. All Training reports submitted by the students and given by the respective Training Advisors of training units, will be evaluated and maintained as well, and grades communicated to the relevant Technology Department.



Appendix – A

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Industrial Training Report

Name: _____

Student Roll No: _____

Industrial Training Course: _____

Training Period: _____

Training Organization: _____

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Abstract to be written after the completion of the Report.

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Table of Contents

Chapter No.	Subject	Page
Chapter 1	Backgrounds of Training Organization	xx
Chapter 2	Schedule of Training & Duties, as Trainee	
	2.1	xx
	2.2	xx
	2.3	xx
Chapter 3	Working Experiences	
	3.1 <i>Projects carried out (if assigned by On The Job Trainer)</i>	xx
	3.2 <i>Hands on skill acquired</i>	xx
	3.3 <i>Problems encountered</i>	xx
	3.4 <i>Problems solving process, approach</i>	xx
	3.5 <i>Supervisory works</i>	xx
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Industrial Training Log Book

Training Information

Personal Details	
Student Name	
Student Roll	
Address	
Email	
Course of Study	
Year/Semester of Study	
Training Start Date	
Training End Date	
Training Organization	
Name	
Address	
Contact Person	
Contact Number	

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Daily Training Log

Training Week: _____

(Please specify training information by descriptive statement, tables, sketches, figures and etc)

Date	Time	Entry

Note: Please include attachment whenever necessary

Declaration

I hereby declare that all information provided above is true.

Signed by Trainee		Signed by Supervisor	Dated