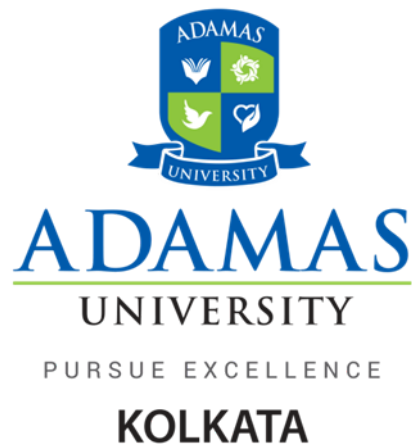




**ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING & TECHNOLOGY**

**B.Tech. Civil Engineering
Course Structure & Syllabus**

Academic Year 2019-20

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF CIVIL ENGINEERING
B. Tech (Civil Engineering⁺ Smart Infrastructure Management)
Course Structure
FIRST YEAR
SEMESTER I

S. No	Type	Course Code	Course Title	L	T	P	Contact Hrs/wk	Credits
1.	Theory BSC	SMA41101	Engineering Mathematics-I	3	1	0	4	4
2.	Theory BSC	SPH41109/SCY41106	Engineering Physics/ Engineering Chemistry	3	0	0	3	3
3.	Theory ESC	ECS41101/EEE41102	Introduction to Programming / Electrical and Electronics Technology	3	0	0	3	3
4.	Theory HSSM	HEN41117	HSSM –I (English Communication-I)	3	0	0	3	3
5.	Theory HSSM/BSC	HEN41119/ SBT41108	HSSM –II (Engineering Ethics, Values and the Laws) / Life Sciences	3	0	0	3	3
6.	Practical BSC	SPH41209/ SCY41206	Engineering Physics Lab/ Engineering Chemistry Lab	0	0	3	3	2
7.	Practical ESC	ECS41201/ EEE41202	Programming Lab/ Electrical and Electronics Technology Lab	0	0	3	3	2
8.	Practical ESC	ECE41201/EME41204	Engineering Drawing and CAD/ Engineering Workshop	0	0	3	3	2
9.	Practical MC	EMC41201	Communication and Collaboration Skill -I	0	0	2	2	1
Total				15	1	11	27	23

SEMESTER II

S. No	Type	Course Code	Course Title	L	T	P	Contact Hrs/wk	Credits
1.	Theory BSC	SMA41102	Engineering Mathematics– II	3	1	0	4	4
2.	Theory BSC	SCY41106/ SPH41109	Engineering Chemistry/ Engineering Physics	3	0	0	3	3
3.	Theory ESC	EEE41102/ ECS41101	Electrical and Electronics Technology/ Introduction to Programming	3	0	0	3	3
4.	Theory BSC/ HSSM	SBT41108/ HEN41119	Life Sciences/ HSSM –II (Engineering Ethics, Values and the Laws)	3	0	0	3	3
5.	Theory ESC	EME41104	Engineering Mechanics	3	0	0	3	3
6.	Practical HSSM	HEN41212	HSSM – III (Professional Communication in English)	0	0	3	3	2
7.	Practical BSC	SCY41206/ SPH41209	Engineering Chemistry Lab/ Engineering Physics Lab	0	0	3	3	2
8.	Practical	EEE41202/	Electrical and Electronics Technology Lab/	0	0	3	3	2

	ESC	ECS41201	Programming Lab					
9.	Practical ESC	EME41204/ ECE41201	Engineering Workshop/ Engineering Drawing and CAD	0	0	3	3	2
10.	Practical MC	EMC41202	Communication and Collaboration Skill –II	0	0	2	2	1
Total				15	1	14	30	25

Total Credit (First Year): 48

HSSM: Humanities, Social Sciences & Management

BSC: Basic Science

ESC: Engg. Science

SECOND YEAR

Semester-III								
S. No	Type	Course Code	Subject Name	L	T	P	Contact Hrs/wk	Credits
1.	Theory BSC	SMA42113	Engineering Mathematics– III A	3	1	0	4	4
2.	Theory ESC	ECE42101	Engineering Geology	3	0	0	3	3
3.	Theory HSSM	HEC42180	HSSM-IV (Economics for Engineers)	3	0	0	3	3
4.	Theory PC	ECE42103	Prof. Core – I Building Planning and Materials	3	0	0	3	3
5.	Theory PC	ECE42105	Prof. Core – II Fluid Mechanics & Hydraulic Machinery	3	0	0	3	3
6.	Theory PC	ECE42107	Prof. Core – III Structural Mechanics I	3	0	0	3	3
7.	Theory	SET42101	Design Thinking for Engineers	2	0	0	2	2
8.	Practical PC	ECE42201	Prof. Core Lab – I Fluid Mechanics Lab	0	0	3	3	2
9.	Practical	SET42403	Capstone Project-A	0	0	2	2	1
Total				20	1	5	26	24

Community Service will be taken up during the summer vacation of II Semester and evaluated in III Semester.

SEMESTER-IV								
S. No	Type	Course Code	Subject Name	L	T	P	Contact Hrs/wk	Credits
1.	Theory BSC	SMA42111	Engineering Mathematics-IV	3	0	0	3	3
2.	Theory PC	ECE42102	Prof. Core – IV Structural Mechanics II	3	0	0	3	3
3.	Theory PC	ECE42104	Prof. Core – V Soil Mechanics	3	0	0	3	3
4.	Theory PC	ECE42106	Prof. Core – VI Surveying	3	0	0	3	3
5.	Theory PC	ECE42108	Prof. Core – VII Water Resources Engineering	3	0	0	3	3
6.	Practical BSC	SMA42211	Numerical Techniques Lab	0	0	3	3	2
7.	Practical PC	ECE42202	Prof. Core Lab – II Surveying Practice Lab	0	0	3	3	2
8.	Practical PC	ECE42204	Prof. Core Lab – III Solid Mechanics Lab	0	0	3	3	2
9.	Practical	SET42404	Capstone Project-B	0	0	2	2	1
10.	Practical	SET42406	Interdisciplinary Project Work	0	0	5	5	3
Total				15	0	16	31	25

Total Credit (Second Year): 49

THIRD YEAR

SEMESTER –V								
S. No	Type	Course Code	Subject Name	L	T	P	Contact Hrs	Credits

							/week	
1.	Theory PC	ECE43101	Prof. Core – VIII Design of RC Structure	3	0	0	3	3
2.	Theory PC	ECE43103	Prof. Core – IX Foundation Engineering	3	0	0	3	3
3.	Theory PC	ECE 43105	Prof. Core – X Transportation Engineering	3	0	0	3	3
4.	Theory PE	ECE43107/ ECE43109/ ECE43111	Prof. Elective – I 1.Earthquake Engineering 2.Concrete Technology 3.Solid Waste Management	3	0	0	3	3
5.	Theory	SET43101	Venture Ideation for Beginners	2	0	0	2	2
6.	Practical PC	ECE43201	Prof. Core Lab – IV Geotechnical Engineering Lab	0	0	3	3	2
7.	Practical PC	ECE43203	Prof. Core Lab – V Transportation Engineering Lab	0	0	3	3	2
8.	Practical PC	ECE43205	Prof. Core Lab – VI Civil Engineering Drawing	0	0	3	3	2
9.	Practical	SET43403	Capstone Project-C	0	0	2	2	1
Total				14	0	11	25	21

SEMESTER –VI								
S. No	Type	Course Code	Subject Name	L	T	P	Contact Hrs/wk	Credits
1.	Theory PC	ECE43102	Prof. Core – XI Design of Steel Structure	3	0	0	3	3

2.	Theory PC	ECE43104	Prof. Core – XII Environmental Engineering	3	0	0	3	3
3.	Theory PE	ECE43106/ ECE43108/ ECE43110	Prof. Elective – II 1. Remote Sensing & GIS 2. Advanced Construction Materials & Techniques 3. Advanced Structural Analysis	3	0	0	3	3
4.	Theory OE	-----	Open Elective – I	2	0	0	2	2
5.	Practical PC	ECE43202	Prof. Core Lab – VIII Environmental Engineering Lab	0	0	3	3	2
6.	Practical (Sessional) PC	ECE43204	Prof. Core Lab – IX Estimation & Valuation	0	0	3	3	2
7.	Practical PC	ECE43206/ ECE43208	Prof. Elective-II Lab 1. Remote Sensing & GIS Lab 2. Advanced Structural Analysis Lab	0	0	3	3	2
Total				11	0	9	20	17

Total Credit (Third Year): 38

FOURTH YEAR

SEMESTER-VII								
S. No	Type	Course CODE	Subject Name	L	T	P	Contact Hrs/week	Credits
1.	Theory HSSM	MBA4314 4	HSSM –V (Industrial Management)	3	0	0	3	3
2.	Theory PE	ECE44101 / ECE44103 / ECE44105	Prof. Elective – III 1. Air Pollution Control Engineering 2. Construction Planning & Management 3. Advanced RC Design	3	0	0	3	3

3.	Theory PE	ECE44107 / ECE44109 / ECE44111	Prof. Elective – IV 1. Repair and Rehabilitation of Structures 2. Prestressed Concrete 3. Environmental Impact Assessment	3	0	0	3	3
4.	Theory OE	---	Open Elective – II	3	0	0	3	3
5.	Theory OE	---	Open Elective – III	3	0	0	3	3
6.	Practical PC	ECE44201 / ECE44203 / ECE44205	Prof. Elective III Lab Air Pollution Control Lab/Construction Planning & Management Lab/ Advanced RC Design Lab	0	0	3	3	2
7.	Practical PC	ECE44301	Summer Internship [#]	-	-	-	-	2
8.	Practical PC	ECE44401	Minor Project	0	0	6	6	3
Total				15	0	9	24	22

Summer Internship for 30 days will be taken at the end of 6th semester and will be evaluated in the 7th semester.

Semester-VIII								
S. No	Type	Course Code	Subject Name	L	T	P	Contact Hrs/week	Credits
1.	Practical	ECE44402/ ECE44404/ ECE44406	Industry Work Experience / SIRE* / Major Project	0	0	12	12 (For Major Project only)	5
2.	Practical	ECE44502	Comprehensive Viva Voce	-----			-----	2
Total				0	0	12	12	7

***SIRE: Scientific Investigation & Research Experience**

Total Credits (Fourth Year): 29

ADAMAS UNIVERSITY
B.Tech Civil Engineering
SEMESTER – I

Engineering Mathematics– I	SMA41101	3-1-0	4 Credits
Module 1: Differential Calculus: Successive differentiation, Leibnitz's Theorem, Rolle's theorem, Mean value theorems, Taylor's and Maclaurin's theorems with remainders, Expansions, indeterminate forms, infinite Series, curve tracing, functions of several variables, partial Differentiation, total differentiation, Euler's theorem and generalization, maxima and minima of functions of several variables (two and three variables), Lagrange's method of multipliers, change of variables, Jacobean's, asymptote, curvature.			[15]
Module 2: Integral Calculus: Fundamental theorem of integral calculus and mean value theorems; Evaluation of plane areas, volume and surface area of a solid of revolution and lengths. Convergence of Improper integrals, Beta and Gamma integrals, Elementary properties, Differentiation under integral sign, Double and triple integrals, computation of surface areas and volumes, change of variables in double and triple integrals.			[15]
Module 3: Ordinary differential equations of first order: Formation of differential equations; Separable equations; equations reducible to separable form; exact equations, integrating factors, linear first order equations; Bernoulli's equation; Orthogonal trajectories.			[12]
Module 4: Ordinary linear differential equations of higher order: Homogeneous linear equations of arbitrary order with constant coefficients, Non-homogeneous linear equations with constant coefficients, Euler and Cauchy's equations, Method of variation of parameters, System of linear differential equations., modelling of electrical circuit.			[10]

Module 5: Series solution of differential equation, power series method, Legendre's equation and Legendre's polynomials, Bessel's equation, Bessels function and its application.	[8]
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Text Books:
ErwynKreyszig : Advanced Engineering Mathematics, John Wiley and Sons
Reference Books:
Higher Engineering Mathematics by B.V. Ramana, Tata McGraw-Hill.
B.S.Grewal : Higher Engineering Mathematics, Khanna Publications

Engineering Physics	SPH41109	3-0-0	3 Credits
Module 1: Mechanics: Basic ideas of Vector Calculus Potential energy function - $F = -\vec{\nabla}V$, Conservative and non-conservative forces. Conservation laws of energy & momentum. Central and non-central forces, Angular Velocity and Torque, Moment of Inertia, SHM, Damped, Undamped and forced Oscillations (no derivations).			[8]
Module 2: Optics: Principle of Superposition and Interference from parallel thin films, Single slit and Double slit diffraction, Diffraction grating, dispersive power of Grating, resolving power of prism and grating. Production of plane polarized light by different methods, Brewster and Malus Laws. Double refraction, Nicol prism, specific rotation.			[7]

Module 3: Electromagnetic Theory : Motion of Charged Particles in crossed electric & magnetic fields, Velocity Selector & Magnetic focussing, Gauss law, continuity equation, inconsistency in Ampere’s Law, Maxwell’s equations (differential and integral forms), Poynting vector, Poynting Theorem (Statement only).				[8]
Module 4: Quantum Mechanics and Statistical Mechanics: Blackbody Radiation and Compton Effect (Elementary Ideas). Matter wave, De-Broglie Hypothesis, Uncertainty Principle, wave function and its properties, expectation value, Schrodinger Equation for free Particle, Particle in a box (1-D), Hydrogen Atom (Qualitative discussion).Qualitative Features of Maxwell Bollzman, Bose-Einstein and Fermi-Dirac statistics distribution, functions & their comparison (no derivation)				[10]
Module 5: LASER and Fibre Optics: LASER: Introduction, temporal and spatial coherence, principle of Laser, stimulated and spontaneous emission, Einstein’s Coefficients, Application of Lasers. Fibre Optics: Introduction, numerical aperture, step index and graded index fibres, attenuation & dispersion mechanism in optical fibres (Qualitative only), application of optical fibres.				[6]
Module 6: Solid State Physics: Formation of energy bands in metals, semiconductors and insulators, intrinsic and extrinsic semiconductors, Tunnel diode, Zener diode. Magnetization, permeability and susceptibility, classification of magnetic materials, ferromagnetism, magnetic domains and hysteresis, applications. Introduction to superconductivity (Qualitative discussion only).				[6]
Text Books:				
1	Arthur Beiser, S RaiChoudhury, ShobhitMahajan, (2009), Concept of Modern Physics, 6th Edition, Tata-McGraw Hill.			
2	V. Rajendran, Engineering Physics, Tata McGraw Hill, 1st Edition, 2010			
Reference Books:				
1	Hitendra K Malik, A. K. Singh, Engineering Physics, McGraw Hill, 1st Edition, 2009			
2	A J Dekker, Solid State Physics, Mcmillan India Ltd, 1st Ed. 2009			
Introduction to Programming		ECS41101	3-0-0	3 Credits
Module 1: Basics of C Programming : Characters used in C, Identifiers, Keywords, Data type & sizes, Constants &Variables, Various Operators used such as Arithmetic Operators, Relational & Logical Operators, Increment & Decrement Operators, Assignment Operators, Conditional or Ternary Operators, Bitwise Operators & Expressions; Standard Input & Output, formatted input scanf(), formatted output printf(); Flow of Control, if-else, switch-case, Loop Control Statements, for loop, while loop, do-while loop, nested loop, break, continue, goto, label and exit() function				[10]
Module 2: Functions and Pointers: Definition of Function, Declaration or Prototype of Function, Various types of Functions, Call by Value, Call by Reference, Recursion, Tail Recursion, Definition of				[8]

Pointer, Declaration of Pointer, Operators used in Pointer, Pointer Arithmetic, Functions with Pointer Introduction to Data Structures: Basic Terminology, Elementary Data Organization, Algorithm, Efficiency of an Algorithm, Time and Space Complexity, Asymptotic notations: Big-Oh, Time-Space trade-off. Abstract Data Types (ADT)	
Module 3: Arrays and String: Definition, Single and Multidimensional Arrays, Representation of Arrays - Row Major Order, and Column Major Order, Application of arrays – searching and sorting, Sparse Matrices and their representations. Definition of a String, Declaration of a String, Initialization of a String, Various String Handling Functions with example Structures and Unions: Definition of a Structure, Declaration of a Structure & Structure Variable, Initialization of a Structure, Operators used in Structure, Structure within Structures, Union, Difference between a Structure and an Union Files: Types of File, File Processing, Handling Characters, Handling Integers, Random File Accessing, Errors During File Processing	[9]
Module 4: Stacks and Queues: ADT Stack, Array Implementation Multiple Stacks, Applications of Stacks – Conversion from Infix to Postfix, Evaluation of Postfix Expressions, Prefix Notation, etc. ADT queue, Linear Queue, Circular Queue, Priority Queue, Array Implementations of Queues, Applications of Queues Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Array and linked implementation of queues in C, Dequeue and Priority Queue.	[8]
Module 5: Linked lists: Array Implementation and Dynamic Implementation of Singly Linked Lists, Doubly Linked List, Circularly Linked List, Operations on a Linked List. Insertion, Deletion, Traversal, Polynomial Representation and Addition, Generalized Linked List. Trees: Basic terminology, Binary Trees, Binary Tree Representation: Array Representation and Dynamic Representation, Complete Binary Tree, Algebraic Expressions, Extended Binary Trees, Array and Linked Representation of Binary trees, Tree Traversal algorithms: Inorder, Pre-order and Postorder, Threaded Binary trees, Traversing Threaded Binary trees, Huffman algorithm. Graphs: Terminology, Sequential and linked Representations of Graphs: Adjacency Matrices, Adjacency List, Adjacency Multi list, Graph Traversal: Depth First Search and Breadth First Search, Connected Component, Spanning Trees, Minimum Cost Spanning Trees: Prims and Kruskal algorithm. Transitive Closure and Shortest Path algorithm: Warshal Algorithm and Dijkstra Algorithm, Introduction to Activity Networks.	[10]

Text Books:
“Fundamentals of Data Structures”, Illustrated Edition by Ellis Horowitz, Sartaj Sahni and Computer Science Press.
Reference Books:
“Algorithms, Data Structures, and Problem Solving with C++”, Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
“How to Solve it by Computer”, 2 nd Impression by R. G. Dromey, Pearson Education

HSSM –I (English Communication-I)	HEN41117	3-0-0	3 Credits
Module 1: Communication Level 1: Basics of Communication, Means of Communication, Barriers of Communication			[8]
Module 2: Grammar and Syntax Level 1: Tense, Idioms, One Word Substitutes, Articles, Prepositions, Sentence-making, Voice Change, Synonyms and Antonyms			[8]
Module 3: Reading and Listening Skills Level 1: Active Listening, Types of Listening, Listening Exercises, Reading Exercises			[11]
Module 4: Speaking Skills Level 1: Introduction, Description, Narration, Extempore			[10]

Module 5: Writing Skills Level 1: Composition, Letter Writing—simple applications, Essay/ Paragraph writing (argumentative and descriptive)		[8]
Text Books:		
1	Spoken English and Functional Grammar. P. C. Das.	
2	Essential Grammar in Use. Raymond Murphy.	
Reference Books:		
1	A Practical Course in English Pronunciation. J Sethi, KamleshSadanand and D.V. Jindal.	
2	English for Technical Communication. NP Sudarshana and C Savitha.	

HSSM –II (Engineering Ethics, Values and the Laws)	HEN41119	3-0-0	3 Credits
Module 1: Ethics, morals and values : The meaning of ethics, morals and values, The relevance of ethics, morals and values in the promotion of scientific temper, Theories of right action, Kohlberg’s and Gilligan’s theory of moral development, Ethical theories and their applications			[9]
Module 2: Ethics in Engineering Practice and Research: Overview of engineering ethics, Rights and obligations in engineering, The NPSE, IEEE and ECI codes, Violation of codes and their consequences, Conflicts of interest, Whistle blowing, Whistle blowing cases			[9]
Module 3:			[10]

Sustainable Engineering and Sustainable Development: Meaning of sustainable engineering, Principles of sustainable engineering, Safety and risk assessment, Sustainable development, Sustainable engineering v. engineering negligence		
Module 4: Engineering Negligence: The elements of engineering negligence, The standard duty of care, Liability in negligence cases, Defenses, Negligence Cases (Engineering, medical and others)		[9]
Module 5: Rights and obligations of Engineers under Various Indian Laws: The Indian adjudatory system, Constitutional laws governing engineering professionals, Contractual obligations of engineers, Environment protection laws, Arbitration and conciliation laws, Intellectual property laws, Information technology laws		[8]
Text Books:		
1	AroraVibha, AroraKunwar, Laws for Engineers, Central Law Publications, 1 st Edition, 2017	
2	Fledderman Charles B., Engineering Ethics, Pearson Education Inc., 4 th Edition, 2012	
3	Govindarajan M., Natarajan S., Senthilkumar V. S., Engineering Ethics Includes Human Values, PHI Learning Private Limited, 1 st Edition, 2010	
Reference Books:		
1	Govindarajan M., Natarajan S., Senthilkumar V. S., Professional Ethics and Human Values, PHI Learning Private Limited, 1 st Edition, 2017	
2	Harris Charles E., Jr., Pritchard Michael S., Rabins Michael J., Engineering Ethics, Wadsworth Cengage Learning, 4 th Edition, 2009	

Engineering Physics Lab	SPH41209	0-0-3	2 Credits
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Experiments:

1. Determination of Young's Modulus of a Beam by travelling microscope by FLEXURE method.
2. Carry Foster's Method to Determine Resistance of a Given Coil.
3. Determination of the Coefficient of viscosity of water by Poiseuille's Capillary Flow method.
4. To determine the wavelength of sodium light by forming Newton's Ring.

5. Determination of Rigidity Modulus by dynamical method.
6. Determine the **Plank's constant** using photocell.
7. To verify **Stefan's law** by electrical method.
8. To study the **temperature** dependence of **reverse saturation current** in a junction diode and hence to determine the **Band gap**.
9. Determination of **specific charge(e/m)** of electron by J.J. Thomson's method.
10. Determination of the **Rydberg constant** by studying hydrogen or helium spectrum.
11. Determination of **dielectric constant** of a given dielectric material.
12. Determination of **Hall coefficient** of Semiconductor.
13. Study **current – voltage characteristic load response** of photovoltaic solar cells

Programming Lab	ECS41201	0-0-3	2 Credits
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Experiments:

1. Familiarization with LINUX commands and vi editor.
2. Programs to demonstrate Decision Making, Branching and Looping, Use of break and continue statement etc.
3. Implementation involving the use of Arrays with subscript, String operations and pointers.
4. Implementation involving the use Functions and Recursion.
5. Implementation involving the use Structures and Files.
6. Implementation based on Stack Queues and Linked List for example Insertion and Deletion.

Engineering Drawing and CAD	ECE41201	0-0-3	2 Credits
Module 1: Introduction to Engineering Drawing covering, Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;			[9]

Module 2: Orthographic Projections covering, Principles of Orthographic Projections Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes;		[9]
Module 3: Projections of Regular Solids covering, those inclined to both the Planes- Auxiliary Views;		[8]
Module 4: Sections and Sectional Views of Right Angular Solids covering, Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone;		[9]
Module 5: Isometric Projections covering, Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;		[10]
Text Books:		
1	Bhat, N.D.& M. Panchal (2008), Engineering Drawing, Charotar Publishing House	
2	Shah, M.B. & B.C. Rana (2008), Engineering Drawing and Computer Graphics, Pearson Education	
Reference Books:		
1	Dhawan, R.K. (2007), A Text Book of Engineering Drawing, S. Chand Publications	
2	Narayana, K.L. & P Kanniah (2008), Text book on Engineering Drawing, Scitech Publishers	

Communication and Collaboration Skill -I	EMC41201	0-0-2	1 Credit
Module 1: Introduction and self-assessment: The students are introduced to Emotional Intelligence and the need for it. Self-evaluation / assessment happen through a peer-peer / group activity.			[4]
Module 2:			[12]

Bollywood in action: The groups will form a team to make a movie. They will roles of director, producer, editor, actors, stuntmen etc. They learn to team up and communicate. A jury will be elected by the students. Each movie will be played. The jury will select the “AdOSCARS” winners. The winners are required to make the speech accepting the award.	
Module 3: Pages 3A, 3B, 3C, 3D Magazine / newspapersupplement and daily broadcasts : 3 to 4 groups will be formed who will publish a magazine selecting a specific theme. They will take multiple roles in this game. Every class, the groups will do news broadcast on their chosen theme. Video recording will be done, with follow up discussion on body language, tone etc.	[12]

Text Books:	
1	None.
Reference Books:	
1	Stephen R Covey, Seven Habits of Highly Effective People, Free Press, 1989
2	Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, 1998
3	Thomas A Harris, I am ok, You are ok, New York-Harper and Row, 1972
4	Daniel Coleman, Emotional Intelligence, Bantam Book, 2006
5	Innovation and Entrepreneurship (1985) by Peter F. Drucker.

SEMESTER – II

Engineering Mathematics– II	SMA41102	3-1-0	4 Credits
Module 1: Linear Algebra: Elementary row and column operations on a matrix; Rank of matrix , Normal form, Inverse of a matrix using elementary operations, Consistency and solutions of systems of linear equations using elementary operations, Gauss Elimination method, Caley-Hamilton theorem, Eigen values and Eigen vectors, Symmetric and skew-symmetric matrices, orthogonal matrices, complex matrices, Hermitian and skew-Hermitian matrices, unitary matrices and similarity of matrices, Unitary matrix, Normal matrix, Algebraic and geometric multiplicity, Diagonalization, spectral theorem for Real symmetric matrices, Application of quadratic forms.			[12]
Module 2: Vector space and Linear transformations: Definition of vector space, subspaces, linear combination, Linearly dependent and linearly independent vectors, Basis of vector space, Dimension, Rank-Nullity theorem (statement and verification by examples), Definition of linear transformation, types of linear transformations (Rotation, Reflection, Expansion, Contraction, Projection), Matrix of Linear transformations, Change of basis and similarity.			[12]
Module 3: Functions Of Complex Variables: Reorientation, Analytic function, Cauchy – Riemann equation (Cartesian and Polar forms), Harmonic functions, conformal mappings, complex integration, Cauchy's theorem and integral formula, Singularities, Taylor's and Laurent's Series theorem, evaluation of integrals using residues.			[12]
Module4: Partial Differential Equation: Introduction, classification, construction and geometrical interpretation of first order partial differential equations (PDE), method of characteristic and general solution of first order PDE, canonical form of first order PDE, equations solvable by direct integration,.			[12]
Module 5: Langrange's method, solution of non-linear first order partial differential equation by Charpit's method, special types of first order PDE, solution satisfying given conditions, Jacobi's method			[12]

Text Books:
ErwynKreyszig : Advanced Engineering Mathematics, John Wiley and Sons
Higher Engineering Mathematics by B.V. Ramana, Tata McGraw-Hill.
Reference Books:
E. Kreyszig, Advanced engineering mathematics (Latest edition), John Wiley.
H. Anton, Elementary linear algebra with applications (Latest edition), John Wiley.

Engineering Chemistry	SCY41106	3-0-0	3 Credits
Module 1: Thermodynamics: Importance and scope, definition of system and surroundings: type of systems (isolated, closed and open); extensive and intensive properties; steady state versus equilibrium state; concept of thermal equilibrium and the zeroth law of thermodynamics; thermodynamic coordinates, state of a system, equation of state, state functions and path functions; partial derivatives and cyclic rule; concept of heat and work (IUPAC convention); graphical explanation of work done during expansion and compression of a ideal gas; reversible and irreversible processes and work done; first law of thermodynamics, internal energy (U) as a state function; enthalpy as a state function; energy conservation in the living organism; heat changes at constant volume and constant pressure; relation between C_p and C_v using ideal gas; Thermodynamics of Chemical Processes, Concept of entropy, 2 nd law of thermodynamics, Idea of Chemical potential, Equilibrium conditions for closed systems, Phase and reaction equilibrium, Maxwell relations.			[12]
Module 2: Reaction Dynamics, Catalysis & Electrochemistry: Rate laws, 1 st Order reaction & 2 nd order reaction, Arrhenius equation, Mechanism and Theories of reaction rates, kinetic and thermodynamic control of reaction; idea of rate determining step; steady-state approximation; Characteristics and types of Catalyst, Theories of Catalysis, Electrode potential, Redox reaction & Nernst Equation.			[8]
Module 3: Solid State and Molecular spectroscopy: Homo nuclear and Hetero nuclear concepts, Non – covalent interaction, Van der waals bonding, hydrogen bonding, Idea of spatial periodicity of lattice, Unit cells, Bravais lattice, Atomic packing factor of SCC, BCC and FCC, Band theory, Conductors Semiconductors and insulators. Basic concepts of spectroscopy, selection rule, fundamentals of IR, UV-Vis, NMR spectroscopy			[8]
Module 4: Co-Ordination Chemistry: Transition elements, Werner's co-ordination theory, Structure of Co-ordination Compounds corresponding to Co-ordination number 2 to 6, Types of ligands, Isomerism & its types viz. Geometrical, Optical, Ionization, linkage & Co-ordination isomerism, Theories of bonding in Co-ordination compounds viz. crystal field theory and valence bond theory.			[8]
Module 5: Reactivity of Organic Molecules, Types of Reactions and Stereochemistry: Inductive effect, Resonance, Hyper conjugation, Electromeric effect, Carbocation, carbanion & free radicals, Substitution reactions, Elimination reactions, Addition reactions, & their Mechanisms. Introduction to stereochemistry, stereo chemical nomenclature & terminology (chiral carbons, allenes, biphenyls, etc.) and nomenclature (R/S, E/Z, D/L, d/l). Identification of stereo chemical relationship (enantiomers, diastereomers, epimers, etc.). Polymers & Fuel Chemistry: Polymerization, Mechanism of Addition polymerization, Classification of plastics, Preparation properties & industrial applications of PTFE, PVC, Phenolic resin & Polyester resin, Conducting polymers & Biopolymers. Solid Fuel: Coal, Classification of coal, Coal analysis. Liquid fuel: Petroleum, classification of petroleum, Thermal cracking, Octane number, Cetane number, Aviation Fuel Bio-diesel. Gaseous fuels: Natural gas, water gas, bio gas.			[11]

Text Books:	
1	P. W. Atkins, Physical Chemistry, ELBS/Oxford, 7th Edition, 1995
2	P. C. Rakshit, Physical Chemistry, Sarat Book House (7 th Edition)
3	Kuriacose & Raja Ram, Chemistry in Engineering and Technology, Vol.1 & 2 by, Tata McGraw Hill & Co.
4	Morrison & Boyd, Organic Chemistry
Reference Books:	
1	G.W.Castellan, Physical Chemistry
2	P. C. Rakshit, Physical Chemistry, Sarat Book House (7 th Edition)
3	D. A. McQuarrie and J.D. Simon, Physical Chemistry - a molecular approach, Viva Books Pvt. Ltd. (1998)
4	Cotton, F A, Wikinson G. and Gaus, P L, Basic Inorganic Chemistry
5	J. D. Lee, Concise Inorganic Chemistry, 4th Edition, ELBS, 1991
6	I.L. Finar, Organic Chemistry, Vol – I & II, Pearson Education
7	P. Sykes, Mechanism in Organic Chemistry, Orient Longman
8	Joel R. Fried, Polymer Science and Technology, Pearson Education (2 nd Edition)
9	S. Sarkar, Fuels and Combustion, Taylor & Francis (3 rd Edition), 2009

Electrical and Electronics Technology	EEE4110 2	3-0-0	3 Credits
Module 1: D.C.Circuit Analysis and Network Theorems: Concept of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, R, L and C as linear elements, source transformation, Kirchoff's Law, mesh analysis and nodal analysis, star-delta transformation, network theorems: Thevenin's theorem, Norton's theorem, maximum power transfer theorem, network analysis with dependent sources.			[10]

Module 2: Steady State Analysis of Single Phase A.C. Circuits: Sinusoidal, square and triangular waveforms-average and effective value, form the peak factors, concept of phasor, phasor representation of sinusoidal voltage and current, analysis of series-parallel RLC circuits. Apparent, active and reactive powers, power factor, causes and problems of low power factor, power factor improvement, resonance in series and parallel circuits, bandwidth and quality factors.	[10]
Module 3: Three Phase A. C. Circuits: Its necessity and advantages, meaning of phase sequence, star and delta connections, balanced supply and balanced load, line and phase voltage/current relation, three phase power measurements, two wattmeter method.	[06]
Module 4: Basics of Semiconductors and PN Junction: Introduction; Carrier Concentrations- the Fermi Level; Electron and Hole Concentration at Equilibrium; Temperature Dependence of Carrier Concentration; Drift and diffusion current; The Hall Effect; Optical Absorption, Luminescence; PN Junction Diode in Equilibrium Conditions; PN Junction Diode in Forward Biased and Reverse Biased Condition; Breakdown in PN Junction Diodes. Introduction, Types: NPN and PNP; Current Components; Early Effect Ebers Moll Model; Different Configurations of a Transistor and its Characteristics; Transistor as an Amplifier (CE, CB, CC); Transistor as a Switch.	[10]
Module 5: Bipolar Junction Transistor: Introduction; JFET and MOSFET; Realization of digital logic circuit using MOSFET (AND, OR, NOT etc.); Realization of switching circuits using MOSFET. Electronics Instruments & Digital Electronics Fundamental: Signal generator, Multimeter, operation of CRO and its application. Number systems, Conversions and codes, Logic gates and truth tables.	[09]

Text Books:	
1	V. N. Mittal and A. Mittal, Basic Electrical Engineering, Tata McGraw-Hill Publishing Company Ltd, 2006.
2	E. Hughes, Electrical and Electronic Technology, 10th Ed., Pearson, 2011.
3	C. K. Alexander and Matthew N. O. Sadiku, Fundamentals of Electric Circuits, 6th Ed., McGraw Hill Education, 2019.
Reference Books:	
1	Basic Electrical Engineering-D P Kothari, I J Nagrath, Tata McGraw-Hill Publishing Company, New Delhi
2	Integrated Electronics: Analog & Digital Circuit Systems – Jacob Millman & Halkias, TMH
3	Digital Principles & Applications, 8th Edition by Donald P Leach, Albert Paul Malvino, Goutam Saha (Tata McGraw Hill Publishing Co Ltd, 2014)

Life Sciences	SBT41108	3-0-0	3 Credits
Module 1: Basic cell biology: Introduction; Living Organisms; Cells and Cell theory, Cell Structure and Function, Genetic information, protein synthesis, and protein structure, Cell metabolism; Cell growth, reproduction, and differentiation; Cell division, cell cycle and apoptosis; ATP synthesis and Glycolysis; Respiration and photosynthesis.			[08]
Module 2: Biochemistry and transport process: Chemistry of life: chemical bonds; Non-covalent interactions and free energy changes in biological processes; Fundamentals of			[08]

momentum, heat and mass transport as applied to biological systems; Human body as a thermodynamic system; Blood Rheology, Fluid mechanical aspects of some diseases and organs; Biochemistry and Human biology; Stem cells and Tissue engineering.	
Module 3: Chemical biology: Carbohydrates; Lipids; Proteins: structure and sequencing; DNA: structure and sequence, replication, recombination; RNA synthesis; Genetic code and protein biosynthesis; Recombinant DNA technology.	[04]
Module 4: Enzymes and industrial applications: Enzymes: mechanism, kinetics and inhibition; Biological catalysts, Proteases, Carbonic anhydrase, Restriction enzymes, and Nucleoside monophosphate kinases.	[04]
Module 5: Fermentation technology and applications: Introduction and scope of microbial processes. Sources of industrial cultures and maintenance. Alcoholic fermentation: Production of Industrial Alcohol. Brewing and malting, manufacture of wine and other distilled liquors. Microbial Foods – Food, Fodder and Baker's yeast, applications of the nonconventional raw materials; Nutritional characteristics of food yeast, mushroom production; Vitamins- Vitamin B-2, Riboflavin, Soya-sauce & cheese production. Production of acids, viz., citric, lactic and gluconic acid. Mechanism of each fermentation, their uses. Production of Amino acids and Antibiotics and its new Developments. Production of Organic Acids its spoilage and prevention.	[10]
Module 6: Mechanochemistry: Molecular Machines/Motors; Cytoskeleton; Biosensors; Bio-Micro devices.	[02]
Module 7: Human physiology: Physiology of cells and molecules; cellular physiology of the nervous system; cardiovascular and respiratory systems; gastrointestinal and renal systems; endocrine and reproductive systems. Immune system and cell signalling: Immune system; General principles of cell signalling.	[07]
Module 8: Impact of biology on society and mankind Crop management, Disease control, Biological Hazards and safety; Unsolved Problems in Biology.	[02]

Text Books:	
1	S. ThyagaRajan, N. Selvamurugan, M. P. Rajesh, R. A. Nazeer, Richard W. Thilagaraj, S. Barathi, and M. K. Jaganathan, "Biology for Engineers," Tata McGraw-Hill, New Delhi, 2012.
2	Biology for Engineers. Arthur T. Johnson. 2010 by CRC Pres. ISBN 9781420077636

Engineering Mechanics	EME41104	3-0-0	3 Credits	Contact Hours
Module 1: Basics of Statics and Concurrent Forces Statics of Particles: Force System: Force, classification & representation, force as a vector, composition and resolution of forces, principle of superposition and transmissibility of forces. Statics of Rigid bodies: Equilibrium of coplanar force system, free body diagrams, determination of reactions, equilibrium of a body under three forces, Lami's theorem.				[11]

Moment of a force about a point and an axis, moment of coplanar force system, Varignon's theorem.	
Module 2: Parallel and Distributed Forces Parallel forces in a plane, Distributed Parallel forces in a plane, couple, resolution of a force into a force and a couple, moment of a couple. Centroid and Moment of Inertia: Determination of centre of gravity, centre of mass and centroid by direct integration and by the method of composite bodies, area moment of inertia of composite plane figures and mass moment of inertia, radius of gyration, parallel axis theorem, Pappus theorems, polar moment of inertia.	[11]
Module 3: Friction Introduction to wet and dry friction, laws of dry friction, cone of friction, block friction, ladder friction, wedge friction, application of friction in machines.	[6]
Module 4: Virtual Work Virtual displacement, principle of virtual work.	[4]
Module 5: Introduction to Dynamics Laws of motion, Projectile motion, D'Alembert's Principle, Work and energy, impulse and momentum, impact of bodies.	[8]
Text Books: 1. Engineering Mechanics [Vol-I & II] by Meriam&Kraige, 5th ed. – Wiley India 2. Engineering Mechanics by S.S. Bhavikatti and K.G. Rajashekarappa – New Age International 3. Mechanics of Solids by Crandall,Dahl and Sivakumar-MC Graw Hill ,5 th Edition 2015,New Delhi	
Reference Books: 1. Engineering Mechanics: Statics & Dynamics by I.H.Shames, 4th ed. – PHI 2. Engineering Mechanics by Timoshenko , Young and Rao, Revised 4th ed. – TMH	

HSSM– III(Professional Communication in English)	HEN41212	3-0-0	3 Credits
Module 1: Communication Level 2: Theories of Communication,Symbolic Interaction Theory, Social Penetration Theory, InterPersonal, IntraPersonal, Group Communication, Mass Communication, Verbal Communication, Non-verbal Communication, Models of Communication,			[09]

Module 2: Grammar and Syntax: Level 2: Kinds of sentences, Phrases and Clauses, Conjunctions, Participles, Degrees of comparison, Subject-verb agreement, Narration, Types of Narration,	[09]
Module 3: Reading and Listening skills Level 2: Types of reading, Scheming , Scanning, Pronunciation skills, Mother Tongue Influence, Barriers to effective listening, Types of Barriers, Reading exercises, Listening Exercises,	[09]
Module 4: Speaking skills: Group Discussion, Types of roles in a group, Role play, Dialogues, Performance, Small skits, Interview preparation, Interview etiquette, Mock interviews,	[09]
Module 4: Writing Skills: Email, Types of Emails, Replies to Emails, Types of Memo, Notice, Minutes, Letter writing, Types of Letter, Replies to Letter.	[09]

Text Books:	
1	Business Communication Today. Bovee, Thill, Schwartzman, Pearson Education
Reference Books:	
1	Spoken and Written Communication. Board of Editors. Orient Blackswan
2	M. S Gupta. Current English Grammar and Usage. Prentice Hall India Learning Private Limited; 2016
3	P. C. Das. Spoken English and Functional Grammar.
4	Sangeeta Sharma and Binod Mishra. Communication skills for Engineers and Scientists. Prentice Hall India Learning Private Limited, 2009

Engineering Chemistry Lab	SCY41206	0-0-3	2 Credits
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Experiments:

1. Determination of total hardness of water by complexometric titration method

2. Determination of carbonate and bicarbonate in water
3. Estimation of iron by permanganometry
4. Estimation of ferrous ion in Mohr salt
5. Dissolved oxygen by Winkler's method
6. Measurement of the coefficient of viscosity
7. Measurement of the surface tension
8. Kinetics of ester hydrolysis
9. pH metric titration
10. Conductometric titration
11. Determination of standard EMF of a Daniel Cell
12. Verification of Beer Lambert's law
13. Partition coefficient of iodine
14. Identification of organic Compounds using melting point
15. Solubility, functional group test of organic compounds

Electrical and Electronics Technology Lab	EEE41202	0-0-3	2 Credits
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Experiments:

1. Familiarization of bread board and electronics elements such as R, L, C, diode, and BJT etc.
2. Familiarization of Function generator and measuring instruments such as CRO and multimeter.
3. Study the V-I characteristic of PN junction diode and find knee voltage.
4. Study the input and output characteristic of bipolar junction transistor (BJT):
 - (a) Common emitter (CE) configuration
5. Study the transfer and drain characteristic of junction field-effect transistor (JFET), hence determine the drain resistance, transconductance factor, amplification factor.
6. Study the transfer and drain characteristic of MOSFET, Determine the drain resistance, transconductance factor & amplification factor.
7. Realization of digital logic circuit using MOSFET (AND, OR, NOT etc.).

Engineering Workshop	EME41204	0-0-3	2 Credits
List of Experiments (Any ten)			

1	To make a single piece pattern from the given work piece and dimensions.
2	To make a double piece match pattern from the given dimensions.
3	To make a single piece cylindrical (solid) pattern from the given dimensions.
4	To make a cone from sheet metal as per given dimensions.
5	To make a frustum from sheet metal as per given dimensions.
6	To prepare a sand mould, given the single piece pattern and casting.
7	To prepare a sand mould, given the double piece match pattern and casting with different dimensions and shape
8	To make a square fitting from the given mild steel piece and the dimensions.
9	To make a square fitting from the given mild steel piece and the dimensions.
10	To make a single 'V' butt joint between two metal plates by using ARC welding.
11	To make a square butt joint between metal plates by using gas welding.
12	To perform various types of machining operations (cantering, facing and turning) on a given mild steel rod followed by the given dimensions.
13	To perform various types of machining operations (chamfering, grooving, thread cutting, and knurling) on a given mild steel rod followed by the given dimensions.
Reference Book: Workshop Technology by S.K.Garg, 3rd Edition, LP	

Communication and Collaboration Skill –II	EMC41202	0-0-2	1 Credit
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Module 1: ADA-TEDx sessions: Individuals will be chosen + volunteers who will do ADA-TEDX talks on chosen subject of interest – current affairs / latest trends / technology / engineering / specific company. Voting for the best speaker. Group will present why they liked a specific speaker. Students will learn how to prepare, create impact and public speaking.	[8]
Module 2: Debate sessions: The groups will be given debate topics. They will be required to prepare. Everyone gets to speak on the topic for / against. Audience gets to vote for winners.	[12]
Module 3: Drama or stand-up comedy sessions: Drama / Stand-up comedy topics will be chosen by students, they can pick from any source – movies, books etc. Everyone in the groups must have a role to play/act. The audience gets to vote for winners.	[8]

Reference Books:	
1	Stephen R Covey, Seven Habits of Highly Effective People, Free Press, 1989
2	Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, 1998
3	Thomas A Harris, I am ok, You are ok, New York-Harper and Row, 1972
4	Daniel Coleman, Emotional Intelligence, Bantam Book, 2006
5	Innovation and Entrepreneurship (1985) by Peter F. Drucker.

ADAMAS UNIVERSITY
B. Tech Civil Engineering
SEMESTER – III

Engineering Mathematics III	SMA42109	L: T: P-3-1-0	4 Credits	Contact Hours
Module 1: Laplace Transform: Definition, Linearity, shifting & scaling properties, Transform of elementary functions, Transform of derivatives and integrals, Multiplication by t & division by t. Inverse Laplace transform, Convolution theorem, Transform of periodic functions, Unit step function, Dirac delta function, Initial value & final value theorems and its application to solution of ordinary differential equations.				[15]
Module 2: Partial Differential Equation: Introduction, classification, construction of first order partial differential equations (PDE), method of characteristic and general solution of first order PDE, canonical form of first order PDE, equations solvable by direct integration, Langrange's method, solution of non-linear first order partial differential equation by Charpit's method. Linear second order homogeneous and non-homogeneous PDE with constant coefficients, method of finding the complementary function and particular integral for homogeneous and non-homogeneous PDE, solution of heat conduction, wave equation and Laplace equation				[18]
Module 3: Probability: Review of concepts of probability. Random variable, discrete and continuous probability distribution, joint probability distribution, mathematical expectation, variance and co-variance of random variables, mean and co-variance of linear combination of random variables, Binomial, Hyper-geometric, Geometric, Poisson, Negative binomial distributions, Uniform, Exponential, Normal, Distribution, its applications in engineering.				[14]
Module 4: Statistics: measures of central tendency, measures of dispersion, Scatter diagram, Karl-Pearson's correlation, concurrent deviation method, rank correlation, regression lines, regression coefficients, properties of regression coefficients. Hypothesis Testing Definition, one and two tailed test, critical region, test statistics, type-I and type-II error, test on a single mean when variance is known and variance is unknown, test on two means, test on a single mean population and test on two populations, one and two sample test for variance.				[13]
Text Book				
1	Higher Engineering Mathematics, B V Ramana, Tata McGraw Hill			
2	Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers.			
3	Advanced Engineering Mathematics, ErwynKreyszig, John Wiley and Sons			
Reference Books:				
1	Sancheti, S.C. & V.K. Kapoor, Statistical Methods			
2	Ellhans, D.N., Fundamentals of Statistics			

Engineering Geology	ECE42101	L:T:P-: 3-0-0	3 Credits	Contact Hours
Module 1: Physical Geology: Geology and its importance in Civil Engineering: Earth as a planet – its internal structure and composition. Mineralogy: Physical properties of minerals Classification, description, chemical, composition, mode of occurrence and uses of the following group of minerals (I) Quartz group (ii) Feldspar group (iii) Mica group (iv) Carbonate group v) Amphibole group (iv) Pyroxene group Classification of rocks: Igneous rocks: Origin, mode of occurrence, forms & texture, classification and engineering importance; Sedimentary rocks: Process of sedimentation, classification and engineering importance; Metamorphic rocks: Agents and types of metamorphism, classification and engineering importance.				[10]
Module 2: Weathering of rocks: Agents and kinds of weathering. Soil formation, soil profile, classification of soils, soil Erosion and soil conservation. Measures, coastal erosion and protective measures. Geological work of rivers: origin and stages in the system. Erosion, transportation, Deposition, Floods and flood management measures with Indian Examples.				[8]
Module 3 : Natural Hazards: Earthquakes and seismic hazards: Causes and effects, seismic waves and seismographs, Mercalli's intensity scale and Richter's scale of magnitude. Distribution of Earthquakes in the world and India with examples. Earthquake resistant structures. Tsunami: Physical Characteristics of Tsunami, Causes and effects, Necessary Preventive Measures, Development and implementation of numerical model simulations at regional and local scales Land Slide: Introduction, Landslide nomenclature & processes, Inherent & external processes for landslide phenomena, Landslide susceptibility & vulnerability assessment, Geo-investigation & failure mechanism, Real time landslide monitoring for early warning system, Landslide control measures: types & design Remote sensing: Introduction to remote sensing, aerial photographs and satellite imagery. Advantages and limitations of remote sensing. Interpretation of satellite data. Applications of remote sensing in Civil Engg.				[10]
Module 4 : Rocks as construction materials: Qualities required for building and ornamental stones, foundations, concrete aggregate, railway ballast, road metal, pavement, flooring and roofing. Geophysical exploration: Methods of Geophysical Exploration, electrical resistivity method field procedure – sounding and profiling, electrode configuration, and interpretation of resistivity data, Geophysical surveys in Civil Engg. Projects.				[8]
Module 5: Applied Geology: Geological studies of Dams and reservoir sites, Geological studies for selection of tunnels and underground excavations. Structural geology: Stratification, Dip and strike, compass clinometers. Definition, description, classification of folds, faults, joints and unconformities, and their recognition in the field. Importance of geological structures in Civil Engg.				[9]

Text Books:

1	Engineering and General Geology by Parbin Singh, Fourth edition. Katson publishing house Delhi 1987.
2	A text book of Geology by Mukherjee P.K. Eleventh revised edition. The World Press Private Limited, Calcutta – 1990.
3	Engineering Geology for Civil Engineers D. Venkat Reddy, Oxford, IBH,

Reference Books:

1	Tyrell : Principles of petrology, 1972, Asia, Bombay.
2	Marland P. Billings : Structural Geology, fourth edition, 1975, Wiley eastern Prentice-Hall, U.S.A. 1972.
3	Remote Sensing Principles and Interpretation – Floyd F. Sabins, H. Freeman and Co.
4	https://nptel.ac.in/courses/105105106/

HSSM –IV (Economics for Engineers)		L: T: P-3-0-0	3 Credits	Contact Hours
Module 1: Basic Concepts of Economics: Introduction to The Literature of Microeconomics centering around Decision Making at Individual Level, Some Fundamental Concepts: Maximization, Equilibrium, and Efficiency				[05]
Module 2: Theories of Economics: The Theory of Consumer Choice and Demand, The Theory of Supply, Market Equilibrium, Market Structure, Market Failure and Environmental Issues, Game Theory, Concept of Yield and Theories of Term Structure, The Theory of Asset Pricing, Decision-Making under Uncertainty: Risk and Insurance				[12]
Module 3:				[10]

Sustainability Study of a Project: Budget plan, Estimation of the project cost, Prices, fees and cost recovery, Financing of recurrent costs, Sustainability of the activities generated by the project	
Module 4: Economic Feasibility Study: Problem of Pricing under Oligopoly, Problem of Market Stagnation, Problem of Volatility in Open Economy, Problem of Global Meltdown, Problem of Financing a Project	[12]
Module 5: Project Report: Facets of Project Viability – Commercial, Technical, Financial, Outline of a Model Project Report, A Real Life Case Study	[6]

Text Books:	
1	Engineering Economy, Leland Blank and Anthony Tarquin, McGraw-Hill, New York, 7 th Edition
2	How to Make Cash Flow Projections, Tim Spilker, https://www.tgci.com/sites/default/files/pdf/How%20to%20Make%20Cash%20Flow%20Projections_0.pdf
3	Esty, Benjamin C., Modern Project Finance: A Casebook, John Wiley & Sons, Inc., (New York, NY). 2003
Reference Books:	
1	Gregory Mankiw, Principles of Economics, South-Western College, 6 th Edition
2	“Economics for Engineers”, H.L.Bhatia& S.N. Maheshwari, Vikas Publishing House

Building Planning and Material	ECE42103	L: T: P-3-0-0	3 Credits	Contact Hours
Module 1: Building Planning: Introduction, site selection, orientation, factors affecting orientation, orientation criteria for Indian conditions, points of obtaining optimum orientation. Principles of planning the building, thickness of walls according to building bye-laws, requirements of parts of buildings, lighting and ventilation requirements of various rooms, distance from electric lines, plinth area regulation in plot.				[10]
Module 2:				[10]

Open air spaces, projections into open spaces, open spaces for ROW housing, Classification of building, covered area limitations. submission of drawings and plans for issue of permission for construction, guide for the qualifications of registered architects, engineers and licensed supervisors. Format of first application to erect, re-erect or to make alterations in any place in building, form of architectural supervision, form of notice for commencement of work, form of completion certificate, form of occupancy certificate.	
Module 3: KMC Building Rules: Preliminary definitions, prohibition of erection of building without building permit, procedure for sanction, execution of work, municipal building committee, area and height limitations, provisions for more than one building in a plot, provisions for building in government approved schemes, requirements of parts of buildings, fire protections and exit requirements.	[10]
Module 4: Bricks: Classification, Characteristics of good bricks, Ingredients of good brick earth, Harmful substance in brick Earth, Different forms of bricks, Testing of bricks as per BIS, Defects of bricks. Stone: Definitions, classification, sources, uses, dressing of stones and tools required for stone work, stone quarrying, common building stones, qualities of good building stone.	[7]
Module 5: Lime: Classification, manufacture, slaking, manufacture of hydraulic lime, use of lime, precautions during handling of lime, difference of slaking of fat lime and hydraulic lime. Cement: Composition, setting action, manufacture, varieties, storage. Wood and Wood Products: Classification of Timber, Characteristics of good timber, Seasoning of timber, Defects in Timber, Diseases of timber, Decay of Timber, Preservation of Timber, Testing of Timber, Veneers, Plywood, Fiber Boards, Particle Boards, Chip Boards, Black Boards, Button Board and Laminated Boards, Applications of wood and wood products, Paints, Enamels and Varnishes.	[8]

Text Books:	
1	Building construction and Materials (SI Units), Gurcharan Singh, 12th edition, Standard book house, Rajsons Publications Pvt. Ltd.
2	The Kolkata Municipal Corporation Building Rules (2016), L.N.Datta, 2009.
3	Building Construction, S.C. Rangwala, K.S. Rangwala, P.S. Rangwala, 17th edition, Charotar Publishing House.
Reference Books:	
1	Jha and Sinha, Construction and foundation Engineering, Khanna Publishers
2	Building Materials, P.C Varghese, PHI Publishers.
3	https://nptel.ac.in/courses/105102088/

Fluid Mechanics and Hydraulic Machinery	ECE42105	L:T:P-3-0-0	3 Credits	Contact Hours
Module 1: Introduction: Fluid Property, Viscosity, surface tension & capillarity, Pressure and its measurement: Pascal's Law, different type of pressure- Absolute, Gauge, Atmospheric and Vacuum, Pressure measuring Instrument Buoyancy and Flotation: Buoyancy, Meta-center and Meta-centric height, Conditions of equilibrium of floating body				[9]

Module 2: Hydrostatics Forces on Surfaces: Determination of Total pressure and center of pressure on vertical plane surface and inclined plane surface submerged in liquid, forces on curved surface submerged in liquid, Kinematics of Flow: Types of fluid flow, Continuity equation, Velocity potential function and Stream function Dynamics of Fluid Flow: Euler's and Bernoulli's equation of motion, Flow through orifice and mouthpieces, Practical application of Bernoulli's equation- Venturimeter, orificemeter & pitot tube. Notches and Weirs: Classification of notches and weir, Discharge through different types of notches and weirs	[9]
Module 3: Viscous Flow: Flow of viscous liquid through circular pipe and between two parallel plates, kinetic and momentum correction factors, loss of head due to friction in viscous flow Turbulent Flow: Friction loss in turbulent flow through pipe, shear stress & velocity distribution in turbulent flow, hydrodynamically smooth and rough boundaries Flow through Pipes: Major and minor losses in pipe and H.G.L & T.E.L line, Pipe Networks, Water Hammer	[9]
Module 4: Dimensional and Model Analysis: Rayleigh's Method and Buckingham's π Theorem, Dimensionless numbers and Model analysis. Flow in Open Channels: Discharge through open channel by Chezy's formula, Most Economical sections for channels, Non-uniform flow through open channels- specific energy and Condition of maximum discharge for a given value of specific energy, Hydraulic jump, gradually varied flow Impact of jets and jets propulsion: Drawing of velocity triangle, Force exerted by the jet on stationary and moving plate	[9]
Module 5: Hydraulic Machines: Turbines- Working principle of-Pelton Turbine, Francis Turbine & Kaplan Turbine, Draft Tube, Specific speed, Characteristics curves of turbines Pumps: Centrifugal pumps, performance characteristic graph – design flow rate, Working principles of positive displacement pumps, Reciprocating and Vane pumps, Hydraulic Ram.	[9]

Text Books:	
1	Fluid Mechanics Modi & Seth Standard Book House, New Delhi
2	Fluid Mechanics A.K.Jain Khanna Publishers, New Delhi
3	Fluid Mechanics & Machinery H. M. Raghunath CBS Publishers, New Delhi
Reference Books:	
1	Fluid Mechanics, Hydraulics and Fluid Machines S. Ramamrutham Dhanpat Rai
2	https://nptel.ac.in/courses/105101082/

Structural Mechanics-I	ECE42107	L:T:P-3-0-0	3 Credits	Contact Hours
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Module 1: Simple Stress & Strain: Types of external loads, normal and shear stresses & strain, Hooke's law, Poisson's ratio, relationship between elastic constants, working stress, stress-strain diagrams, elongation of bars of constant and varying sections, statically indeterminate problems in tension and compression, Temperature and Pre-strain effects. Analysis of stress and strain on oblique sections: Stress on inclined planes for axial and biaxial stress fields, principal stress & strain, Mohr's circle of stress.	[9]
Module 2: Bending Moment & Shear force: Different types of beams, various types of loading, Relationship connecting intensity of loading, shearing force and bending moment, shear force diagrams for cantilever beams, bending moment diagrams for cantilever beams, shear force diagrams for Simply supported beams, bending moment diagrams for Simply supported beams, shear force diagrams for Overhanging beams, bending moment diagrams for Overhanging beam.	[9]
Module 3: Stresses in Beam: Theory of simple bending, assumptions and limitations, Normal stresses in beams, Stresses in non-prismatic beams, moment of resistance, beams of uniform strength, beams of two materials, strain energy due to bending, shearing stresses in beams, Unsymmetrical bending and shear centre, Doubly symmetric beams with skew loads, pure bending of unsymmetrical beams, Generalized theory of pure bending, shear centre of thin walled open cross sections.	[9]
Module 4: Theory of columns: Direct and bending stresses in short columns, Kern of a section, Buckling and stability, Euler's buckling/crippling load for columns with different end conditions, Rankine's formula, Eccentric loads and the Secant formula, Imperfections in columns. Torsion: Torsion of solid and hollow circular shafts, Pure shear, strain energy in pure shear and torsion, Close coiled helical springs, open coiled helical springs.	[9]
Module 5: Thin and Thick Cylinders: Stresses in thin cylinders, thick cylinders, Lamé's equation, stresses in thick cylinders due to internal and external pressures, Wire wound pipes and cylinders, compound Cylinders, shrink fit. Deflection of beams: Differential equation of the elastic curve, Method of successive integration, Macaulay's method.	[9]

Text Books:	
1	Elements of Strength of Material S. P. Timoshenko & D. H. Young EWP Pvt. Ltd
2	Engineering Mechanics of Solids E. P. Popov Pearson Education
3	Strength of Materials R. Subramanian OXFORD University Press
Reference Books:	
1	"Basic Structural Analysis", C.S.Reddy, Mc Graw Hill Education
2	https://nptel.ac.in/courses/105105166/

Fluid Mechanics Lab	ECE42201	L:T:P-0-0-3	Credit: 2
EXP. NO. 02	Calibration of Orifice meter		
EXP. NO. 03	Calibration of V- Notch		
EXP. NO. 04	Measurement of water surface profile for flow over Broad crested weir		
EXP. NO. 05	Measurement of water surface profile for a hydraulic jump		
EXP. NO. 06	Determination of efficiency of a Centrifugal pump		
EXP. NO. 07	Determination of efficiency of a Reciprocating pump		
EXP. NO. 08	Determination of efficiency of a Pelton wheel Turbine		
EXP. NO. 09	Determination of efficiency of a Francis Turbine		
EXP. NO. 10	Determination of efficiency of a Hydraulic Ram		

Design Thinking-I	DGS11001	L: T: P-0-0-3	2 Credits	Contact Hours
Module 1: Why Design Thinking and The Design Process provides context and an introduction to key concepts, terminology, and structure for the course. Scoping, The Design Brief and Visualization introduces ways to clarify the scope of a project and its intent, questions to explore, target stakeholders, and establishes the importance of pictures and storytelling in the overall process				[6]
Module 2: Fundamentals of Ethnography and Identifying Insights review how to observe users in their “natural habitat” and efficiently extract useful patterns from collected data. Establishing Design Criteria and Brainstorming shows how to develop a succinct expression of the ideal end state of a project, and deliberately generate many fresh alternatives to the status quo				[8]
Module 3: Concept Development and The Napkin Pitch details how to choose the best ideas, assemble them into detailed solutions, and rationally evaluate them, as well introduce a simple, consistent format for summarizing and communicating new concepts				[6]
Module 4: Assumptions Testing and Prototyping introduces a tool for surfacing key assumptions underlying the attractiveness of a new concept and using data to assess the likelihood that they are true, as well as ways to create visual manifestations of concepts				[5]
Module 5: Co-Creation, Learning Launches, and “So What?” highlights ways to engage stakeholders in the development of new concepts, conduct experiments in the world Quickly and inexpensively, and lead innovation in organizations.				[5]
Text Books:				
1	Jeanne Liedtka, Tim Ogilvie, and Rachel Brozenske, The Designing for Growth Field Book: A Step-by-Step Project Guide (Columbia University Press, 2014).			
2	Jeanne Liedtka and Tim Ogilvie Designing for Growth: A Design Thinking Tool Kit for Managers (Columbia University Press, 2011)			
3	Design Thinking for Educators (IDEO); https://designthinkingforeducators.com/			
Reference Books:				
1	Human-Centered Design Toolkit (IDEO); https://www.ideo.com/post/design-kit			
2	Design Thinking Boot Camp Bootleg (Stanford D-School); https://dschool.stanford.edu/resources/the-bootcamp-bootleg			
3	Collective Action Toolkit (frogdesign); https://www.frogdesign.com/wpcontent/uploads/2016/03/CAT_2.0_English.pdf			

ADAMAS UNIVERSITY
B. Tech Civil Engineering
SEMESTER – IV

Engineering Mathematics-IV	SMA42111	L: T: P-3-0-0	3 Credits	Contact Hours
Module 1: Floating point representation and computer arithmetic, Significant digits, Errors: Round-off error, Local truncation error, Global truncation error, Order of a method, Convergence and terminal conditions, Efficient computations Bisection method, Secant method, Regula-Falsi method, Newton-Raphson method, Newton's method for solving nonlinear systems				[12]
Module 2: Gauss elimination method (with row pivoting) and Gauss-Jordan method, Gauss Thomas method for tri-diagonal systems Iterative methods: Jacobi and Gauss- Seidel iterative methods, Lu decomposition method, Residual method.				[08]
Module 3: Interpolation: Lagrange's form and Newton's form Finite difference operators, Gregory Newton forward and backward differences Interpolation. Piecewise polynomial interpolation: Linear interpolation, Cubic spline interpolation (only method), Numerical differentiation: First derivatives and second order derivatives, Numerical integration: Trapezoid rule, Simpson's rule (only methods), Newton-Cotes open formulas.				[15]
Module 4: Ordinary differential equation: Euler's method Modified Euler's methods: Heun method and Mid-point method, Runge-Kutta second methods: Heun method without iteration, Mid-point method and Ralston's method, Classical 4th order Runge-Kutta method, Finite difference method for linear ODE, Stability theory.				[10]

Text Books:	
1	S. Gupta, Numerical Methods, McGraw Hill Education.
2	va Gupta, S.C. Bose, Introduction to Numerical Analysis, Academic Publishers
3	D. Kincaid and W. Cheney, Numerical Analysis: Mathematics of Scientific Computing, 3rd Edn., AMS, 2002.
4	K. E. Atkinson, Introduction to Numerical Analysis, 2nd Edn., John Wiley, 1989.
Reference Books:	
1	Laurence V. Fausett, Applied Numerical Analysis, Using MATLAB, Pearson, 2/e (2012)
2	rewal, Numerical Methods in Engineering & Science with Programs in C & C++, Khanna Publications

Structural Mechanics-II	ECE42102	L:T:P-3-0-0	3 Credits	Contact Hours
Module 1: Introduction: General Concept of Static Equilibrium of Structures, Concept of Free Body Diagram. Support and connection, Elastic and linear behaviour of structure, Principal of superposition General Theorem relating to elastic structure: Principal of virtual work, Strain energy stored due to axial loading. , Maxwell's reciprocal deflection theorem, Betti's law, Castigliano's 1st theorem				[9]
Module 2: Analysis of statically determinate structures: Analysis of Statically Determinate Trusses, Moment Area Theorem, Conjugate Beam Method, Maxwell Betti's Theorem, Method of Superposition, Application of Energy Methods to Statically Determinate Beams, Rigid Frames				[9]
Module 3: Analysis of statically indeterminate structures: Introduction to Analysis of Statically Indeterminate Trusses, beams- Continuous, propped cantilever, fixed beam, frames-symmetric, unsymmetrical using Slope deflection and Moment distribution method.				[9]
Module 4: Analysis of Arches and cable structures: Analysis of Three hinged arch, Cable equation of the cable, Horizontal tension in the cable supported at different levels, Length of cable support at the same level and different levels, Effect on cable due to temperature change, Three hinged stiffening girder. Column and Struts: Theory of buckling , Euler's theory of struts for different support conditions , Struts subjected to axial loads , Euler's and Rankine's design formula, Struts subjected to eccentric and lateral loading , struts with initial curvature				[9]
Module 5: Analysis of Rolling Loads and Influence Line Diagram: Analysis of bending moment, shear force subjected to a concentrated, series of rolling load , Analysis of bending moment and shear force subjected to a UDL rolling load, Maximum bending moment and absolute bending moment concepts				[9]

Text Books:	
1	"Structural Analysis", R. C. Hibbler, Pearson, 9 th Edition
2	"Structural Analysis Volume II", G.Pandit& S. Gupta, Mc Graw Hill Education
3	"Structural Analysis- Volume II", R. Vaidyanathan, P.Perumal, Laxmi Publications
Reference Books:	
1	Theory of Structures, Timoshenko & Young, Tata McGraw Hill , 4TH EDITION, 2010
2	"Intermediate Structural Analysis", C K Wang, Tata McGraw Hill , 3RD EDITION , 2010

3	https://nptel.ac.in/courses/105105109/
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Soil Mechanics	ECE42104	L:T:P: 3-0-0	3 Credits	Contact Hours
Module 1: Introduction : Soil three phase system, Definitions of (water content, density, unit weights), voids ratio and porosity and degree of saturation, Density index and functional relationships, Atterberg's Limits, Particle Size Distribution of soil by sieve analysis, Sedimentation Analysis, Classification of soil, Soil structure and Atomic and molecular bonds, Clay mineralogy.				[9]
Module 2: Effective stresses and neutral pressures: Modes of occurrence of water in soil, Effective stresses and neutral pressures in different conditions, capillary siphoning, Darcy's Law, Coefficient of permeability and laboratory and field determination of coefficient of permeability, Seepage pressure, Quick sand condition, Flow nets, Critical hydraulic gradient.				[9]
Module 3: Compaction of soil: Stresses due to self-weight, Boussinesq equations, Pressure distribution diagrams, vertical pressure under different loads, Newmark's chart, westergaard's analysis, Compaction of soil: Principles of Compaction, Standard and Modified proctor test, Factors and effects of compaction on soil.				[9]
Module 4: Consolidation: Spring analogy, Terzaghi's theory of one dimensional consolidation, Compressibility characteristics of soils: Compression index, Coefficient of compressibility and volume change, Coefficient of consolidation, Degree & rate of consolidation, Laboratory method of one dimensional consolidation test, Determination of consolidation parameters, Secondary consolidation.				[9]
Module 5: Shear Strength of Soil: Basic concepts of Mohr's circle stress, Mohr- Columb's failure Theory, Determination of shear parameters: Direct Shear, Tri-axial Test, Unconfined Compression, Vane Shear Test, Sensitivity, Thixotropy of clay, shear strength of different cohesive soils under several drainage paths.				[9]

Text Book:	
1	Applied Soil Mechanics with ABAQUS Applications Helwany, S. (2007 John Wiley & Sons, INC, New Jersey, USA
2	Geotechnical Modelling Wood, D.W. (2004) Spon Press, Taylor and Francis Group, London, First Edition

3	“Soil Mechanics and Foundation Engineering”, P. Purusothama Raj, PEARSON
Reference Book:	
1	Advanced Soil Mechanics Das, B.M. (2008).Taylor and Francis Group, London, Second edition
2	https://nptel.ac.in/courses/105103097/

Surveying	ECE42106	L:T:P-3-0-0	3 Credits	Contact Hours
Module 1: Introduction: Objectives and Classification of surveying, Various applications and principle of surveying. Methods of Linear Measurements and Preparation of Maps: Basic Principle of Chain Surveying, Concepts of link and offsets. Basic Overview of Preparation of field map. Basic Principle of Compass Surveying, Concepts of bearing and preparation of map after graphical correction. Basic Principle of Plane Table Surveying, different accessories and methods of plane table surveying.				[6]
Module 2: Contouring: Definitions, Uses of contour map, Characteristics of contours, Methods of contouring Levelling: Object and use of levelling, Definitions, Description of different types of levelling instruments, Temporary & permanent adjustment of level, Types of levelling, Corrections, Reciprocal Levelling, Methods of calculation of reduced level, Example Curves: Types of horizontal curves, Properties of simple circular curve, Horizontal curve setting by different methods, Rankine's method of horizontal curve setting, Compound curve, Field procedure of setting compound curve.				[9]
Module 3: Theodolite Surveying: Definition, Description of Transit Theodolite, Temporary adjustment of theodolite, Method of measuring horizontal angle & vertical angle, Method of measuring deflection angle & measurement of magnetic bearing, Sources of error in theodolite, Computation of Latitude and departure, Closing error and its limitation, Procedure for traverse survey with theodolite & permanent adjustment of theodolite. Tacheometric Surveying: Basic principle of stadia tachometry, Instruments, Analytic lens, Stadia Method.				[9]
Module 4: Total Station Surveying: Basic Principles of Total Station, Methods of Measuring Distance, Applications and comparison with conventional surveying. Method of setting of Total Station, Creating New Job/File , Station , Back Sight, Fore Sight and Pole Handling. Method of Change Point (CP) Shifting using Fore Sight Method. Methods of Setting Out using Coordinates. Method of Area Measurement. Methods of Levelling using Total Station. Method of transferring data to the plotter as a data soft copy.				[9]

Module 4: GPS surveying- applications – Geoids and Ellipsoid- satellite orbital motion – Keplerian motion – Kepler’s Law. Remote Sensing: Principles of Remote Sensing, platform and sensors, visual image interpretation. Photographic Surveying: Principle of the method of Terrestrial Photogrammetry & Stereo-photogrammetry, Aerial surveying, Scale and distortion of vertical and tilted photograph, Plotting from air photograph.	[12]
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Text Books:	
1	Surveying and Leveling. N.N. Basak, 1st Edition, Tata McGraw Hill, 6 TH EDITION , 2017
2	Surveying and Leveling, Vol I & II, Kanetkar and Kulkarni, 24th edition, Pune Vidyarthi Griha, Pune.
3	Engineering Surveying 2, W. Schofield, Butterworths
Reference Books:	
1	“ Surveying, R Agor, Khanna Publishers. 4 TH EDITION, 2017
2	https://nptel.ac.in/courses/105107122/

Water Resources Engineering	ECE42108	L:T:P: 3-0-0	3 Credits	Contact Hours
Module 1: Introduction: Importance of water resource engineering, Management and development of Indian water resources, Water requirements of water for various uses, Necessity of irrigation – Advantages and Disadvantages, Types of irrigation, Techniques of water distribution in the farms, Quality of Irrigation & Standards.				[8]
Module 2: Water requirements of Irrigation: Crop period or base period, Duty and delta of crop – Relation between duty and delta, Irrigation efficiencies, Consumptive use or Eva-transpiration –CIR. NIR, Estimation of Consumptive use, Soil moisture irrigation Relationship, Important definitions- Plane irrigation or watering, Crop Rotation.				[9]
Module 3: Ground water for Irrigation through wells and tube wells: Ground water reservoir, Movement of groundwater, Aquifers and their types, Confined and unconfined aquifers, Themis equilibrium formula for unconfined and confined aquifers, Classifications of Wells--- Open Wells Yield of well, Efficiency of well, Tube wells—Types of tube wells, Yield of tube wells, Pumps and types of Pumps Types of irrigation: Flow irrigation, Lift irrigation, Canal irrigation system—Types of canals, Alluvial and alluvial canals, Distribution system for canals, Canal section, Certain important definition, Losses of water in canals, System of Bandhara irrigation.				[10]
Module 4: Reclamation of water logged Soils: Introduction of saline and alkaline soils, Water logging, its Causes, Water logging Control, Reclamation of saline, Alkaline lands – Leaching, Leaching requirement, Surface and subsurface drainage, Drainage channel Design--- Estimation of runoff Sediment transport and Design of Irrigation channels: Importance, Sediment load, Design of stable channels, Regime channels, Kennedy’s theory, Lacy ‘s Theory, Initial and final				[9]

regime , Design procedure for Lacy 'theorem, Lining of Irrigation canals—Objective and types , Difference between Kennedy and Lacey's theorem	
Module 5: Canal Regulations works: Introduction - Canal falls, Canal escapes, Canal regulators, Canal Head Works-Storage headwork's, and diversion head works, Its components, Hydraulic jump and its usefulness in the design of irrigation structures, Storage headwork's—Dams& Spillways. Reservoir Planning: Purpose of reservoir, Classification, Yield and capacity of reservoir, Mass curve and demand curve, Zones of storage reservoir, Useful life of reservoir - Trap efficiency, Water losses from reservoir, Sedimentation in reservoirs- Causes Control, Computations of sediment load.	[9]

Text Books:	
1	G L Asawa, Irrigation Engineering, Wiley Eastern
2	S K Garg, Irrigation Engineering & Hydraulic Structures, Khanna Publishers.
3	P N Modi, Irrigation Engineering & Hydraulic Structures
Reference Books:	
1	J D Zimmerman, Irrigation, John Wiley & Sons
2	Varshney, Gupta & Gupta, Theory and Design of Irrigation Structures, Nem Chand & Bros.
3	Punmia B C & Pande B B Lal, Irrigation Engineering and Water Power Engineering, Laxmi Publications.
4	https://nptel.ac.in/courses/105105110/

Numerical Techniques Lab	SMA42211	L-T-P: 0-0-3	Credit: 2
Exp. 1	The root of non-linear equation using Bisection method.		
Exp. 2	The root of non-linear equation using false position method.		
Exp. 3	The root of non-linear equation using Newton Raphson method.		
Exp. 4	Interpolate values using Newton's forward Interpolation method.		
Exp. 5	Interpolate values using Newton's backward Interpolation method.		
Exp. 6	Interpolate values using Lagrange 's interpolation method.		
Exp. 7	Solve a system of linear equation using gauss-elimination method.		
Exp. 8	Solve a system of linear equation using gauss-seidel method.		
Exp. 9	Evaluate the integral using different numerical integration rules.		
Exp. 10	Solve an ordinary differential equation using different numerical methods.		

Surveying Practice Lab	ECE42202	L-T-P: 0-0-3	Credit: 2
Exp. No.01	Distance between two inaccessible points by chain, Ranging, Preparation of map		
Exp. No.02	Getting outline of the structures and calculation of area		
Exp. No.03	Preparation of field book from field data.		
Exp. No.04	Measurement of bearing, closed traversing using compass and application of Bowditch Rule. Preparation of Gale's Table		
Exp. No.05	Temporary adjustments of plane table, Radiation method, Intersection, Traversing and Resection methods of plane tabling		
Exp. No.06	Temporary adjustment of Dumpy level, Differential leveling, Profile leveling and plotting the profile, Longitudinal and cross sectioning, Sensitiveness of Bubble tube		
Exp. No.07	Direct contouring, Indirect contouring – Block leveling, Indirect contouring – Radial contouring, Demonstration of minor instruments.		
Exp. No.08	Temporary and permanent adjustment of theodolite, Observations of vertical, horizontal and deflection angle using Vernier Transit Theodolite		
Exp. No.09	Observations of vertical, horizontal and deflection angle using Total Station, Plotting of an area in Autocad from Total Station Data		

Exp. No.10	Study of Global Positioning System and Accessories, Observations using GPS
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Solid Mechanics Lab	ECE42204	L-T-P: 0-0-3	Credit: 2
Exp. No. 01	Determination of Tensile strength of Structural Materials(e.g Mild Steel and Tor steel, HYSD bars)		
Exp. No. 02	Determination of Compressive strength of Structural Materials (e.g Timber, bricks and concrete cubes		
Exp. No. 03	Determination of Bending strength of Mild Steel		
Exp. No. 04	Determination of Torsional strength of Mild Steel Circular Bar		
Exp. No. 05	Determination of Hardness of Ferrous and Non-Ferrous Metals (Brinell and Rockwell Tests)		
Exp. No. 06	Determination of stiffness of closely coiled helical spring		
Exp. No. 07	Determination of Impact strength of mild steel by Izod method		
Exp. No. 08	Determination of Impact strength of mild steel by Charpy method		

Reference Books:	
1	Elements of Strength of Material S. P. Timoshenko & D. H. Young EWP Pvt. Ltd
2	Engineering Mechanics of Solids E. P. Popov Pearson Education

Course Code	Course Name	L	T	P	C
	Inter-Disciplinary Project AU	0	0	5	3

**Typical
Progress
Roadmap**

- After discussion with the Project Advisor(s), each student shall prepare an initial outline of their assigned project indicating the major sections of discussion, list the principal research sources for each section, and explain the overall objective of the project, including a justification of the interdisciplinary nature of the work.
- Each student shall meet with the Project Advisor(s) regularly as per the weekly Time-Table. Other meetings may be scheduled at the discretion of the Project Advisor(s) at mutually agreed upon timings.

- Typically, the progress will include a combination of industrial and academic mentoring, self study sessions, case studies, trend studies, presentation by students, interactive sessions, industrial visits etc.
- Regular submission of progress reports shall be required of each student-group as notified through the Project Advisor(s) from time to time.

Design Thinking-II		L: T: P-0-0-3	2 Credits	Contact Hours
Module 1: Beyond Design Thinking: The Design Thinking Model is a tool that helps guide you along a design thinking path. The model does this by providing a series of activities that that will help you effectively design a product, service or solution to a user’s need. The model presents the approach as a process, allowing us to look at each step – or phase – along the journey to the development of a final design. Experience: A project will be done in collaboration with a partnering organization. This will introduce students with a variety of design and innovation methods, through specific exercises and project work; It will put special emphasis on ethnographic research and problem framing and understanding. The module will end with presentation of the projects to an expert panel providing students with an industry perspective of their ideas and concepts and what it will take to make them happen.				[12]
Module 2: This will be an extensive project that seeks to develop the student’s design and innovation related skills by applying them in a collaborative project in the Industry. The project will be planned and executed in collaboration with and industry or community partner. This project will have emphasis on experimentation. Students are expected to perform multiple iterations on their ideas and show improvement and learning through these iterations				[18]
Text Books:				
1	IDEO Field Guide to Human Centered Design. Download at: http://www.designkit.org/resources/1/			
2	Brown, Tim. “What We Can Learn from Barn Raisers.” Design Thinking: Thoughts by Tim Brown. Design Thinking, 16 January 2015. Web. 9 July 2015			
3	Millenson, Alisson. “Design Research 101: Prototyping Your Service with a Storyboard.” Peer Insight. Peer Insight, 31 May 2013. Web. 9 July 2015			
Reference Books:				
1	Brown, Tim. “Designers -- think big!” TED: Ideas worth spreading. http://www.ted.com/talks/tim_brown_urges_designers_to_think_big.html .			
2	“David Kelley: Human-centered design Talk Video TED.” TED: Ideas worth spreading. https://www.ted.com/talks/david_kelley_on_human_centered_design?language=en			
3	Knapp, Jake. “The 8 Steps to Creating a Great Storyboard.” Co.Design. Fast Company & Inc., 21 Dec. 2013. Web. 9 July 2015			
4	van der Lelie, Corrie. “The Value of Storyboards in the Product Design Process.” Journal of Personal and Ubiquitous Computing 10.203 (2006): 159–162. Web. 9 July 2015. [PDF].			

ADAMAS UNIVERSITY
B. Tech Civil Engineering
SEMESTER – V

Design of RC Structure	ECE43101	L:T :P- 3-0-0	3 Credits	Contact Hours
Module 1: Reinforced Concrete Fundamentals-Working Stress Method: Concept of reinforced concrete, stress strain characteristics of concrete and steel reinforcement, elastic theory, Reinforced concrete (RC) structures, Loadings, analytical models for analysis and design of RC structures, Design Methodologies singly of reinforced, balanced section, under reinforced section and over reinforced section. Limit State Method: Review of partial safety factors, Limit state of collapse, Limit state of serviceability.				[9]
Module 2: Limit State of Collapse- Flexure: Limit state of collapse for flexure as per IS. Assumptions, Moment capacity of rectangular and flanged sections, Singly and doubly reinforced sections, Design tables and charts, Critical sections for bending in important structural elements- slabs , beams , footings & staircase, Design of one way slab, Design of two way slab, Design of staircase spanning longitudinally, Design of staircase spanning horizontally				[9]
Module 3: Limit State of Collapse-Shear: Nominal shear stress, Design shear strength of concrete, Design of shear reinforcement, Use of SP16 for shear design, Critical sections for bending in important structural elements- slabs , beams , footings & staircase, Design of Singly reinforced beam, Design of Doubly reinforced beam, Design of Flanged beam.				[9]
Module 4: Limit State of Collapse-Torsion: Critical section, Shear and torsion, Equivalent, Reinforcement for Torsion, Equivalent longitudinal moment, Design project for the design and detailing of a water tank with curved beam. Limit State of Serviceability: Deflection, Short term deflection, Long term deflection, Cracking, Control of cracking, Estimation of width of crack.				[9]
Module 5: Limit State of Collapse-Compression: Analysis and design of columns using IS: 456-rectangular, square and circular cross sections, Axially loaded columns, Columns with uniaxial eccentricity using SP 16 design charts, Column with biaxial eccentricity using SP 16 design charts, Short and slender columns, Design of isolated square footings, Design of isolated rectangular footings, Pedestal				[9]

Text Books:	
1	“Plain and Reinforced Concrete”, Vol. I, Jain & Jaikrishna, Nemchand Brothers.
2	“Design of Reinforced Concrete Structures”, Dayaratnam P, Oxford & IBH.
3	“Reinforced concrete design”, Pillai and Menon, McGraw Hill Publication.
Reference Books:	

1	“ Design of Concrete Structures”, J.N. Bandopadhyay, Prentice Hall India Learning Private Limited
2	https://nptel.ac.in/courses/105105105/
3	Relevant IS Codes.

Foundation Engineering	ECE43103	L: T: P: 3-0-0	3 Credits	Contact Hours
Module 1: Soil Exploration and Site Investigation: Introduction, Planning of soil exploration programme, Description of samplers with area ratios, Field testing, Preparation of bore-log and soil investigation report, Geo-physical exploration: Seismic refraction survey, electrical resistivity method, Problems				[6]
Module 2: Shallow Foundations: Bearing Capacity using Prandtl, Terzaghi and Meyerhof's method of analysis and from SPT and SCPT and Plate Load Test data, Effects of Size, Shape and Water Table. Proportioning of footing based on consolidation and settlement criteria, combined footings, Beams on elastic foundation: Infinite beam, Finite beam, Modulus of sub-grade reaction and effecting parameters. Raft Foundation: Settlement and Bearing Capacity analysis, Design of Raft including floating raft, Analysis of flexible and rigid raft as per IS 2950.				[12]
Module 3: Deep Foundations Pile: Tension piles, laterally loaded piles: Elastic continuum approach, under reamed piles, Ultimate load Analysis, mechanics of load transfer in piles, load carrying capacity, Deflection and maximum moment as per IS 2911, Pile load test, design of pile groups including settlement calculations Drilled Shaft: Construction procedures, Design Considerations, Load Carrying Capacity and settlement analysis Caissons: Types, Sinking and control.				[11]
Module 4: Retaining walls: Earth pressure computations on retaining walls and Design: Gravity, cantilever and counter fort retaining walls: Stability checks and design Sheet Pile Structures: Cantilever sheet piling, Anchored sheet piling: Free and fixed earth support methods of Analysis, Braced Excavation.				[12]
Module 5: Design of foundation for vibration control: Elements of vibration theory, Soil- springs and damping constants, dynamic soil parameters, Types of Machine foundations, General consideration in designing dynamic bases. Foundations on expansive soils: Problems and Remedies				[4]

Text Books:

1	Soil mechanics and Foundations, Dr. B.C Punmia, Er. Ashok Kumar Jain & Dr. Arun Kumar Jain, Laxmi Publications (P) Ltd., 6th Edition
2	Advanced Foundation Engineering, V.N.S. Murthy, CBS Publisher's & Distributors
3	Principles of Foundation Engineering, B.M. Das, Thomson Book
Reference Books :	
1	Foundation Analysis & Design, J.E. Bowels, McGraw Hill
2	https://nptel.ac.in/courses/105101083/

Transportation Engineering	ECE 43105	L: T: P-3-0-0	3 Credits	Contact Hours
Module 1: Highway planning: Classification of roads, brief history of road development in India, present status of roads in India, Recommendations by Jayakar Committee, road patterns, saturation systems. Highway alignment: Basic requirements of Highway alignment, factors governing alignment. Alignment in hilly areas, Highway location surveys and studies.				[9]
Module 2: Geometric Design of Highways: Elements of geometric design, Design controls and criteria, Terrain classification and Design speed, vehicular characteristics, highway cross-section elements. Introduction to sight distance and reaction time, analysis of safe sight distance, analysis of overtaking sight distance, intersection sight distance. Design of horizontal alignment: horizontal curves, design of super elevation and its provision, radius at horizontal curves, widening of pavements at horizontal curves, analysis of transition curves. Design of vertical alignment: Different types of gradients, grade compensation on curves, analysis of vertical curves, summit curves, valley curves.				[9]
Module 3: Intersection: At-grade and grade separated intersections, Canalization, Design of rotary intersection.				[9]
Module 4:				[9]

Traffic Engineering & Control: Traffic engineering definitions: Functions and organization and importance, necessity of understanding the behaviour of road user and vehicle characteristics. Traffic Studies and Surveys: Presentation of traffic volume data and traffic speed studies (journey time, running time, travel time) and speed and delay studies and methods, origin and destination (O-D) studies and methods and presentation of O-D data, Parking Surveys: needs and techniques and Basics of traffic manoeuvres. Traffic Signs: Different types and location height and Miscellaneous traffic control aids (roadway delineators, hazard markers, object marker, speed breakers, rumble strips etc.), Design of Traffic Signal: Requirement and components, Phase, Design as per Webster's approach.	
Module 5: Design of pavements: Types of pavements like flexible pavements, rigid pavements, comparison of pavements, components and functions of flexible pavements, pavement design factors, design wheel load, equivalent single wheel load, repetition of loads, equivalent wheel load factors, climatic factors. Design of flexible highway pavement as per IRC approach, Stresses in rigid highway pavements, critical load positions, stresses due to wheel loads, temperature and warping stresses, critical combination of stresses, Joints in rigid pavements: transverse joints, longitudinal joints, fillers and sealers.	[9]

Text Books:	
1	Highway Engineering by S.K.Khanna, C.E.G.Justo, A. Veeraragavan, Publisher - Nem Chand & Bros., Revised 10 th Edition.
2	Traffic Engineering and Transport Planning by L.R.Kadiyali, Khanna Publishers.
3	Highway Engineering by L.R. Kadiyali, Khanna Publishers.
Reference Books:	
1	Principles of Transportation Engineering by Partha Chakraborty, Animesh Das- PHI Learning Pvt. Ltd., 01-Jan-2003.
2	https://nptel.ac.in/courses/105101087/

Rural & Urban Planning	CEH43101	L:T:P -3-0-0	3 Credits	Contact Hours
Module 1: Rural Planning - Introduction: Meaning, Scope and overview of rural development; Historical perspective - Rural Development Programmes in India, Problem / perception and identification; Role of Planning Commission and an Overview of District Planning Manual of Planning Commission of India, Finance Commissions, and ICT in District Planning, Institutional and other support for Urban Planning Committee; Guidelines for District Planning: Content and context and methodologies, Village Development Plans – an Integrated approach, rural norms and standards (spatial); Special Component Plan- Tribal Sub Plan and Weaker Sector Plan allocation. History: Panchayati Raj - beginning of planning and community development; Balwant Rai Mehta Committee - three tier system of rural local Government; Five Year Plans and Rural Development; Planning process at National, State, Regional and District levels; Planning, development, implementing and monitoring organizations and agencies				[14]
Module 2: Urban Planning - History: History of human settlements as an expression of civilization, Basic elements of the city, Concepts of space, time, scale of cities; Town planning of				[10]

industrial and post-industrial cities in India; City as a living & spatial entity; Concepts of landmark, axis, orientation. City form as a living space; The dynamics of the growing city. Impact of industrialization and urbanization. Metropolis and Megalopolis; Generic and para-centric cities.	
Module 3: Urban Planning - Theory: Theories of urbanization including Concentric Zone Theory, Sector Theory, Multiple Nuclei Theory and other latest theories; Emerging Concepts: Global City, inclusive city, Safe city, etc. City of the future, future of the city; shadow cities, divided cities; Systems approach to planning: rationalistic and incremental approaches, mixed scanning and middle range planning; Types of Development Plans: Master plan, City development plan, Structure plan, District plan, Action area plan, Subject plan, Comprehensive planning, Zonal plans etc.	[9]
Module 4: Planning process: Principles and Methods of participatory planning; preconditions for participatory planning; steps in participatory planning in local governance: case studies from different parts of India, Participatory Learning and Action (PLA) tools, challenges faced in planning; Urban forms, patterns, elements of urban environment, concepts of urban design, urban design principles and techniques	[6]
Module 5: Sustainability and rationality in planning: Components of sustainable urban and regional development; Globalization, internationalization, modernism and postmodernism debate; Impact of Information Technology on urban economics and politics Gender and Development: Gender and sex; Gender sensitive; Gender and development planning; Gender and implications for spatial planning	[6]

Text Books:	
1	Urban Design: The architecture of towns & cities, Paul D. Spreiregen, Mc Graw Hill
2	Regional Development Planning in India, R. P. Misra, Vikas Publishing House Pvt. Ltd
3	The Municipal administration in India: A Sociological analysis of rural & urban India, R. K. Bhardwaj, Sterling Publishers
Reference Books:	
1	Sustainable Development, D. D. Khanna, Macmillan Publishers India
2	Urban Planning: use of critical path Method, Sol A. Ward, New York : Philosophical Library
3	Development Planning, Models and Methods, Michael P. Todaro, Oxford University Press Tanzania Ltd

Earthquake Engineering	ECE43107	L:T:P-3-0-0	3 Credits	Contact Hours
Module 1: Earthquake Fundamentals: Interior Earth, Elastic rebound theory, Plate tectonics, faults, Definitions of magnitude and intensity and scales, Epicenter etc., Seismographs, Seismic zones of India, Response of Simple Structural Systems				[9]
Module 2: Degrees of freedom: Static loads, dynamic loads, different types of dynamic loads, comparison between static and dynamic loads, damping in structure, Undamped single degree freedom system, Damped single degree freedom system, Natural frequency.				[9]
Module 3: Periods of vibration: modes of vibration, Response of structure subject to gravitational motion. Direct determination of frequencies and mode shapes: orthogonality principle, approximate methods for determination of frequencies, mode shapes, Introduction to multiple (maximum three) degree freedom system, modal analysis, applications to multi storied rigid frames subject to lateral dynamic loads.				[9]
Module 4: Characterization of ground motion: earthquake response spectra, factors influencing response spectra, peak ground acceleration, response spectrum shapes and deformation, pseudo-velocity Design philosophy: earthquake resistant design, four virtues of earthquake resistant structures, seismic structural configuration. Introduction to IS:1893 (part -1): static and dynamic analysis and IS codal provisions (OMRF, SMRF, shear walls, dual systems)				[9]
Module 5: Principles of earthquake resistant design: Several terms, Design criteria, Lateral Load Distribution (SDOF): Rigid diaphragm effect, centres of mass, stiffness, torsionally coupled and uncoupled system. Lateral Load Analysis: Analysis of frames using approximate methods like portal & cantilever methods. Ductile Detailing: Concepts of Detailing of various structural components as per IS: 13920 provisions, Special topics: Soil Liquefaction.				[9]

Text Books:	
1	Structural Dynamics (Theory and Computation), Mario Paz., Publisher - CBS Publishers and Distributor
2	Dynamics of Structure (Theory and Application to Earthquake Engineering), A.K.Chopra, Publisher – Pearson Education
3	Elements of Earthquake Engineering, Jai Krishna, A. R. Chandrashekhar and, Publisher - Brijesh Chandra South Asian Publishers
Reference Books:	
1	https://nptel.ac.in/courses/105101004/
2	Earthquake Resistant Design, D. J. Dowrick, Publisher - John Wiley & Sons
3	IS 1893 (Part 1): 2002, IS 3920, IS 4326, Bureau of Indian Standard

Concrete Technology	ECE43109	L:T:P- 3-0-0	3 Credits	Contact Hours
Module 1: Cement: Portland cement- chemical composition- Hydration of cement- Structure of hydrate cement- Test on physical properties- Different grades of cement. Admixtures: Types of admixtures- mineral and chemical admixtures- properties- dosages- effects- usage. Aggregates: Classification of aggregate- Particle shape & texture- Bond, Strength & other mechanical properties of aggregate- Specific gravity, Bulk density, Porosity, adsorption & moisture content of aggregate- Bulking of sand- Deleterious Substance of aggregate- Soundness of aggregate- Alkali Aggregate reaction- Thermal properties- Sieve analysis- Fineness modulus- Grading curves- Grading of fine & coarse Aggregates- Gap graded aggregate- Maximum aggregate size.				[10]
Module 2: Fresh Concrete: Workability- Factors affecting workability- Measurement of workability of tests- Setting times of concrete- Effect of time and temperature on workability- Segregation & bleeding- Mixing and vibration of concrete- Steps in manufacture of concrete- Quality of mixing water.				[10]
Module 3: Hardened Concrete: Water/ Cement ratio- Abram's Law- Gel space ratio- Nature of strength of concrete- Maturity concept- Strength in tension & compression- Factors affecting strength- Relation between compression & tensile strength- Curing. Testing of Hardened Concrete: Compression tests- Tension tests- Factors affecting strength- Flexure tests- Splitting tests- Pull- out tests, Non- destructive testing methods- codal provisions for NDT. ELASTICITY, CREEP & SHRINKAGE- Modulus of elasticity- Dynamic modulus of elasticity- Poisson's ratio- Creep of concrete- Factors influencing creep- Relation between creep & time- Nature of creep- Effects of creep- Shrinkage - types of shrinkage.				[10]
Module 4: Mix Design: Factors in the choice of mix proportions- Durability of concrete- Quality Control of concrete- Statistical Quality control- Acceptance criteria- Proportioning of concrete mix by normal pumpable concretes by- BIS method of mix design.				[7]
Module 5: Special Concretes: Light weight concrete- Lightweight aggregate concrete- Cellular concrete- No-fines concrete- Fibre reinforced concrete- Polymer concrete- Types of Polymer concrete- Self compacting concrete.				[8]

Text Books:	
1	Properties of Concrete by A.M. Neville - Low priced Edition - 4th edition.
2	Concrete Technology by M.S.Shetty. - S. Chand & Co

3	Concrete Technology by A.R. Santha Kumar, Oxford university Press New Delhi				
Reference Books:					
1	Concrete Technology by Job Thomas, Cengage Learning.				
2	Concrete Technology by M.L. Gambir. - Tata Mc. Graw Hill Publishers, New Delhi.				
3	https://nptel.ac.in/courses/105/102/105102012/				
Solid Waste Management		ECE43111	L:T :P- 3-0-0	3 Credits	Contact Hours
Module 1 Introduction- Waste Management, Need of waste Management, Waste- Classification of Waste (MSW, Industrial waste, Biomedical waste, e-waste), Characteristics of waste, Environmental rules and regulation of solid, hazardous & biomedical waste, Impacts of waste on Environmental and human health, 5 R of Waste Management					[9]
Module 2 Solid waste management: Introduction of solid waste management, Need of Integrated solid waste management, Functional Elements of MSW, Characterization and waste generation, on site waste storage, handling and processing, Separation and recycling of waste. Integrated solid waste management.					[9]
Module 3 Hazardous waste management: Disposal of Radioactive Disposal of e-waste, Disposal of waste- Land filling, Incineration, Pyrolysis and Composting, Disposal of hazardous waste, Disposal methods of biomedical waste, (Chemical and thermal methods)					[9]
Module 4 Waste minimization: Objectives of waste minimization, Flow chart of waste minimization (hierarchy process in detail), Waste minimization methods- by source reduction, process modification, Waste minimization by reuse and recycle, Waste minimization by treatment and processing of waste, Recovery of thermal conversion products and Recovery of biological conversion products , Calculation of Amount of oxygen required.					[9]
Module 5 Industrial Waste: Characteristics, Industrial waste effects on water streams, Effluent standards, Treatment of industrial waste , Waste management for industries , Introduction to Zero discharge concept, Industrial ecology, Industrial symbiosis and industrial Eco parks.					[9]

Text Books:	
1.Introduction to Environmental Engineering by P. AarneVesilind, Susan M. Morgan, Thompson /Brooks/Cole; Second Edition 2008.	
2.Introduction to Environmental Engineering, Vesilind, PWS Publishing Company 2000	
3.Environmental Engineering by H.S.Peavy, D.R. Rowe, G. Tchobanoglous; 2007, Tata Mcgraw Hill.	
Reference Books:	
1.Integrated Solid Waste Management, Tchobanoglous, Theissen& Vigil. McGraw Hill Publication	
2. https://nptel.ac.in/courses/120108005/	

Geotechnical Engineering Lab	ECE43201	L:T :P- 0-0-3	Credit: 2
Experiment no. 1 :	Determination of determination of natural moisture content by Oven Drying method, Calcium Carbide method. Determination of specific gravity of i) Cohesionless ii) cohesive soil		
Experiment no. 2 :	Determination of In-situ density by core cutter method & sand replacement method		
Experiment no. 3 :	Determination of Grade of cohesionless soil by sieving & fine grained soil by hydrometer analysis		
Experiment no. 4 :	Determination of Atterberg's limits (liquid limit, plastic limit & shrinkage limit)		
Experiment no. 5 :	Determination of compaction characteristics of soil using Light compaction. Determination of Determination of co efficient of permeability by constant head permeameter (coarse grained soil) & variable head parameter (fine grained soil)		
Experiment no. 6 :	Determination of Shear parameter of soil by Direct shear test		
Experiment no. 7 :	Determination of shear parameter of soil by Tri-axial test (UU).		
Experiment no. 8 :	Determination of un-confined compressive strength of soil		
Experiment no. 9 :	Determination of undrained shear strength of soil by Vane shear test		
Experiment no. 10 :	Determination of compressibility characteristics of soil by Oedometer test (co efficient of consolidation & compression Index)		

Reference Books :	
1	Soil mechanics and Foundations, Dr. B.C Punmia, Er. Ashok Kumar Jain &Dr.Arun Kumar Jain, Laxmi Publications (P) Ltd., 6th Edition
2	Advanced Foundation Engineering, V.N.S. Murthy, CBS Publisher's &, Distributors
3	Foundation Analysis & Design, J.E. Bowels, McGraw Hill
4	Principles of Foundation Engineering, B.M. Das, Thomson Book

Transportation Engineering Lab	ECE43203	L:T :P- 0-0-3	Credit: 2
Experiment no. 1 :	Determination of specific gravity and water absorption of fine aggregate and coarse aggregate		
Experiment no. 2 :	Determination of bulking of sand and deleterious materials in fine aggregate		
Experiment no. 3 :	Determination of gradation and fineness modules of fine aggregate and coarse aggregate by Sieve analysis		
Experiment no. 4 :	Determination of bulk density of fine aggregate and Flakiness and Elongation Index of coarse aggregate		
Experiment no. 5 :	Determination of Impact value and Los-Angeles Abrasion value of coarse aggregate		
Experiment no. 6 :	Determination of penetration value, specific gravity and softening point of Bitumen & bituminous materials		
Experiment no. 7 :	Determination of Flash & Fire point, loss on heating of Bitumen & bituminous materials and Stripping value of materials		
Experiment no. 8	Determination of California Bearing ratio (CBR) of soil in highway engineering		
Experiment no. 9 :	Design of B.C & S.D.B.C mix , Marshal Stability test		
Experiment no. 10 :	Benkelman beam Test		

Reference Books :	
1	Highway Engineering, S.K.Khanna , C.E.G.Justo , A. Veeraragavan , Publisher - Nem Chand & Bros., Revised 10 th Edition
2	Principles, Practice and Design of Highway Engineering , Dr.S.K.Sharma, Publisher - S. Chand and company Ltd., reprint, 2017

Civil Engineering Drawing	ECE43205	L:T :P- 0-0-3	Credit:2
Experiment No	Experiment		
1	Engineering drawing covering and principles, significance and use of different instruments		
2	Drawing and Scales,		
3	Drawing conic sections including parabola, hyperbola, cycloid, epicycloid, hypocycloid, involute,		

4	raphic projection: point, lines, planes, solid object,
5	raphic projection: section, surface development,
6	ric Projection: lines, planes, Solid Object, Sectional views,
7	sion of isometric views to orthographic view
8	sion of orthographic view to isometric view
9	ction to Autocad,
10	mands of Autocad.

Reference Books	
1	Engineering Drawing, N. D. Bhat, Charotar Publishing House (2012).
2	Engineering Drawing + Autocad, K. Venugopal, New Age; Fifth edition (1 January 2011).
3	Engineering Drawing& Graphics using Autocad, T. Jeyapoovan, Vikas Publishing House Pvt. Ltd.-Noida; Third edition (2010)

Rural and Urban Planning Lab		CEH43201	L:T :P- 0-0-3	Credit:2
Experiment No	Experiment			
1	Field Survey of the study area: Traversing, Levelling, Contouring etc.			
2	g: Elements of spatial data in CAD - Arcs, lines, rectangles, polylines, points, circles, donuts, layers, grids, snaps and object snaps, etc.			
3	g: Move, scale, copy, offset, change, trim, extend, mirror, divide, measure, array, break, hatch, block, zoom, view, pan, fontsetc.			
4	udies of Layout plans: Paper maps, digital layout maps, on screen digitization; 2D and 3D conversion, perspective view, walk through of layout.			
5	Housing cluster and residential sector studies – layout, density, utility net-work and community facilities locations.			
6	Introduction to special area problems (slum / new town / rural area) and preparation of their plan program.			
7	Land use interaction studies of a small urban area and its environment.			

Venture Ideation		L: T: P-0-0-2	1 Credit	Contact Hours
Module 1: Introduction Preview of the Course, Introduction to the Course, Guest Lecture with U.S. Secretary of Commerce Penny Pritzker – Meaning of Innovation, Entrepreneurial opportunities, Factors influencing the feasibility of an innovation, Innovation strategy: technology-push or market-pull, Product-market fit, How to develop a business model, Walkthrough of the business model canvas, Welcome to Innovation for Entrepreneurs: From Idea to Marketplace.				[6]
Module 2: Customer Discovery and Validation Customer types, Customer archetypes, Customer segments and business models, Customer segments, value propositions, product features, value mapping, interviewing customer, insights of your customers				[6]
Product Understanding and Marketing. Customer value, The DNA of customer-centricity, Crossing the chasm, Qualitative and quantitative marketing research, importance and methods of market segmentation, Focusing on the target market, Beyond the chasm, Strategic implications of beyond the chasm, E-commerce: The internet as a selling platform.				[6]
Module 4: Planning for prototyping, Rapid prototyping and development, Lean startup MVPs, Choosing a wire framing/UX prototyping tool, Anatomy of an experience map, What you'll learn from user testing, Analytics and insight, Troubleshooting Your customer discovery, Levels of a product/service				[6]

Adamas Foundation (CSR Activity)		L: T: P-0-0-0	1 Credit
Module 1: Introduction to the course. A brief on social issues facing the society with both global and Indian examples			
Module 2: Minimum 24 hours of field work on a social issue and helping the marginalized / affected community / cause with photographs and testimonies.			
Module 3: Submission of individual reflection on the social service rendered.			

Further Reading:	
1	Tadevosyan, Gohar&Schoenhuth, Michael. Participatory Research Approach : Principles, Challenges and Perspectives. http://ysu.am/files/01G_Tadevosyan_M_Schoenhuth.pdf
2	Bergold, Jarg& Thomas Stefan. Participatory Research Methods: A Methodological Approach in Motion http://www.qualitative-research.net/index.php/fqs/article/view/1801/3334

ADAMAS UNIVERSITY
B. Tech Civil Engineering
SEMESTER – VI

Design Of Steel Structure	ECE43102	L:T :P- 3-0-0	3 Credits	Contact Hours
Module 1: Introduction: Historical development, Structural steel properties, Classification of structural steel, Metallurgy of steel, Manufacturing of steel, Corrosion and fire on steel. The Basis of structural Design: Design considerations, Steps involved in construction, Codes and specification, Design philosophies, Failure criteria for steel, Concept of plastic hinge. Bolted Connections: Rivets and riveted connection, Behaviour of bolted connection, Design strength of ordinary black bolts, Eccentric connection, Truss connections. Welded Connection: Welding process, Symbols, Classification, Welding process, Types of joints, Design strength of weld, Design of welded bracket connection.				[10]
Module 2: Design of Tension Member: Types of tension members, Slenderness ratio, Behaviour of tension member, Modes of failure, Design of tension member, Design of Gusset Plate.				[8]

Design of Compression Member: Classification of cross section, Buckling of slender compression member, Design of compression member using rolled section, Design of Built-Up Compression Member using Batten, Laced compression member, Design of Column Base.	
Module 3: Design of Beams: Beam types, Section Classification, Shear strength of Steel Beams, Web buckling, Web crippling, Deflection of beam, Concept of shear buckling, Design of laterally supported beam, Design of laterally unsupported beam, Failure modes of beam. Purlin : Design procedure of purlin using Channel and I-section. Design of roof trusses : Selection of the type of truss, spacing of truss, panel layout, loads on truss, analysis and design procedure as per Indian Standard IS : 875. Design of Beam-Columns: Design of Beam-Columns subjected to Tension and Bending, Design of Eccentrically Loaded Base Plates.	[10]
Module 4: Design of Plate Girders: Introduction of Plate Girders, Web panel subjected to Shear, Web panel subjected to combined bending and shear, Concept of tension field method, Simple post critical method, Design of Plate Girders using IS-800 provisions without stiffener, Design of stiffened plate girder, Splices and curtailment. Design of Gantry Girder: Introduction of Gantry Girder, Loading Considerations, Maximum Load effects, Design of Gantry Girders.	[8]
Module 5: Design of industrial steel structures as per Indian code provisions, provide suitable sections of different components subjected to various type loads.	[9]

Text Books:	
1	“Limit State Design of Steel Structures”, V.L.Shah and Veena Gore, Structures Publications.
2	“Limit State Design of Steel Structures”, S K Duggal, McGraw Hill Publication.
3	“Design of Steel Structures”, S.S.Bhavikatti, I.K. International Publishing House Limited.
Reference Books:	
1	“Design of Steel Structures”, N. Subramanian, Oxford University Press.
2	Relevant IS Codes.
3	https://nptel.ac.in/courses/105105162/

Environmental Engineering	ECE43104	L:T :P- 3-0-0	3 Credits	Contact Hours
Module 1 Water supply schemes : Introduction- Necessity of water supply systems , Components of water supply schemes, Lay out of water Supply system Water Demand -Types of water Demand, Factors Per capita demand, Break up of Domestic demand , Variations of water demand, Forecasting population—Methods of forecasting , Design period				[9]
Module II Sources of Water – Subsurface and surface sources of water, Classification of wells, Yield Estimation , Intakes--- Selection of site, Types of intakes Quality of water--- Impurities in water, Physical chemical , bacteriological analysis of water, Water borne diseases, Indian standards of drinking water.				[10]

Module III Water Treatment – Objectives Flow diagram of WTPS, Sedimentation – Theory, Estimation of settling velocity, Sedimentation with coagulation, Design Filtration – Theory Classifications of filters--- Construction, Working of Slow. Rapid sand filters, Disinfection of water- Objectives Necessity. Chlorination Miscellaneous treatment —Aeration, Removal of iron and Manganese, Removal of colour and odour , Fluoridation DE fluoridation	[10]
Module IV Conveyance of water ----- Different types of Pipes used for Conveyance, Pipe materials, its advantages and Disadvantages, Appurtenances- Valves, water meters , Laying of pipes , Hydraulics of flow and Design of Pipes, Testing of pipes.	[8]
Module V Distribution of water -Introduction, Requirement of distribution system, Methods of distribution, System of water supply, Methods of distribution system, Layout of distribution system, Wastage of water, Detection of leakage in water.	[8]

Text Books:
Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan, Thompson / Brooks/Cole; Second Edition 2008.
Introduction to Environmental Engineering, Vesilind, PWS Publishing Company 2000
Reference Books:
Integrated Solid Waste Management, Tchobanoglous, Theissen & Vigil. McGraw Hill Publication
Environmental Engineering by H.S. Peavy, D.R. Rowe, G. Tchobanoglous; 2007, Tata-Mcgraw Hill.
https://nptel.ac.in/courses/103/107/103107084/

Remote Sensing And GIS	ECE43106	L: T: P-3-0-0	3 Credits	Contact Hours
Module 1: Introduction to Remote Sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, Radiation Characteristics, Spectral Information, Spatial Information, Classification of RS.				[10]
Module 2: Types and Radiation principles: Types of RS, Imaging System, Solar Irradiation, Spectral Reflectance Signature, Images & their classification, Radiation Principles – Planck's Law, Stephens Boltzmann Law, Kirchhoff's Law.				[8]

Module 3: Sensors and Applications: Sensors, SPOT HRV and HRVIR Instrument Characteristics, Remote sensing in the optical domain and their Application, Electromagnetic Spectrum	[10]
Module 4: Geographic Information System: Introduction, key components, System application areas of GIS map projections, Data entry and preparation: spatial data input, raster data models, vector data models	[8]
Module 5: Application to Hydrology and Water Resources: Flood zoning and mapping, groundwater prospects and potential recharge zones, watershed management.	[9]

Text Books:	
1	Campbell, J.B. Introduction to Remote Sensing (2nd Ed), Taylor and Francis, London, 1996.
2	Harris R., "Satellite Remote Sensing: An Introduction", Routledge & Kegan Paul, 1987.
3	Jensen, J. R., <i>Remote Sensing of the Environment: An Earth Resource Perspective</i> , Prentice Hall, New Jersey, 2000. (Excellent on RS but no image processing).
Reference Books:	
1	Kumar S, 'Basics of Remote sensing & GIS' by Laxmi Publications, New Delhi, 2005.
2	Burrough P. A. and McDonnell R. A., 'Principals of Geographical Information Systems', Oxford University Press, 1998.
3	KandTsung Chang, 'Introduction to Geographic Information Systems', McGraw Hill, Higher Education, 2009.
4	https://nptel.ac.in/courses/105/103/105103193/

Advanced Construction Materials and Techniques	ECE43108	L:T:P - 3-0-0	3 Credits	Contact Hours
Module 1: Modern Materials and Equipment used in Special Constructions: Features and functions of the special types of civil engineering structures: Multistoried building, Chimney, Elevated service reservoir, Dams and retaining walls, Bridges and hydraulic structures, Industrial structures, Marine and offshore structures, Tall structures. Effect of lateral forces on building like Wind, Water and Earthquake Admixtures and its Classification: Use of Waste products and Industrial By products in bricks, blocks, concrete and mortar. Hauling equipment: Trucks, Wagon, Dumpers, Scrapers and rippers. Hoisting equipment: Derrick- Pole, Gin Pole, Crane, Power driven scotch derrick crane, Hand operated crane, Locomotive crane, Gentry crane, Tower crane, Lattice Girder, Winches, Elevators, ladders. Conveying equipment: Belt conveyors, Buckets, Chutes Pumping equipment: Water pumps and concrete pumps. Compacting equipment: Rollers (earth compaction), Smooth surface roller, sheep foot roller, pneumatic rollers, tamping roller, vibrating roller and compactors. Pile Driving Equipment: including types of hammer driving, drilling equipment with types of drill. Vibrators: for concrete consolidation: Internal, Needle, Surface, Platform and form vibrators.				[10]
Module 2: Excavation and related Equipment Shallow and deep excavation, Dewatering situations, necessity and method of dewatering. Excavations Machinery: Power Shovel, Drag line, Calm Shell, Scoop, Trenching equipment, Wheel mounted belt loaders. Earth moving Vehicles: Tractors, Boulders, Graders, Scrapers, Rippers. Earth moving machinery: Handling, Hoisting, Conveying, Pumping, and Compacting, Pile driving, Drilling equipment, Plants for Grouting, Guniting and Hot Mix Plant, Concrete Mix Plant, Ready Mix Plant.				[10]
Module 3: Pile Foundation Pile foundations, Classification, Sheet piles based on materials, Classifications of piles based on materials like concrete, steel, timber, composite, sand, concrete (pre-cast, Cast –in – situ, Pre-stressed) including cased and uncased with advantages and disadvantages, Selection of type of piles, Pile accessories and tools, Pile driving methods, Failure or settlement of piles, Under reamed piles including method of it' construction, Group action of piles and its efficiency.				[10]
Module 4: Drilling and Blasting Drilling: Types, Drilling requirements, Selecting the drilling pattern for blasting, Effect of air pressure on drilling operation, Betonies/mud slurry in drilling, Factors affecting the selection of drilling method and equipment Explosives for blasting: Dynamite, Blasting caps Prime line, Safety fuse, Stemming, Blast hole, Prime detonators, Process of using explosive, Types of blasting, Precautions, Storage of explosives Erection of Steel Structures Formwork: Requirements of a good form work, Loads, guiding points for design, Column form work, Slab and beam formwork, Slip from work, Hanging form works and Trestles, Form work for domes and arches, Cantilever method of Pre- stressed concrete				[7]

bridge construction, Roof truss: erection problems Building / Industrial component, Equipment and tackles used for erecting these, Plate girder Launching a portion of bridge Girder, Large span lattice girder, Erection of chimney	
Module 5: Composites: Plastics -Reinforced Polymers - Fiber Reinforced Plastics - Cellular cores - Types of Polymer concrete composites - Properties of composites - Ferro-cement Smart and Intelligent Materials: Brief outline and uses - Smart materials - Types of smart and intelligent materials - Usage in advanced construction - Smart structures - energy efficient building constructions. Other Materials: Applications. Water proofing compounds - Non-weathering materials - Flooring and facade Materials - Accelerating mixtures - Air entraining admixtures - Mineral admixtures –Super - plasticizers - Applications. Bitumen: Bitumen chemistry – Traditional properties – Susceptibility parameters – ageing of bitumen.	[8]

Text Books:	
1	Building construction, S.P. Arora and S.P. Bindra, Dhanpat Rai Publications
2	Building Construction Engineering, Gurcharansingh, Jain Book Agency
3	Building construction, S.C. Rangwala, Charotar Publishing House Pvt. Ltd. Anand
Reference Books:	
1	Building construction, B.C. Punmia, Laxmi Publication, New Delhi
2	Relevant IS codes, BIS, New Delhi
3	https://nptel.ac.in/courses/105106053/

Advanced Structural Analysis	ECE43110	L:T :P- 3-0-0	3 Credits	Contact Hours
Module 1: Approximate analysis of building frames-Cantilever and portal method.				[5]
Module 2: Matrix methods in structural analysis;Flexibility and Stiffness method; Elements of matrix algebra;				[22]

Application of matrix methods to plane truss; continuous beam & frames.	
Module 3: Finite Difference and Relaxation technique-Application to simple problems.	[8]
Module 4: Finite Element Technique in structural analysis - Fundamental concept, Finite Element modeling, Finite element formulation to One Dimensional Problems.	[10]

Text Books:	
1	Matrix method of structural analysis, New Age International Publishers, M.B.Kanchi
2	An Introduction to the Finite Element Method, McGraw Hill, 2006. Huebner, K.H., Thornton, E.A., and Byrom, T.G.
3	The Finite Element Method for Engineers, John Wiley & Sons, 1995.
Reference Books:	
1	“Advanced Structural Analysis”, Devdas Menon, Narosa
2	https://nptel.ac.in/courses/105106050/

Intelligent Waste Management	CEH43102	L:T :P- 3-1-0	4 Credits	Contact Hours
Module-1 Introduction: Introduction, Need for improvement in waste management system, Features of smart waste management system, Advantages of smart waste management system, Application of smart waste management system, Equipment of smart waste management system, working principle.				[12]
Module -2				[12]

Solid Waste Management- Definition, Concept of 4'R's (reduce, reuse, recycle and recover) of waste management, Elements of a waste management system, Current Issues in Solid Waste Management, Integrated Waste Management Hierarchy: Source reduction, Recycling, Waste-to-Energy and Landfilling. Review of waste management under Swachh Bharat Mission and Smart Cities Program.	
Module-3 Municipal Solid Waste: Waste Composition and Quantities, Collection, Transportation, Segregation, and Processing. Disposal of Municipal Solid Waste: Landfill, Biochemical Processes and Composting, Energy Recovery from Municipal Solid Waste. Municipal Solid Waste (MSW) Rules 2016	[12]
Module-4 Liquid Waste Management: Introduction, Public health importance of waste water/sewage, Classification of liquid waste/sewage, Waste water/sewage composition, Points to be considered before selecting one particular sewage disposal techniques, Liquid waste disposal methods at the rural communities/household level, Sewage/wastewater treatment.	[12]
Module-5 Construction and Demolition (C&D) Waste Management: -Overview, Components; C&D Waste Management Rules 2016, Beneficial Reuse of C & D Waste Materials. Electronic Waste (E-Waste) Management: – Issues and Status in India and Globally, E-Waste Management Rules 2016 and Management Challenges. Contaminated Waste Management:- Introduction, Purpose of contaminated waste management, Collection and disposal of contaminated waste, Remedial alternatives.	[12]

Text Books:	
1	George Tchobanoglous, Hilary Theisen and Samuel A Vigil, Integrated Solid Waste management, Tata McGraw Hill.
2	Vesilind PA, Worrell W and Reinhart D, Solid Waste Engineering' Brooks/Cole Thomson Learning Inc., 2002
3	Sasikumar, K, Gopi Krishna, Sanoop, Solid Waste Management; 2009, PHI
Reference Books:	
1	Ramachandra T.V., Management of Municipal Solid Waste, 2009; by The Energy and
2	Resource Institute, TERI
3	Peavy, H.S, Rowe, D.R., and G. Tchobanoglous, Environmental Engineering, McGraw Hill Inc., N.York, 1985

Smart Materials and Infrastructure	CEH43104	L:T :P- 3-0-0	3 Credits	Contact Hours
Module-1				[9]

Introduction: Introduction to Smart Materials and Structures – Instrumented structures functions and response – Sensing systems – Self-diagnosis – Signal processing consideration – Actuation systems and effectors.	
Module -2 Measuring techniques: Strain Measuring Techniques using Electrical strain gauges, Types – Resistance – Capacitance– Inductance – Wheatstone bridges – Pressure transducers – Load cells – Temperature Compensation – Strain Rosettes.	[9]
Module-3 Sensors: Sensing Technology, Types of Sensors, Physical Measurement using Piezo Electric Strain measurement – Inductively Read Transducers, The LVDT – Fiber optic Techniques. Chemical and Bio-Chemical sensing in structural Assessment, Absorptive chemical sensors, Spectroscopes, Fiber Optic Chemical Sensing Systems and Distributed measurement.	[9]
Module-4 Actuators: Actuator Techniques, Actuator and actuator materials , Piezoelectric and Electrostrictive Material ,Magneto-structure Material,Shape Memory Alloys, Electro rheological Fluids– Electromagnetic actuation, Role of actuators and Actuator Materials.	[9]
Module-5 Signal processing and control systems: Data Acquisition and Processing, Signal Processing and Control for Smart Structures, Sensors as Geometrical Processors, Signal Processing – Control System – Linear and Non-Linear.	[9]

Text Books:	
1	Brain Culshaw, Smart Structure and Materials, Artech House Publication.
2	L. S. Srinath, Experimental Stress Analysis, Tata McGraw Hill.
3	J. W. Dally & W. F. Riley, Experimental Stress Analysis, Tata McGraw Hill
Reference Books:	
1	“Smart Material and Structure”, Peter L. Reece, Nova Publishers
2	https://nptel.ac.in/courses/112104251/
3	https://nptel.ac.in/courses/105106115/

Environmental Engineering Lab	ECE43202	L:T :P- 0-0-3	Credit: 2
EXP. NO.01	Determination of turbidity for a given sample of water		
EXP. NO.02	Determination of color for a given sample of water		
EXP. NO. 03	Determination of solids in a given sample of water: Total Solids,		
EXP. NO.04	Determination of Suspended Solids and Dissolved Solids		
EXP. NO.05	Determination of pH for a given sample of water		
EXP. NO.06	Determination of concentration of Chlorides in a given sample of water		
EXP. NO.07	Determination of carbonate, bi carbonate and hydroxide alkalinity		
EXP. NO.08	Determination of hardness for a given sample of water		
EXP. NO.09	Determination of the Optimum Alum Dose for a given sample of water by Jar Test		
EXP. NO.10	Determination of amount of Dissolved Oxygen (DO) in a given sample of water		
EXP. NO.11	Determination of the Biochemical Oxygen Demand (BOD) for a given sample of waste water		
EXP. NO. 12	Determination of the Chemical Oxygen Demand (COD) for a given sample of waste water		
EXP. NO.13	Determination of the Residual Chlorine in a given sample of water		

Estimation & Valuation	ECE43204	L:T :P- 0-0-3	3 Credits	Contact Hours
Module-1 Types of estimates :Types of estimates, approximate estimates, items of work, unit of measurement, unit rate of payment, quantity estimate of a single storied building, bar bending schedule , details of measurement and calculation of quantities with cost, bill of quantities,				[15]
Module -2 Analysis of rate: abstract of quantities, estimate of quantities of road, underground reservoir, surface drain, septic tank Analysis of rates: Earthwork, brick flat soling, DPC, PCC and RCC, brick work, plastering, flooring and finishing				[10]
Module-3 Specification of works Specification of materials: Brick, cement, fine and coarse aggregates				[10]

Specification of works: Cement concrete, reinforced cement concrete, first class brickwork, cement plastering, pointing, white washing, colour washing, distempering, lime punning, painting and varnishing	
Module-4 Valuation : Values and cost, gross income, outgoing, net income, scrap value, salvage value, market value, Book Value, sinking fund, capitalised value, Y. P., depreciation, obsolescence, deferred income, freehold and leasehold property, mortgage, rent fixation, valuation table	[10]

Text Books:	
1	Estimating, Costing, Specification & Valuation M. Chakraborty Self
2	Estimating Costing And Valuation N R Rangwala Charotar Publishing House Pvt.Ltd
3	Civil Estimating & Costing: Including Quality Surveying, Tendering A.K. Upadhyay S K Kataria and Sons
Reference Books:	
1	“ A Textbook of Estimation and Costing”, D.D.Kohli& Ar. R.C. Kohli, S. Chand Publication
1	SP: 34 (BIS)

Remote Sensing and GIS Lab	ECE43206	L:T :P- 0-0-3	Credit: 2
Exp. No.01	Advance DIP Fuzzy, ANN, Expert system, Image Segmentation etc.		
Exp. No.02	SAR Interferometry and its applications		
Exp. No. 03	Analysis of hyperspectral satellite data		
Exp. No.04	GIS customization concepts Concept and approaches of Multi-criteria decision making		
Exp. No.05	Geo-statistics		
Exp. No.06	Demonstrations and assignments		

Reference Books:

1	Rao, U. R. Space Technology for Sustainable development. New Delhi, Tata McGraw-Hill, 1996.
2	J. R., M.G. Chandrasekhar and V. Jayaraman. Space and Agenda 21-caring for the planet earth. Bangalore, prism Books, 1995.
3	I Chang, Hyperspectral Imaging: Techniques for Spectral Detection and Classification, Springer; 1 edition (July 31, 2003).
4	Andrew Skidmore, Environmental Modelling with GIS and Remote Sensing, Published 2002 CRC Press

Advanced Structural Analysis Lab	ECE43208	L:T :P- 0-0-3	Credit: 2
Exp. No.01	ction of STAAD for building structures.		
Exp. No.02	ng structural systems for symmetric and unsymmetric building structures.		
Exp. No. 03	ving and assigning of various types of loads on structural systems as per codal provisions.		
Exp. No.04	ving analysis and performing analysis.		
Exp. No.05	Modelling and analysis of steel structures.		

Reference Books:	
1	IS: 456 – 2000, “Indian Standard for Plain and Reinforced Concrete – Code of Practice”, Bureau of Indian Standard.
2	IS: 875 (Part -1, 2, 3, 4) – 1987, “Indian Standard Code of Practice for Design Loads (other than Earthquake) for Building and Structures”, Bureau of Indian Standard.
3	IS: 1893 (Part 1) – 2002, “Indian Standard Criteria for Earthquake Resistant Design of Structures”, Bureau of Indian Standard.
4	STAAD’s tutorial help.

Intelligent Waste Management Lab	CEH43202	L:T :P- 0-0-3	Credit: 2
Exp. No.01	onal elements of waste generation,		
Exp. No.02	teristics of Solid waste,		
Exp. No. 03	ion of solid waste at source-on site segregation of solid waste-Recycling and Reuse Need for transfer and transport,		
Exp. No.04	nical methods with or without compaction, economy in transportation of waste optimization of transportation routes,		
Exp. No.05	ation, reduction at source,		
Exp. No.06	pal solid waste in Indian conditions,		
Exp. No.07	al and Collection of liquid waste,		
Exp. No.08	and segregation of hazardous waste,		
Exp. No.09	spects of solid waste disposal		

Reference Books:	
1	George Tchobanoglous, Hilary Theisen and Samuel A Vigil, Integrated Solid Waste management, Tata McGraw Hill.
2	Vesilind PA, Worrell W and Reinhart D, Solid Waste Engineering' Brooks/Cole Thomson Learning Inc., 2002
3	Sasikumar, K, Gopi Krishna, Sanoop, Solid Waste Management; 2009, PHI
4	Ramachandra T.V., Management of Municipal Solid Waste, 2009; by The Energy and
5	Resource Institute, TERI
6	Peavy, H.S, Rowe, D.R., and G. Tchobanoglous, Environmental Engineering, McGraw Hill Inc., N.York, 1985

ADAMAS UNIVERSITY
B. Tech Civil Engineering
SEMESTER – VII

HSSM-V(Industrial Management)		L:T :P- 3-0-0	3 Credits	Contact Hours
Module 1: Basic concepts of management: Definition, Essence, Functions, Roles, Level, Evolution and Foundations of Management Theories - Classical and Neo - Classical Theories, Systems Approach to organization, Modern Organization Theory.				[8]
Module 2:				[7]

Functions of Management: Planning – Concept, Nature, Types, Analysis, Management by objectives; Organisation Structure – Concept, Structure, Principles, Centralization, Decentralization, Span of Management; Organisational Effectiveness		
Module 3: Staffing: Meaning, Job analysis, Manpower planning, Recruitment and selection, Retention: Transfers and Promotions, Appraisals, Management Development, Job Rotation, Training, Rewards and Recognition. Leadership: Concept, Nature, Styles. Decision making: Concept, Nature, Process, Tools & techniques. Directing: Concept, Principles, Process, and Elements. Motivation: Concepts and Theories (Maslow’s Need Hierarchy Theory, Herzberg Two Factor Theory, Theory X & Y), ERG Theory. Communication: Concept, Process, Types, Barriers, Effective Communication. Leadership: Concept, Qualities of a Good Leader, Coordination.		[15]
Module 4: Management and Society: Concept, External Environment, CSR, Corporate Governance, Ethical Standards. People Management: Overview, Job design, Recruitment & Selection, Training & Development, Stress Management. Managerial Competencies: Communication, Motivation, Team Effectiveness, Conflict Management, Creativity, Entrepreneurship.		[7]
Module 5: Management Control: Meaning, Nature, Features, Objectives and Process of Management Control and Behavioural Aspects of Management Control, Need for Control system, techniques of control and linkage between planning and control. Operations & Technology Management: Production & Operations Management, Logistics & Supply Chain Management, TQM, Kaizen & Six Sigma, MIS.		[8]
Text Books:		
1	Management: Principles, Processes & Practices – A Bhat& A Kumar, Oxford University Press India (OUP)	
2	Essentials for Management – H Koontz, Revised edition, Tata McGraw Hill (TMH)	
3	Management –K Ghuman, Tata McGraw Hill(TMh)	
Reference Books:		
1	Management – A. F. Stoner James,Pearson	
2	“ General and Industrial Management”, Henri Fayol, Martino Fine Books	

Air Pollution Control Engineering	ECE 44101	L:T :P- 3-0-0	3 Credits	Contact Hours
Module 1: Introduction: Air Pollution: Definitions, Scope, Significance and Episodes, Air Pollutants Classifications, Natural and Artificial, Primary and Secondary, point and Non-Point, Line and Areal Sources of air pollution, stationary and mobile sources.				[9]
Module 2: Effects and causes of pollutants: Effects of Air pollutants on man, material and vegetation; Global effects of air Pollution: Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.				[8]

Module 3: Meteorology: Thermodynamics and Kinetics of Air-pollution, Applications in the removal of gases like SO _x ; NO _x ; CO; HC etc., air-fuel ratio. Computation and Control of products of combustion. Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity; Influence of Meteorological phenomena on Air Quality wind rose diagrams.	[9]
Module 4: Plume behaviours: Lapse Rates, Pressure Systems, Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion. Control of particulates matter: Control at Sources, Process Changes, Equipment modifications, Design and operation of control. Equipment's – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.	[10]
Module 5: General Methods of Control of NO_x and SO_x emissions: In-plant Control Measures, process changes, dry and wet methods of removal and recycling. Air Quality Management – Monitoring of SPM, SO _x ; NO _x and CO Emission Standards.	[9]

TEXT BOOKS :	
1	Air pollution By M. N. Rao and H. V. N. Rao – Tata McGraw Hill Company.
2	Air pollution by Wark and Warner. – Harper & Row, New York.
3	Air pollution and control by K.V.S.G. Murali Krishna, Kaushal Publishers. Kakinada
Reference Books:	
1	“Air Pollution Control Engineering”, Noel De Nevers, Waveland Pr. Inc
2	https://nptel.ac.in/courses/105/104/105104099/

Construction Planning And Management	ECE44103	L:T :P- 3-0-0	3 Credits	Contact Hours
Module 1: Project Management: Introduction, Construction stages, Elements of Construction Management, Tools of Construction management, Planning, Scheduling and Controlling, Methods of construction Management, Steps in construction Planning, Work breakdown Structure, Coding				[9]

Module 2: Fundamentals of network: Activity, Type of activities, Event, type of events , Relationship between Activities-- Activity on Arrow, Activity on node, Dummy activity, Planning of network construction , Precedence relationships	[9]
Module 3: PERT and CPM analysis: Time estimation - Deterministic approach. Probabilistic approach, Frequency distribution Probability distribution PERT calculations- Expected time Event time, Slack Critical path, Probability of completion of project CPM analysis: Time estimate of an analysis, Floats, Critical path Project cost control – Crashing /time cost trade off	[10]
Module 4: Construction Plants and Equipment – Introduction, Common construction equipment's, Excavating equipment's--Scraper, Trenching Machine, Hauling equipment, Equipment for compaction of earth Conveying equipment, Hoisting equipment, Concrete production equipment	[8]
Module 5: Construction personal and safety Management - Manpower planning, Organization charts, Staffing, Planning, Compensation- wages and salary, Employee benefit- safety and health, Safety of accidents, Prevention of accidents. Safety measures.	[9]

Text Books :
1. M. S. Shetty, Concrete technology, S.Chand& Co.
2. S. P.Arora, Building construction, Dhanpat Rai & Sons, New Delhi.
3. Dr.Mahesh Varma, Construction Equipment and its Planning and Application, Metropolitan Book Company. 4. R.L.Peurifoy, W.B.Ledbetter, Construction Planning, Equipment, and methods, Tata Mc Graw Hill.
Reference Books :
1. Chitkara, Construction Project Management Planning scheduling and control Mc GrawHill 6.
2. B.L.Gupta, Amit Gupta, Construction Management and Accounts, Standard publishers and Distributors.
3. James.D. Steevens, Techniques for Construction Network Sheduling, McGraw Hill
4. https://nptel.ac.in/courses/105103093/

Advanced RC Design	ECE 44105	L:T :P- 3-0-0	3 Credits	Contact Hours
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Module 1: Design of Flat slab: Introduction, classification, behaviour of flat slabs, direct design and equivalent frame method of design, I.S codal provisions. Yield Line Theory: Assumption, Rules and Method of Analysis.	[11]
Module 2: RCC water tank: Design of rectangular and circular water tanks- Underground and overhead.	[10]
Module 3: RCC Retaining wall: Design of cantilever and counter-fort retaining walls.	[9]
Module 4: Shells and Folded plates: Forms of shells and folded plates, structural behaviour of cylindrical shell and folded plate, method of analysis, membrane analysis, beam arch approximation, codal provisions, design of simply supported circular and cylindrical long shells and folded plates.	[15]

Text Books:	
1	Krishnaraju, N., <i>Advanced Concrete Design</i> , CBS Publishers and Distributors, Delhi, 1986
2	Varghese, P.C., <i>Advanced Reinforced Concrete Design</i> , Pretince-Hall India, 2nd edition.
3	Ramaswamy, G.S., <i>Design and Construction of Concrete Shell Roofs</i> , CBS Publishers. 1986.
4	Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, <i>Reinforced Concrete Structures</i> , Laxmi Publications, New Delhi, 1988.
Reference Books:	
1	Code of practice for Plain and Reinforced Concrete IS456-2000, BIS, New Delhi
2	Design Aids for Reinforced Concrete to IS 456, Special Publication (SP16), BIS New Delhi, 1980.
3	https://www.youtube.com/watch?v=undsd92MM8w&list=PLbQQO4xhI7wEDIYv90NoF7veaJlohpuf0Q

Repair and Rehabilitation of Structures	ECE44107	L:T :P- 3-0-0	3 Credits	Contact Hours
Module 1: Deterioration of concrete in structures: Physical processes of deterioration like Freezing and Thawing, Wetting and Drying, Abrasion, Erosion, Pitting, Chemical processes like Carbonation, Chloride ingress, Corrosion, Alkali aggregate reaction, Sulphate attack Acid attack, temperature and their causes, Mechanism, Effect, preventive measures. – Cracks: Cracks in concrete, type, pattern, quantification, measurement & preventive measures				[9]
Module 2: Non Destructive Testing: Non-destructive test methods for concrete including Rebound hammer, Ultrasonic pulse velocity, Rebar locator, Corrosion meter, Penetration resistance and Pull out test, Core cutting- Corrosion: Methods for corrosion measurement and assessment including half-cell potential and resistivity, Mapping of data.				[9]
Module 3 Failure of buildings: Definition of building failure-types of failures- Causes of Failures- Faulty Design, Accidental over Loading, Poor quality of material and Poor Construction practices- Fire damage – Methodology for investigation of failures-diagnostic testing methods and equipment-repair of cracks in concrete				[9]
Module 4: Materials for repair and rehabilitation -Admixtures- types of admixtures- purposes of using admixtures- chemical composition- Natural admixtures- Fibres- wraps- Glass and Carbon fibre wraps- Steel Plates-Concrete behaviour under corrosion, disintegrated mechanisms- moisture effects and thermal effects – Visual investigation- Acoustical emission methods- Corrosion activity measurement- chloride content – Depth of carbonation- Impact echo methods- Ultrasound pulse velocity methods- Pull out tests.				[9]
Module 5: Repair Techniques: Grouting, Jacketing, Shotcreting, externally bonded plates, Nailing, Underpinning and under water repair; Materials, Equipments, Precautions and Processes. Investigation of structures: Distress, observation and preliminary test methods. Case studies: related to rehabilitation of bridge piers, dams, canals, heritage structures, corrosion and erosion damaged structures				[9]

Text Books:	
1	Maintenance & Repair of Civil Structures' by B.L. Gupta & Amit Gupta.
2	'Rehabilitation of Concrete Structures' by B. VidiVELLI, Standard Publishers
3	'Concrete Bridge Practice Construction, Maintenance & Rehabilitation' by V. K. Raina
Reference Books:	
1	'Concrete Structures- protection Repair and Rehabilitation' by R. Doodge Woodson, BH Publishers
2	"Deterioration, Maintenance and Repair of Structures" by Johnson, McGraw Hill
3	https://nptel.ac.in/courses/105/106/105106202/

Prestressed Concrete	ECE44109	L:T :P- 3-0-0	3 Credits	Contact Hours
Module 1: Introduction: Basic concepts , High strength concrete, high tensile steel, terminology, system of pre-stressing, pre-tensioning, post-tensioning, principle of pre-stressing, types of pre-stressing.				[8]
Module 2: Analysis for Stresses: Assumptions, analysis of pre-stress, concentric & eccentric tendon, resultant stresses, concepts of pre-stressing - stress concept, strength concept and load balancing concept, analysis of stresses of composite construction of pre-stressed and in-situ concrete. Losses of Pre-stress: Losses of pre-stress, types, losses due to elastic deformation of concrete, shrinkage of concrete, creep of concrete , friction , anchorage slip.				[10]
Module 3: Deflection of Pre-Stressed Member: Effect on tendon profile on deflections, Factors influencing deflections, Calculation of deflections – Short term deflection, long term deflections, permissible limits of deflection. Check of deflection according to IS:1343 code recommendations.				[8]
Module 4: Limit State Design Criteria: Inadequacy of Ultimate load method, criteria for limit states, strength and serviceability, design of flexural members, check of serviceability according to IS:1343 End Zone Stresses In Pre-Stressed Members: Pretension transfer bond, transmission length, end block of post-tensioned members.				[11]
Module - 5: Strength of Pre-Stressed Concrete: Types of flexural failure strain compatibility method, IS code procedure design for limit state of shear, torsion. Design of Pre-Stressed Concrete: Types of Pre-stressed concrete slab, design of one-way slab, design of two-way slab. Design of electric poles.				[10]

Text Books:	
1	“Pre-stressed Concrete”, N. Krishna Raju, Tata McGraw-Hill, 7th edition , 2015
2	“Reinforced Concrete Design”, Unnikrishna Pillai S and Deavadas Menon, Tata MacGraw Hill Publishing Company Limited, 2nd Edition, New Delhi, 2003
3	Code of Practice for pre-stressed concrete structures, IS: 1343, BIS, 2009
Reference Book:	
1	“Prestressed Concrete”, S.Ramamrutham, Dhanpat Rai Publishing Company
2	https://nptel.ac.in/courses/105106117/

Environment Impact Assessment	ECE44111	L:T :P- 3-0-0	3 Credits	Contact Hours
Module 1: EIA: The Need for EIA, The EIA Cycle and Procedures, -Screening Scoping, Baseline Data, Impact Prediction, Assessment of Alternatives, Delineation of Mitigation Measure and EIA Report, Public Hearing, Decision Making, Components of EIA, Roles in the EIA Process, Government of India Ministry of Environment and Forest Notification (2000)				[9]
Module 2: Identifying the Key Issues: Key Elements of an Initial Project Description and Scoping, Project Location(s), Land Use Impacts, Consideration of Alternatives, Process selection, Construction, Phase Input Requirements Wastes and Emissions Air Emissions Liquid Effluents. Risks to Environment and Human, Health, Socio-Economic Impacts, Ecological Impacts, Global Environmental Issues.				[9]
Module 3: EIA Methodologies: Criteria for the selection of EIA methodology, Impact identification, Impact measurement, Impact interpretation & Evaluation, Impact communication, Methods Adhoc Methods-Checklists Methods Matrices methods, Networks methods Overlays methods. Environmental index using factor analysis- Predictive or Simulation methods, Rapid assessment of Pollution sources method, predictive models for impact assessment, Applications for RS and GIS.				[9]
Module 4: Reviewing the EIA Report: Scope, Baseline Conditions, Site and Process alternatives, Public hearing. Construction Stage Impacts, Project Resource Requirements and Related Impacts, Prediction of Environmental Media Quality, Socio-economic Impacts Ecological Impacts Occupational Health Impact Major Hazard/ Risk Assessment, Impact on Transport System				[9]
Module 5: Integrated Impact Assessment. Review of EMP and Monitoring: Environmental Management Plan Identification of Significant or Unacceptable Impacts Requiring Mitigation, Mitigation Plans and Relief and Rehabilitation Stipulating the Conditions, Case Studies: Preparation of EIA for developmental Projects-Factors to be considered in making assessment decisions, Water Resources Project, thermal plant, Nuclear fuel complex, Highway project, Sewage treatment plant, Municipal Solid waste processing plant, Tannery industry.				[9]
Text Books :				
1	Canter, L.W., Environmental Impact Assessment, McGraw Hill Pub. Co., 1997.			
2	David P. Lawrence, Environmental Impact Assessment: Practical Solutions to Recurrent Problems, John Wiley & Sons,2003.			
3	Anjaneyulu.Y., and Manickam. V., Environmental Impact Assessment Methodologies, B.S. Publications, Hyderabad, 2007.			
Reference Books:				
1	“Environmental Impact Assessment”, Dr.S. Ramachandran, AIRWALK Publications			

2	https://nptel.ac.in/courses/120108004/
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Artificial Intelligence in Infrastructure	CEH44103	L:T :P- 3-0-0	3 Credits	Contact Hours
Module 1: Introduction: Overview, History of AI, Evaluation of AI application				[5]
Module 2: Search: Problem spaces, Heuristic search strategy, Search and optimization, Planning and scheduling, Heuristic search strategy, Adversarial search, Local search algorithms and optimization problem Planning: Time, schedule and process, hierarchical planning, planning in non-deterministic domain, multi-agent planning				[12]
Module 3: Learning: Forms of learning, supervised learning, Learning decision trees, Artificial Neural Network, Practical machine learning				[10]
Module 4: Communicating, perceiving and acting: Natural language for processing and communication- Language models, text classification, information retrieval and extraction; Syntactic analysis, machine translation, speech recognition				[10]
Module 5: Robotics: Robot hardware, robotic perception, Robotic software architectures, application domains Infrastructure for AI: Parallel and distributed computing, Resolving technical tradeoffs, future application of AI, Case Studies				[8]

Text Books:	
1	sell, P. Norvig, Artificial Intelligence: A Modern Approach, Prentice Hall
2	Samui, DwarkadasPralhaddasSamui, Artificial Intelligence in Civil Engineering, Lambert Academic Publishing
3	d. E. Nopolitan, Xi Jiang, Artificial Intelligence with an introduction to Machine Learning, Chapman and Hall/ CRC
Reference Books:	
1	Artificial Intelligence Now”, O’Reilly Media Inc.
2	nptel.ac.in/courses/106106126/

Air Pollution Control Lab	ECE44201	L:T :P- 0-0-3	Credit: 2
Exp. No.01	Stack monitoring		
Exp. No.02	Ambient air monitoring for PM ₁₀ , SO ₂ and NO ₂		
Exp. No. 03	Measurement of meteorological parameters (wind velocity, wind direction, humidity, temperature, solar in solution, rain fall) and drawing wind rose diagram		
Exp. No.04	Determination of HC and CO		
Exp. No.05	Determination of O ₃		
Exp. No.06	Laboratory scale study on few air pollution control devices		

Reference Books:	
1	W.H.O.: Selected Methods of Measuring Air Pollutants
2	Pandey and Carney: Environmental Engineering
3	Keshav Kant and Rajni Kant, “Air Pollution and Control Engineering”, Kannna Publishing House

Construction Planning and Management Lab	ECE44203	L:T :P-0-0-3	Credit: 2
Exp. No.01	Quantity takeoff, Preparation and delivery of the bid or proposal of an engineering construction project		
Exp. No.02	PERT and CPM - Software Development - Use of MS Project & PRIMAVERA		
Exp. No. 03	Estimation of a single storey building		
Exp. No.04	Scheduling of a small construction project using tools like MS project scheduling systems including reports and tracking		

Exp. No.05	Scheduling and allocation of resources
Exp. No.06	Scheduling of a small construction project using Primavera scheduling systems including reports and tracking
Exp. No.07	Resource leveling, resource list, resource allocation, Resource loading, Cumulative cost
Exp. No.08	Deterministic and Probabilistic Inventory Models - Software applications
Exp. No.09	Decision Making – Baye’s Theory

Advanced RC Design Lab	ECE44205	L:T :P-0-0-3	Credit: 2
Exp. No.01	Selection and assigning of member properties for different structural components.		
Exp. No.02	Summarization and shortlisting of load cases for design of 3D frame structures.		
Exp. No. 03	Design of different elements of structures.		
Exp. No.04	Specifying and assigning of design parameters for different structural components as per codal provisions.		
Exp. No.05	Checking and validation of design results as per codal guidelines.		

Reference Books:	
1	IS: 456 – 2000, “Indian Standard for Plain and Reinforced Concrete – Code of Practice”, Bureau of Indian Standard.
2	IS: 1893 (Part 1) – 2002, “Indian Standard Criteria for Earthquake Resistant Design of Structures”, Bureau of Indian Standard.
3	STAAD’s tutorial help.

Artificial Intelligence in Infrastructure Lab	CEH44201	L:T :P-0-0-3	Credit: 2
Exp. No.01	Write a prolog program to study fact, verification, domain, predicate and clauses section		
Exp. No.02	Write a program for 8-Queen problem		
Exp. No. 03	Write a program to solve Traveling Salesman Problem		
Exp. No.04	Write a program to read address of a person using compound variable		
Exp. No.05	Write a MATLAB program to plot a few activation functions that are being used in neural networks		
Exp. No.06	Generate AND NOT function using McCulloch-Pitts neural net by a MATLAB program		
Exp. No.07	With a suitable example simulate the perceptron learning network and separate the boundaries using MATLAB. Plot the points assumed in the respective quadrants using different symbols for identification		
Exp. No.08	Application of python programming in robotics		
Exp. No.09	Decision making algorithms for autonomous robots		
Exp. No.10	Experiments with movements of robots		

Reference Books:	
1	Joseph, Learning Robotics using Python, PACKT publishers
2	Samui, DwarkadasPralhaddasSamui, Artificial Intelligence in Civil Engineering, Lambert Academic Publishing
3	d. E. Napolitan, Xi Jiang, Artificial Intelligence with an introduction to Machine Learning, Chapman and Hall/ CRC

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SEMESTER – VIII

Intelligent Transportation System	CEH44102	L:T :P- 3-0-0	3 Credits	Contact Hours
Module 1: Fundamentals of ITS: Definition of ITS, the historical context of ITS from both public policy and market economic perspectives, Types of ITS; Historical Background, Benefits of ITS.				[6]
Module 2: Sensor technologies and Data requirements of ITS: Importance of telecommunications in the ITS. Information Management, Traffic Management Centers (TMC). Application of sensors to Traffic management; Traffic flow sensor technologies; Transponders and Communication systems; Data fusion at traffic management centers; Sensor plan and specification requirements; Elements of Vehicle Location and Route Navigation and Guidance concepts; ITS Data collection techniques – Detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI), GIS, video data collection.				[9]
Module 3: ITS User Needs and Services and Functional areas- Introduction, Advanced Traffic Management systems (ATMS), Advanced Traveller Information systems (ATIS), Commercial Vehicle Operations (CVO), Advanced Vehicle Control systems (AVCS), Advanced Public Transportation systems (APTS), Advanced Rural Transportation systems (ARTS).				[9]
Module 4: ITS Architecture– Regional and Project ITS architecture; Concept of operations; ITS Models and Evaluation Methods; Planning and human factor issues for ITS, Case studies on deployment planning and system design and operation; ITS and safety, ITS and security, ITS as a technology deployment program, research, development and business models, ITS planning.				[10]
Module 5: ITS applications:				[11]

Traffic and incident management systems; ITS and sustainable mobility, travel demand management, electronic toll collection, ITS and road-pricing.; Transportation network operations; commercial vehicle operations and intermodal freight; public transportation applications; ITS and regional strategic transportation planning, including regional architectures: ITS and changing transportation institutions Automated Highway Systems-Vehicles in Platoons – Integration of Automated Highway Systems. ITS Programs in the World – Overview of ITS implementations in developed countries, ITS in developing countries.		
Text Books:		
1	Fundamentals of Intelligent Transportation Systems Planning, Mashrur A. Chowdhury, and Adel Sadek, Artech House, Inc., 2003.	
2	an, J. M., Perspectives on Intelligent Transportation Systems (ITS), Springer, 2005	
3	on Support Systems and Intelligent Systems, Turban, E., and Aronson, J. E., 5th Edition, Prentice Hall.	
Reference Books :		
1	ITS Hand Book 2000: Recommendations for World Road Association (PIARC) by Kan Paul Chen, John Miles.	
2	National ITS Architecture Documentation, US Department of Transportation, 2007.	

OPEN ELECTIVE-I

Disaster Management		L:T :P- 3-0-0	3 Credits	Contact Hours
Module 1: Introduction on Disaster: Different Types of Disaster: Natural Disaster: such as Flood, Cyclone, Earthquakes, Landslides etc., Man-made Disaster: such as Fire, Industrial Pollution, Nuclear Disaster, Biological Disasters, Accidents (Air, Sea, Rail & Road), Structural failures (Building and Bridge), War & Terrorism etc. Causes, effects and practical examples for all disasters.				[10]
Module 2: Risk and Vulnerability Analysis: Risk and Vulnerability Analysis, Risk: Its concept and analysis, Risk Reduction, Vulnerability: Its concept and analysis, Strategic Development for Vulnerability				[10]
Module 3: Disaster Response: Introduction, Disaster Response Plan. Communication, Participation, and Activation of Emergency Preparedness Plan. Search, Rescue, Evacuation and Logistic Management, Role of Government, International and NGO Bodies, Psychological Response and Management (Trauma, Stress, Rumour and Panic), Relief and Recovery, Medical Health Response to Different Disasters				[13]
Module 4: Rehabilitation, Reconstruction and Recovery: Reconstruction and Rehabilitation as a Means of Development, Damage Assessment, Post Disaster effects and Remedial Measures. Creation of Long-term Job Opportunities and Livelihood Options, Disaster Resistant House Construction, Sanitation and Hygiene, Education and Awareness, Dealing with Victims' Psychology, Long-term Counter Disaster Planning, Role of Educational Institute.				[12]

Text Books:	
1	Dr.Mrinalini Pandey, Disaster Management, Wiley India Pvt. Ltd.
2	Jagbir Singh, Disaster Management : Future Challenges and Opportunities, K W Publishers Pvt. Ltd.
3	Shailesh Shukla, Shamna Hussain, Biodiversity, Environment and Disaster Management, Unique Publications.
Reference Books:	
1	J. P. Singhal, Disaster Management, Laxmi Publications.
2	C. K. Rajan, NavalePandharinath, Earth and Atmospheric Disaster Management: Nature and Manmade, B S Publication.

Dream House Planning		L:T :P- 3-0-0	3 Credits	Contact Hours
Module 1: Principles of Planning: Introduction to buildings, Type of buildings, Principles of building planning, Principles of architecture composition, Planning of earthquake resistant building considering symmetry, simplicity, continuity, consideration of locating staircase and overhead water tank, most sensitive to earthquake.				[9]
Module 2: Scientific orientation of building and building components: Building by-laws as per National Building Code, Standards for residential buildings, Building by-laws of local authority, and standards for industrial, public, commercial and institutional buildings.				[9]
Module 3: Construction materials and properties: Stone– Classification and quarrying, properties, structural requirements, dressing, Bricks –Composition of Brick earth, manufacture and structural requirements, Fly ash, Ceramics. Cement and Aggregates -Different grades of cement, Classification of aggregate based on particle shape & texture, strength & other mechanical properties of aggregate, Different tests of aggregates, grading curves, Grading of fine & coarse Aggregates. Concrete & its Properties – Workability, Factors affecting workability, Measurement of workability by different tests, Water / Cement ratio, Abram’s Law, curing, lab tests for hardened concrete, Fundamentals of concrete Mix design, Admixtures in Concrete				[9]
Module 4: Construction Practices: Construction of Masonry structures(brick, stone, load bearing walls), Flooring (selection of materials, types- brick, cement concrete, terrazzo, tiled, marble flooring, upper floors), Lintels, Arches, Roofs, Framed structures, Concept of shallow and deep foundations.				[9]

Module 5: MEP in building: Ventilations - Functional requirements systems of ventilations, Fire protection - Fire Hazards, Classification of fire resistant materials and constructions, Elevators, escalators, and heating and air-conditioning systems - Essentials and Types, Acoustics – characteristic, absorption, basics of Acoustic design, Plumbing Services - Water Distribution, Sanitary – Lines & Fittings.	[9]
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Text Books:	
1	National Building Code-2005, New Delhi
2	Planning, designing building by Y. S. Sane, Allies Book Stall
3	Architecture-Form, Space and Order by Francis D.K. Ching
Reference Books:	
1	Building Construction by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) Ltd., New Delhi.
2	Concrete Technology by M. S. Shetty. – S. Chand & Co.
3	Building Materials by P. C. Varghese, PHI.

OPEN ELECTIVE-II

Prefabricated Structures		L:T :P- 3-0-0	3 Credits	Contact Hours
Module 1: Introduction: Need for Prefabrication, Principles of prefabrication, Prefabrication materials, Modular Coordination, Standardization, Systems, Production, Transportation, Erection				[8]
Module 2: Prefabricated Components: Behaviour of structural components, Large Panel Constructions, Constructions of waffle slabs, Constructions of roof and floor walls, Columns, Shear wall				[8]
Module 3: Design Principle: Dismantling of structures, Design of cross section based on efficiency of materials used, Problems in design because of joint flexibility, Allowance for joint deformation				[9]
Module 4: Joint in Structural Members: Joints for different structural connections, Dimensions and Detailing, Design of expansion joints				[11]
Module 5:				[9]

Design for Uncertain Loads: Progressive collapse, Codal provisions, Equivalent design loads for considering abnormal effects such as earthquakes, cyclone etc., Redundancy of abnormal load paths, Importance of avoidance of progressive collapse	
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Text Books:	
1	“Prefabricated Structures”, M. Pradeep Kumar, Shanlax Publications
2	“Prefabricated Structures”, R. Saravanan, R. Dinesh Kumar, R. Subhaja, Laxmi Publications
3	“Prefabricated Structures”, V.SoundaraRajan, R. Jagdeesh Kumar & S. Kalpanadevi, ARS Publications
Reference Books:	
1.	“Prefabricated Structures”, Dr A. Jebamalar, Mr. S.Sampath Kumar & Mr. T.A.RajhaRajeswaran, Magnus Publications
2.	“Precast Concrete Structures”, Kims S. Elliott, CRC Press

Energy Conservation Techniques In Building		L:T :P- :3-0-0	3 Credits	Contact Hours
Module 1: Global & Indian Energy Scenario-Classification of Energy sources-Energy needs of growing economy-Energy sector reform, Energy and Environment: Global Environmental Concerns, Basics of Energy and its various forms.				[9]
Module 2: Energy Audit: Types of energy audit, Energy management (audit) approach-understanding energy costs, Bench marking, Energy performance, matching energy use to requirement, Maximizing system efficiencies, Optimizing the input energy requirements, Fuel and energy substitution, Energy audit instruments. Material and Energy balance: Facility as an energy system, Methods for preparing process flow, Material and energy balance diagrams.				[9]
Module 3: Energy Action Planning, Financial Management: Financial analysis techniques- Risk and sensitivity analysis- Financing options, Energy performance contracts and role of ESCOs Energy Monitoring and Targeting: Elements of monitoring & targeting, Data and information-analysis, Techniques -energy consumption, Production, Cumulative sum of differences (CUSUM).				[9]

Module 4: Building Envelope – principles of analysis – Envelope performance -Envelope analysis of Existing and new buildings – Building standards for new and Existing constructions. HVAC Systems types – Energy conservation opportunities – cooling equipment – Domestic hot water Estimating HVAC Energy consumption.	[9]
Module 5: Principles of Electric Energy Management, Energy Management control systems – Energy systems maintenance. Energy management in water and waste water treatment – solid waste treatment- air pollution control systems. Energy Management in Boilers and Fired systems – Steam and condensate systems – cogeneration – Waste Heat recovery. Energy Management in Process Industries, Energy Security, Codes, Standards, Electricity Act, Energy Conservation Act.	[9]

Text Books:	
1	Energy Management by Murty
2	General Aspects of Energy Management and Audit, National Productivity Council of India, Chennai (Course Material- National Certification Examination for Energy Management)
3	Energy Management Handbook, W.C. Turner, 5th Edition, Marcel Dekker, Inc, New York, 2005.
Reference Books:	
1	Guide to Energy Management, B. L. Capehart, W. C. Turner, W. J. Kennedy, CRC Press, New York, 2005.
2	Energy Management by O.P. Collagan

OPEN ELECTIVE-III

Conservation of Water Resources		L:T :P- 3-0-0	3 Credits	Contact Hours
Module 1: Ground and Surface Water Utilization- Historical background, Hydrologic Cycle, Water Budget, Ground Water level fluctuations and Environmental influence.				[9]
Module 2: Artificial Ground Water Recharge: Concept & methods of artificial ground water recharge mounds & induced recharge, wastewater recharge for reuse, Water Spreading, Farm Ponds and Percolation Tanks.				[9]
Module 3: Water Harvesting: Rainwater harvesting, Catchment Harvesting, Harvesting Structures, Soil Moisture Conservation, Check Dams.				[9]
Module 4: Reuse & Recycle of Waste Water: Types of reuse, Application of treated waste water, Purity of reclaimed water, Guidelines and Regulations, New technologies used in recycling of Waste Water				[9]
Module 5:				[9]

Watershed management- Introduction, Concept of watershed Management, Watershed Management policies and decision making	
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Text Books:	
1	Ramakrishnan S. (1996), "Ground water", Scitech Publications, 2nd Edition
2	Todd D.K. & Mays L. F.(2006), "Groundwater Hydrology", John Wiley and sons, 2nd Edition
3	Murthy J.V.S.(1998), “Watershed Management”, New Age International Publishers, 2 nd Edition.
Reference Books:	
1	Murthy V.V.N.(2013), “ Land and Water Management”, Kalyani Publications, 6th Edition
2	US Environment Protection Agency, 1992. “Guidelines for Water Reuse”

Sustainable Development		L:T :P- 3-0-0	3 Credits	Contact Hours
Module 1: Status of environment, Environmental, Social and Economical issues, Need for sustainability, Nine ways to achieve sustainability, population, resources, development and environment				[9]
Module 2: Concept of sustainability, Factors governing sustainable development, Linkages among sustainable development, Environment and poverty, Determinants of sustainable development, Case studies on sustainable development, Population, income and urbanization, Health care, Food, fisheries and agriculture, Materials and energy flows				[9]
Module 3: Need for indicators, Statistical procedures, Aggregating indicators, Use of principal component analysis , Three environmental quality indices				[9]
Module 4: National environmental policy act of 1969, Environmental Impact Assessment, Project categories based on environmental impacts, Impact identification methods, Environmental impact assessment process				[9]
Module 5:				[9]

Revisiting complex issues, Sector policies concerning the environment, Institutional framework for environmental management, Achievements in environmental management, People's perception of the environment, Participatory development NGOs , Gender and development, Indigenous peoples, Social exclusion and analysis	
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Text Books:	
1	Sayer, J. and Campbell, B., "The Science of Sustainable Development: Local Livelihoods and the Global Environment" (Biological Conservation, Restoration & Sustainability), Cambridge University Press, London, 2003
2	Kirkby, J., Keefe P. and Timberlake, "Sustainable Development", Earth scan Publication, London, 1993
3	Peter P. Rogers, Kazi F. Jalal, John A. Boyd, "An introduction to sustainable development", Glen Educational Foundation, 2008

References Books:	
1	Jennifer A. Elliott, "An introduction to sustainable development". London: Routledge: Taylor and Francis group, 2001
2	Low, N. Global ethics and environment. London: Routledge. 1999
3	Douglas Muschett, Principles of Sustainable Development, St. Lucie Press, 1997

Avant Grade Project

L	T	P	C

Course: Aerial Robotics (<Code>)

Version: v 1.0, Scheme: 2020-21

Unit 1: Introduction to Aerial Robotics

Unmanned Aerial Vehicles, Quadrotors, Key Components of Autonomous Flight, State Estimation, Applications, Basic Mechanics, Dynamics and 1-D Linear Control, Design Considerations, Agility and Maneuverability, Component Selection, Effects of Size, Supplementary Material: Introduction, Dynamical Systems, Rates of Convergence, Matlab Tutorials - Introduction to the Matlab Environment, Programming Basics, Advanced Tools.

(Semester 3)

Unit 2: Geometry and Mechanics

Transformations, Rotations, Euler Angles, Axis/Angle Representations for Rotations, Angular Velocity, Rigid-Body Displacements, Properties of Functions, Symbolic Calculations in Matlab, The atan2 Function, Eigenvalues and Eigenvectors of Matrices, Quaternions, Matrix Derivative, Skew-Symmetric Matrices and the Hat Operator, Formulation, Newton-Euler Equations, Principal Axes and Principal Moments of Inertia, Quadrotor Equations of Motion, State-Space Form, Getting Started With the First Programming Assignment.

(Semester 4)

Unit 3: Planning and Control

2-D Quadrotor Control, 3-D Quadrotor Control, Time, Motion, and Trajectories, Motion Planning for Quadrotors, Minimum Velocity Trajectories from the Euler-Lagrange Equations, Supplementary Material: Solving for Coefficients of Minimum Jerk Trajectories, Minimum Velocity Trajectories, Linearization of Quadrotor Equations of Motion.

(Semester 5)

Unit 4: Advanced Topics

Sensing and Estimation, Nonlinear Control, Control of Multiple Robots, Adjourn, Supplementary Material: Introduction to the Motion Capture System.

(Semester

6)

Course Outcomes for Aerial Robotics (<Code>)

At the end of the course, the student will be able to:

CO-<Code>-1	Learn about the mechanics and control strategies of aerial robots and realize how careful component selection and design affect the vehicles' performance.
CO-<Code>-2	Learn how to derive the dynamic equations of motion for quadrotors.
CO-<Code>-3	Develop linear controllers for the planar and three-dimensional dynamic models of the quadrotor.
CO-<Code>-4	Learn how to enable quadrotors to perform more agile maneuvers and to operate autonomously in teams.

L	T	P	C

Course: Automated Electric Vehicle (<Code>)

Version: v 1.0, Scheme: 2020-21

Unit 1: Introduction to EV & INDIAN and GLOBAL Scenario:

Past, Present & Feature of EV, Current Major Issues, Recent Development Trends, EV Concept, Key EV Technology, State-of-the Art EVs & HEVs, Comparison of EV Vs IC Engine, Technology

Scenario, Market Scenario, Policies and Regulations, Payback and commercial model, Payback and commercial model, Policies in India
(Semester 3)

Unit 2: EV System, Parameters and Propulsion:

EV Configuration: Fixed & variable gearing, single & multiple motor drive, In-wheel drives, Weight, size, force, energy & performance parameters.

Electric Motor: Choice of electric propulsion system, block diagram of EV propulsion system, concept of EV Motors, single motor and multi-motor configurations, fixed & variable geared transmission, In-wheel motor configuration, classification of EV motors, Electric motors used in current vehicle applications, Recent EV Motors, Comparison of Electric Motors for EV applications.

Required Power Electronics & Control: Comparison of EV power devices, introduction to power electronics converter, four quadrant DC chopper, three-phase full bridge voltage-fed inverter, soft-switching EV converters, comparison of hard-switching and soft-switching converter, three-phase voltage-fed resonance dc link inverter, Basics of Microcontroller & Control Strategies.

(Semester
4)

Unit 3: EV Motor Drive & HEV (Hybrid Electric Vehicle):

Type of wound-field DC Motor, Torque speed characteristics, DC-DC Converter, Two quadrant DC Chopper, two quadrants zero voltage transition converter-fed dc motor drive, speed control of DC Motor, Induction Motor Drive: Three Phase Inverter Based Induction Motor Drive, Equal Area PWM, Three Phase Auxiliary resonant snubbers(ARS), Inverter Type (ZVC & ZCS), Single Phase ARS Inverter Topology, Speed Control of Induction Motor, FOC, Adaptive Control, Model Reference Adaptive Control (MARS), Sliding mode Control, Configuration of HEV (Series, Parallel, Series-parallel & Complex), Power Flow control, Examples, Power flow control in all HEV configurations, Examples of HEV system performance.

(Semester 5)

Unit 4: Energy Sources & Charging:

Different Batteries and Ultra capacitors, Battery characteristics (Discharging & Charging), Battery Chargers: Conductive (Basic charger circuits, Microprocessor based charger circuit. Arrangement of an off-board conductive charger, Standard power levels of conductive chargers, Inductive (Principle of inductive charging, Soft-switching power converter for inductive charging), Battery indication methods, Charging Infrastructure: Domestic Charging Infrastructure, Public Charging Infrastructure, Normal Charging Station, Occasional Charging Station, Fast Charging Station, Battery Swapping Station, Move-and-charge zone.

(Semester
6)

Course Outcomes for Aerial Robotics (<Code>)

At the end of the course, the student will be able to:

CO-<Code>-1	Design electric vehicle & HEV for various applications
CO-<Code>-2	Select appropriate motor and converter for EV applications
CO-<Code>-3	Select battery, battery indication system for EV applications
CO-<Code>-4	Develop battery charger for an EV

L	T	P	C

Course: Smart City (<Code>)

Version: v 1.0, Scheme: 2020-21

Unit 1: Introduction:

Definition, Dimensions of smart city, socio-economic aspect for smart city planning, framework for smart city- Technology framework, Institutional framework, Human framework, Energy framework, Data management framework, transformation of urban digital and physical fabric of cities, Performance, Initiatives.

(Semester
3)

Unit 2: Smart Urban Energy System:

Energy infrastructure layer, energy services layer, planning, maintenance, operations, Emerging Information and communication Technology (ICT), Innovation stages and innovation in energy technologies, Energy Innovation: from Shale gas to solar power, Role of regulation and policies in smart energy technologies.

(Semester 4)

Unit 3: Smart Transportation System (STS):

Fundamentals of ITS, Sensor Technology and data requirements of STS, services covered by STS, advanced traffic management system, Advanced Traveler Information systems (ATIS), Commercial Vehicle Operations (CVO), Advanced Vehicle Control systems (AVCS), Advanced Public Transportation systems (APTS), Advanced Rural Transportation systems (ARTS), Regional and Project STS architecture; Concept of operations; STS Models and Evaluation Methods; Planning and human factor issues for STS, Case studies on deployment planning and system design and operation; STS and safety, STS and security, STS as a technology deployment program, research, development and business models, STS planning, STS application

(Semester 5)

Unit 4: Smart Structure:

Self-Sensing Piezoelectric Transducers, Energy Harvesting Materials, Autophagous Materials, Self-Healing Polymers, Intelligent System Design, Emergent System Design

Smart Actuator: Modeling Piezoelectric Actuators, Amplified Piezo Actuation – Internal and External Amplifications, Magnetostrictive Actuation, Joule Effect, Wiedemann Effect, Magnetovolume Effect, Magnetostrictive Mini Actuators, IPMC and Polymeric Actuators, Shape Memory Actuators, Active Vibration Control, Active Shape Control, Passive Vibration Control, Hybrid Vibration Control

(Semester

6)

Course Outcomes for Smart City (<Code>)

At the end of the course, the student will be able to:

CO-<Code>-1	Learn about the dimensions and performance of smart city
CO-<Code>-2	Learn about the energy management system of smart cities.
CO-<Code>-3	Learn about the implementation of STS components
CO-<Code>-4	Apply concept of various smart materials in the design of smart structure.