

# 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<sup>+</sup> Smart Infrastructure Management) Course Structure

# **FIRST YEAR**

			SEMESTER I					
S. No	Туре	Course Code	Course Title	L	7	ΓР	Contact Hrs/wk	Credits
1.	Theory <b>BSC</b>	SMA41101	Engineering Mathematics-I	3	1	1 0	4	4
2.	Theory <b>BSC</b>	SPH41109/SCY41106	Engineering Physics/ Engineering Chemistry	3	(	0	3	3
3.	Theory <b>ESC</b>	ECS41101/EEE41102	Introduction to Programming / Electrical and Electronics Technology	3	(	0	3	3
4.	Theory <b>HSSM</b>	HEN41117	HSSM –I (English Communication-I)	3	(	0	3	3
5.	Theory HSSM/BSC	HEN41119/SBT41108	HSSM –II (Engineering Ethics, Values and the Laws) / Life Sciences	3	(	0	3	3
6.	Practical <b>BSC</b>	SPH41209/ SCY41206	Engineering Physics Lab/ Engineering Chemistry Lab	0	(	3	3	2
7.	Practical <b>ESC</b>	ECS41201/ EEE41202	Programming Lab/ Electrical and Electronics Technology Lab	0	(	3	3	2
8.	Practical <b>ESC</b>	ECE41201/EME41204	Engineering Drawing and CAD/ Engineering Workshop	0	(	3	3	2
9.	Practical <b>MC</b>	EMC41201	Communication and Collaboration Skill -I	0	(	2	2	1
			Total				27	23
			SEMESTER II	_	_			
S. No	Туре	Course Code	Course Title	L	1	ΓР	Contact Hrs/wk	Credits
1.	Theory <b>BSC</b>	SMA41102	Engineering Mathematics-II	3	1	0	4	4
2.	Theory <b>BSC</b>	SCY41106/ SPH41109	Engineering Chemistry/ Engineering Physics	3	(	0	3	3
3.	Theory <b>ESC</b>	EEE41102/ ECS41101	Electrical and Electronics Technology/ Introduction to Programming	3	(	0	3	3
4.	Theory SBT41108/ BSC/ HSSM HEN41119		Life Sciences/ HSSM –II (Engineering Ethics, Values and the Laws)	3	(	0	3	3
5.	Theory EME41104		Engineering Mechanics	3	(	0	3	3
6.	Practical HEN41212		HSSM – III (Professional Communication in English)	0	(	3	3	2
7.	Practical <b>BSC</b>	SCY41206/ SPH41209	Engineering Chemistry Lab/ Engineering Physics Lab	0	(	3	3	2
8.	Practical	EEE41202/	Electrical and Electronics Technology Lab/	0	(	) 3	3	2

	ESC	ECS41201	Programming Lab					
9.	Practical	EME41204/	Engineering Workshop/	١	0	3	3	2
<i>)</i> .	ESC	ECE41201	Engineering Drawing and CAD	٢	ľ		3	2
10.	Practical <b>MC</b>	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	Туре	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

<sup>#</sup> Community Service will be taken up during the summer vacation of II Semester and evaluated in III Semester.

			SEMESTER-IV					
S. No	Туре	Course Code	Subject Name	L	T	P	Conta ct Hrs/w k	Credits
1.	Theory <b>BSC</b>	SMA42111	Engineering Mathematics-IV	3	0	0	3	3
2.	Theory <b>PC</b>	ECE42102	Prof. Core – IV Structural Mechanics II	3	0	0	3	3
3.	Theory <b>PC</b>	ECE42104	Prof. Core – V Soil Mechanics	3	0	0	3	3
4.	Theory <b>PC</b>	ECE42106	Prof. Core – VI Surveying	3	0	0	3	3
5.	Theory <b>PC</b>	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 <b>PC</b>	ECE42202	Prof. Core Lab – II Surveying Practice Lab	0	0	3	3	2
8.	Practical <b>PC</b>	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	Туре	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										
	_	Course	Subject Name	L	Т	P	Contact	Credits			
S. No	Туре	Code					Hrs/wk				
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	Туре	Course CODE	Subject Name	L	Т	P	Contact Hrs/wee k	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	ECE44107	Prof. Elective – IV	3	0	0	3	3
	PE	/	1. Repair and Rehabilitation of					
		ECE44109	Structures					
		/	2. Prestressed Concrete					
		ECE44111	3. Environmental Impact					
			Assessment					
4.	Theory		Open Elective – II	3	0	0	3	3
	OE							
5.	Theory		Open Elective – III	3	0	0	3	3
	OE							
6.	Practical		Prof. Elective III Lab	0	0	3	3	2
	PC	ECE44201	Air Pollution Control					
		/	Lab/Construction Planning &					
		ECE44203	Management Lab/ Advanced RC					
		/	Design Lab					
		ECE44205						
7.	Practical	ECE44301	Summer Internship <sup>#</sup>	-	-	-	-	2
	PC		r					
8.	Practical	ECE44401	Minor Project	0	0	6	6	3
	PC							
			Total	1	0	9	24	22
				5				

<sup>#</sup> Summer Internship for 30 days will be taken at the end of  $6^{\rm th}$  semester and will be evaluated in the  $7^{\rm th}$  semester.

	Semester-VIII										
S.	_	<b>Course Code</b>	Subject Name	L	T	P	Contact	Credit			
N o	Туре						Hrs/week	s			
1.		ECE44402/	Industry Work Experience /	0	0	1	12 (For	5			
	Practical	ECE44404/	SIRE* / Major Project			2	Major				
	Tractical	ECE44406				-	Project				
							only)				
2.	Practical	ECE44502	Comprehensive Viva Voce					2			
			Total	0	0	1	12	7			
						2					

<sup>\*</sup>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 did value theorems, Taylor's and Maclaur forms, infinite Series, curve tracing, fu differentiation, Euler's theorem and ge variables (two and three variables), La Jacobean's, asymptote, curvature.	rin's theorems with renunctions of several vari eneralization, maxima	nainders, Expansion ables, partial Differ and minima of fur	s, indeterminate entiation, total actions of several	[15]
Module 2: Integral Calculus: Fundamental the Evaluation of plane areas, volume Convergence of Improper integrals Differentiation under integral sign, Do volumes, change of variables in double	and surface area of s, Beta and Gamma puble and triple integra	a solid of revolution integrals, Element	ion and lengths.	[15]
Module 3: Ordinary differential equations Separable equations; equations red factors, linear first order equations;	ucible to separable	form; exact equat	ions, integrating	[12]
Module4: Ordinary linear differential equation arbitrary order with constant coefficient Non-homogeneous linear equations with Method of variation of parameters, Systelectrical circuit.	nts, ith constant coefficient	s, Euler and Cauchy	y's equations,	[10]

Module	5:
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Series solution of differential equation, power series method, Legendre's equation and Legendre's polynomials, Bessel's equation, Bessels function and its application.

[8]

Text	Boo	ze
	1200	N.3.

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

<b>Engineering Physics</b>	SPH41109	3-0-0	3 Credits	
<b>Module 1: Mechanics:</b> Basic ideas of Vector Calculus Potential energy function $F = -\nabla V$ , 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).				
Module 4:				
Quantum Mechanics and Statist (Elementary Ideas). Matter wave, De- its properties, expectation value, Sch Hydrogen Atom (Qualitative discussion and Fermi-Dirac statistics distribution)	-Broglie Hypothesis, Un prodinger Equation for on).Qualitative Feature	ncertainty Principle, free Particle, Partic s of Maxwell Bollz	wave function and cle in a box (1-D), man, Bose-Einstein	[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]
intrinsic and extrinsic semiconductor and susceptibility, classification of n	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).			
Text Books:				
1 Arthur Beiser, S RaiChoudhury, S Tata-McGraw Hill.	<b>,</b>	•	n Physics, 6th Edition	1,
2 V. Rajendran, Engineering Physics	s, Tata McGraw Hill, 1s	t Edition, 2010		
Reference Books:				
1 Hitendra K Malik, A. K. Singh, Er		<u> </u>	on, 2009	
2 A J Dekker, Solid State Physics, N	Acmillan 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	[9]
Structures and Unions: Definition of a Structure, Declaration of a Structure & Structure Variable,	[2]
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	
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	[0]
queue, Linear Queue, Circular Queue, Priority Queue, Array Implementations of Queues,	[8]
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.	
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	[10]
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. Transistive Closure and Shortest Path algorithm: Warshal Algorithm and Dijikstra	
Algorithm, Introduction to Activity Networks.	

### **Text Books:**

"Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, SartajSahni 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<sup>nd</sup> 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, Me	ans of Communica	tion, Barriers of	[8]
Communication				
Module 2:				
Grammar and Syntax Level 1: Tense	e, Idioms, One Word S	ubstitutes, Articles,	Prepositions,	[8]
Sentence-making, Voice Change, Sync	onyms and Antonyms		•	
Module 3:	-			
Reading and Listening Skills Lev	vel 1: Active Listeni	ng, Types of List	ening, Listening	[11]
Exercises, Reading Exercises			<b>U</b> .	
Module 4:				[10]
Speaking Skills Level 1: Introduction	, Description, Narratio	n, Extempore		[10]

M	odule 5:	[8]	
W	Writing Skills Level 1: Composition, Letter Writing—simple applications, Essay/ Paragraph		
wr	iting (argumentative and descriptive)		
Te	xt Books:		
1	Spoken English and Functional Grammar. P. C. Das.		
2	Essential Grammar in Use. Raymond Murphy.		
Re	ference 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 Cr	edits
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: Overviand obligations in engineering, The NPSE, IEEE and Editheir consequences, Conflicts of interest, Whistle blowing	CI codes, Vic	olation of code	_	[9]
Module 3:				[10]

	istainable Engineering and Sustainable Development: Meaning of sustainable gineering, Principles of sustainable engineering, Safety and risk assessment,				
	istainable development, Sustainable engineering v. engineering negligence				
_	odule 4:				
Eı	ngineering Negligence: The elements of engineering negligence, The standard duty of re, Liability in negligence cases, Defenses, Negligence Cases (Engineering, medical	[9]			
an	d others)				
M	odule 5:				
Ri	ights and obligations of Engineers under Various Indian Laws: The Indian				
ad	juratory system, Constitutional laws governing engineering professionals, Contractual	[8]			
ob	oligations of engineers, Environment protection laws, Arbitration and conciliation laws,				
In	tellectual property laws, Information technology laws				
Te	xt Books:	•			
1	AroraVibha, AroraKunwar, Laws for Engineers, Central Law Publications, 1st Edition, 2017				
2	Fledderman Charles B., Engineering Ethics, Pearson Education Inc., 4th Edition, 2012				
3	Govindarajan M., Natarajan S., Senthilkumar V. S., Engineering Ethics Includes Human Value	s, PHI			
	Learning Private Limited, 1st Edition, 2010				
Re	Reference Books:				
1	Govindarajan M., Natarajan S., Senthilkumar V. S., Professional Ethics and Human Value	s, PHI			
	Learning Private Limited, 1st Edition, 2017				
2	Harris Charles E., Jr., Pritchard Michael S., Rabins Michael J., Engineering Ethics, Wad	lsworth			
	Cengage Learning, 4 <sup>th</sup> Edition, 2009				

- **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 Poiseulle'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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- 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 Cre		lits
Module 1:	-	-		
Introduction to Engineering Drawing co	overing, Principles of	f Engineering Graphics	and their	
significance, usage of Drawing instrume	ents, lettering, Conic s	sections including the Re	ectangular	[9]

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;

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;				
Module 3:	[8]			
Projections of Regular Solids covering, those inclined to both the Planes- Auxiliary Views;	[o]			
Module 4:				
Sections and Sectional Views of Right Angular Solids covering, Prism, Cylinder, Pyramid, Cone	[9]			
- Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder	[2]			
and Cone;				
Module 5:				
Isometric Projections covering, Principles of Isometric projection – Isometric Scale, Isometric	[10]			
Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion	[10]			
of Isometric Views to Orthographic Views and Vice-versa, Conventions;				
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 Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers				

Communication and Collaboration Skill -I	EMC41201	0-0-2	1 Cred	it
Module 1:  Introduction and self-accessments The students are introduced to Emotional Intelligence and the			[4]	
<b>Introduction and self-assessment:</b> 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]	

<b>Bollywood in action:</b> 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]

Te	ext Books:
1	None.
Re	eference 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 Cre		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-Hamillton 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.			stems of method, metric matrices, raic and [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.			or space, of linear [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.			complex [12]
Module4: Partial Differential Equation: Introduce interpretation of first order partial difference general solution of first order PDE, canon direct integration,.	ntial equations (PDE	(), method of character	istic and [12]
Module 5: Langrange's method, solution of non-linea method, special types of first order PDE, so	•		•

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	
Module1: Thermodynamics: Importance and scope, definition of system and surroundings: type of systems				
(isolated, closed and open); extensiv	e and intensive proper	rties; steady state v	rersus equilibrium	
state; concept of thermal equilibrium			-	
coordinates, state of a system, equa		•	•	
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	-			
Chemical Processes, Concept of entro		_	-	
Equilibrium conditions for closed syst	ems, Phase and reactio	n equilibriam, Max	well relations.	
Module 2:  Reaction Dynamics, Catalysis & Electrochemistry: Rate laws, 1stOrder reaction & 2ndorder 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:				
<b>Solid State and Molecular spectroscopy:</b> Homo nuclear and Hetero nuclear concepts, Non – covalent interaction, Van der waals bonding, hydrogen bonding, Idea of spatial periodicity of lattice, Unit cells, Bravias 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:		44		
<b>Co-Ordination Chemistry:</b> Transition elements, Warner'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 valance 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.				

Te	xt Books:				
1	P. W. Atkins, Physical Chemistry, ELBS/Oxford, 7th Edition, 1995				
2	P. C. Rakshit, Physical Chemistry, Sarat Book House (7th Edition)				
3	Kuriacose& Raja Ram, Chemistry in Engineering and Technology, Vol.1 & 2 by, Tata McGraw Hill &				
	Co.				
4	Morrison & Boyd, Organic Chemistry				
Re	eference Books:				
1	G.W.Castellan, Physical Chemistry				
2	P. C. Rakshit, Physical Chemistry, Sarat Book House (7th 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 <sup>nd</sup> Edition)				
9	S. Sarkar, Fuels and Combustion, Taylor & Francis (3 <sup>rd</sup> Edition), 2009				

Electrical and Electronics Technology	EEE4110 2	3-0-0	3 Credits	S
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, Land C as linear elements, source transformation,				[10
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.

Module 2: Steady State Analysis of Single Phase A.C. Circuits: Sinusoidal, square and triangular waveforms-average and effectivevalue, form the peak factors, concept of phasor, phasor representation of sinusoidal voltage and current, analysis of series-parallel RLC circuits. Apparent, active andreactive powers, power factor, causes and problems of low power factor, power factorimprovement, resonance in series and parallel circuits, bandwidth and quality factors.	[10
<b>Module 3: Three Phase A. C. Circuits:</b> 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
<b>Module 5: Bipolar Junction Transistor:</b> Introduction; JFET and MOSFET; Realization of digital logic circuit using MOSFET (AND, OR, NOT etc.); Realization of switching circuits using MOSFET. <b>Electronics Instruments &amp; Digital Electronics Fundamental:</b> Signal generator, Multimeter, operation of CRO and its application. Number systems, Conversions and codes, Logic gates and truth tables.	[09

Te	ext 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, 10thEd., Pearson, 2011.			
3	C. K. Alexander and Matthew N. O. Sadiku, Fundamentals of Electric Circuits, 6th Ed., McGraw			
	Hill Education, 2019.			
Re	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,			
	GoutamSaha (Tata Mcgraw Hill Publishing Co Ltd, 2014)			

Life Sciences	SBT41108	3-0-0	3 Credits	
<b>Module 1:Basic cell biology:</b> 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.				
Module 2: Biochemistry and transport process: Chemistry of life: chemical bonds; Non-covalent interactions and free energy changes in biological processes; Fundamentals of				

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.	
<b>Module 3:</b> Chemical biology: Carbohydrates; Lipids; Proteins: structure and sequencing; DNA:	
structure and sequence, replication, recombination; RNA synthesis; Genetic code and protein	[04]
biosynthesis; Recombinant DNA technology.	
Module 4: Enzymes and industrial applications: Enzymes: mechanism, kinetics and inhibition;	
Biological catalysts, Proteases, Carbonic anhydrase, Restriction enzymes, and Nucleoside	[04]
monophosphate kinases.	
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;	[10]
Nutritional characteristics of food yeast, mushroom production; Vitamins- Vitamin B-2, Riboflavin,	[10]
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.	
Module 6: Mechanochemistry: Molecular Machines/Motors; Cytoskeleton; Biosensors;	[02]
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;	[07]
endocrine and reproductive systems.	[07]
Immune system and cell signalling: Immune system; General principles of cell signalling.	
Module 8: Impact of biology on society and mankind	[02]
Crop management, Disease control, Biological Hazards and safety; Unsolved Problems in Biology.	[02]

# **Text Books:**

- 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 o	f Statics and Concurr	ent Forces		[11]
<b>Statics of Particles:</b> Force System: Force, classification & representation, force as a				
vector, composition	and resolution of	forces, principle	of superposition and	
transmissibility of for	rces.			
Statics of Rigid boo	lies: Equilibrium of c	oplanar force system	n, free body diagrams,	
determination of read	ctions, equilibrium of a	a body under three for	orces, Lami's theorem.	

Moment of a force about a point and an axis, moment of coplanar force system,	
Varignon's theorem.	
Module 2: Parallel and Distributed Forces	[11]
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.	
Module 3: Friction	[6]
Introduction to wet and dry friction, laws of dry friction, cone of friction, block	
friction, ladder friction, wedge friction, application of friction in machines.	
Module 4: Virtual Work	[4]
Virtual displacement, principle of virtual work.	
Module 5: Introduction to Dynamics	[8]
Laws of motion, Projectile motion, D'Alembert's Principle, Work and energy, impulse	
and momentum, impact of bodies.	

#### **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<sup>th</sup> 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			[00]	
Penetration Theory, InterPersonal, IntraPersonal, Group Communication, Mass Communication,			[09]	
Verbal Communication, Non-verbal Communication, Models of Communication,				

Module 2:	
Grammar and Syntax: Level 2: Kinds of sentences, Phrases and Clauses, Conjunctions,	[09]
Participles, Degrees of comparison, Subject-verb agreement, Narration, Types of Narration,	
Module 3:	
Reading and Listening skills Level 2: Types of reading, Scheming, Scanning, Pronunciation skills,	[00]
Mother Tongue Influence, Barriers to effective listening, Types of Barriers, Reading exercises,	[09]
Listening Exercises,	
Module 4:	
Speaking skills: Group Discussion, Types of roles in a group, Role play, Dialogues,	[09]
Performance, Small skits, Interview preparation, Interview etiquette, Mock interviews,	
Module 4:	
Writing Skills: Email, Types of Emails, Replies to Emails, Types of Memo, Notice, Minutes, Letter	[09]
writing, Types of Letter, Replies to Letter.	

Tex	at Books:
1	Business Communication Today. Bovee, Thill, Schwatzman, Pearson Education
Rei	ference 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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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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- 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 CROand mustimeter.
- 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 & Camplification factor.
- 7. Realization of digital logic circuit using MOSFET (AND, OR, NOT etc.).

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

1	To make a single piece pottern from the given work piece and dimensions
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.
Refere	nce Book: Workshop Technology by S.K.Garg, 3 <sup>rd</sup> Edition, LP

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]

Rei	Reference Books:		
1	Stephen R Covey, Seven Habitsof 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

Engi	ineering Mathematics III	SMA42109	L: T: P-3-1-0	4 Credits	Contac t Hours
Lapl elem t. Inv funct	lule 1: lace Transform: Definition, Litentary functions, Transform of deverse Laplace transform, Convolution, Dirac delta function, Initiation of ordinary differential equation	erivatives and integrals ation theorem, Transfo al value & final valu	s, Multiplication by orm of periodic func	t & division by tions, Unit step	[15]
Part differ cano meth Lines meth	ial Differential Equation: Introduced in the control of the complementary homogeneous PDE, solution of hemogeneous of the complementary homogeneous PDE, solution of hemogeneous PDE, solution p	of characteristic and gequations solvable border partial different and non-homogeneous function and particular	general solution of for direct integration tial equation by Chass PDE with constant and integral for hor	irst order PDE, n, Langrange's arpit's method. nt coefficients, nogeneous and	[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]		
Stati Karl- regree Hype Defin a sin singl	lule 4: istics: measures of central to- Pearson's correlation, concurrent ession coefficients, properties of re othesis Testing nition, one and two tailed test, critical gle mean when variance is known to be mean population and test on two Book	at deviation method, egression coefficients. cical region, test statist in and variance is unk	rank correlation, re tics, type-I and type- nown, test on two n	gression lines,  II error, test on neans, test on a	[13]
1	Higher Engineering Mathematic	s, B V Ramana, Tata I	McGraw Hill		
2 Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers.					
3 Advanced Engineering Mathematics, ErwynKreyszig, John Wiley and Sons					
Refe	rence Books:				
1	Sancheti, S.C. & V.K. Kapoor, S	tatistical Methods			
2	Ellhans, D.N., Fundamentals of	Statistics			

Engineering Geology	ECE42101	L:T:P-: 3-0-0	3 Credits	Conta ct Hours
Module 1: Physical Geology: Geology and its structure and composition. Mineralogy: Physical properties of mode of occurrence and uses of the (iii) Mica group (iv) Carbonate grout Classification of rocks: Igneous roand engineering importance; Sed engineering importance; Metamorand engineering importance.	of minerals Classification, following group of mineral up v) Amphibole group (iv) ocks: Origin, mode of occur imentary rocks: Process	description, chemical s (I) Quartz group (ii) Pyroxene group rrence, forms & texture of sedimentation, class	, composition, Feldspar group e, classification ssification and	[10]
Module 2: Weathering of rocks: Agents and soils, soil Erosion and soil conserva Geological work of rivers: origin Floods and flood management measurement measurem	tion. Measures, coastal eros and stages in the system.	sion and protective mea Erosion, transportation	asures.	[8]
Module 3:  Natural Hazards: Earthquakes and seismic hazards: Causes and effects, seismic waves and seismographs, Mercelli's intensity scale and Richter's scale of magnitude. Distribution of Earthquakes in the world and India with examples. Earthquake resistant structures.  Tusnami: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 materia foundations, concrete aggregate, rai Geophysical exploration: Method procedure – sounding and profiling Geophysical surveys in Civil Engg.	lway ballast, road metal, pa s of Geophysical Explorati g, electrode configuration,	vement, flooring and roon, electrical resistivit	oofing. y method field	[8]
Module 5: Applied Geology: Geological stud of tunnels and underground excavat Structural geology: Stratification, classification of folds, faults, joints Importance of geological structures	ions. Dip and strike, compass and unconformities, and the	clinometers. Definition	on, description,	[9]

	Engineering and			
	General Geology			
1	by Parbin Singh,			
1	Fourth edition.			
	Katson publishing			
	house Delhi 1987.			
	A text book of			
	Geology by			
	Mukherjee P.K.			
2	Eleventh revised			
_	edition. The World			
	Press Private			
	Limited, Calcutta –			
	1990.			
	Engineering			
2	Geology for Civil			
3	Engineers D.			
	Venkat Reddy,			
D.C. D.I	Oxford, IBH,			
Reference Books:	m 11 n : 1			
1	Tyrell: Principles			
1	of petrology, 1972,			
	Asia, Bombay.			
	MarlandP.Billings:			
	Structural Geology,			
2	fourth edition,			
2	1975, Wiley			
	eastern			
	Prentice-Hall,			
	U.S.A. 1972.			
	Remote Sensing			
2	Principles and			
3	Interpretation – Floyd F.Sabins,			
	Floyd F.Sabins, H.Freeman and Co.			
4	https://nptel.ac.in/c ourses/105105106/			
HSSM –IV (Economics for	<u>0urses/103103100/</u>			Contact
Engineers)		L: T: P-3-0-0	3 Credits	Hours
			<u> </u>	110013
Module 1:		C) E		
Basic Concepts of Economics: In			-	[05]
around Decision Making at Indivi	dual Level, Some Funda	mental Concepts: N	Maximization,	
Equilibrium, and Efficiency				
Module 2:				
Theories of Economics: The The	eory of Consumer Choic	e and Demand, T	he Theory of	
Supply, Market Equilibrium , Mar	ket Structure, Market Fa	ilure and Environr	nental Issues,	[12]
Game Theory, Concept of Yield	and Theories of Term	Structure, The The	eory of Asset	
Pricing, Decision-Making under Ur	ncertainty: Risk and Insura	ance		
Module 3:				[10]

<b>Sustainability Study of a Project:</b> 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	[12]
Stagnation, Problem of Volatility in Open Economy, Problem of Global Meltdown, Problem	[12]
of Financing a Project	
Module 5:	[6]
<b>Project Report:</b> Facets of Project Viability – Commercial, Technical, Financial, Outline of a	
Model Project Report, A Real Life Case Study	

Te	Text Books:				
1	Engineering Economy, Leland Blank and Anthony Tarquin, McGraw-Hill, New York, 7th Edition				
2	How to Make Cash Flow Projections, Tim Spilker,				
	https://www.tgci.com/sites/default/files/pdf/How%20to%20Make%20Cash%20Flow%20Projections				
	<u>0.pdf</u>				
3	Esty, Benjamin C., Modern Project Finance: A Casebook, John Wiley & Sons, Inc., (New York, NY).				
	2003				
R	eference Books:				
1	Gregory Mankiw, Principles of Economics, South-Western College, 6 <sup>th</sup> Edition				
2	"Economics for Engineers", H.L.Bhatia& S.N. Maheshswari, Vikas Publishing House				

Building Planning and Material	ECE42103	L: T: P-3-0-0	3 Credits	Contact Hours
Module 1: Building Planning: Introduction, site orientation criteria for Indian conditions Principles of planning the building, requirements of parts of buildings, light distance from electric lines, plinth area.	s, points of obta thickness of which and vent	aining optimum orie valls according to l ilation requirements	ntation. building bye-laws,	[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:	
<b>KMC Building Rules:</b> Preliminary definitions, prohibition of erection of building without	
building permit, procedure for sanction, execution of work, municipal building committee,	F4.01
area and height limitations, provisions for more than one building in a plot, provisions for	[10]
building in government approved schemes, requirements of parts of buildings, fire	
protections and exit requirements.	
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.	[7]
Stone: Definitions, classification, sources, uses, dressing of stones and tools required for	
stone work, stone quarrying, common building stones, qualities of good building stone.	
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.	[8]
Wood and Wood Products: Classification of Timber, Characteristics of good timber,	լօյ
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.	

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.		
Refe	erence 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:				110015
Introduction: Fluid Property, Viscosity, surface tension & capillarity, Pressure and its measurement: Pascal's Law, different type of pressure- Absolute, Gauge,			[9]	
Atmospheric and Vacuum, Pressure measuring Instrument			[2]	
<b>Buoyancy and Flotation:</b> Buoyancy, Meta-center and Meta-centric height, Conditions of equilibrium of floating body				

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	[9]
<b>Dynamics of Fluid Flow:</b> 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	
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	[9]
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	
Module 4:	
<b>Dimensional and Model Analysis:</b> Rayleigh's Method and Buckinghum'sπ 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	[9]
and Condition of maximum discharge for a given value of specific energy, Hydraulic jump,	
gradually varied flow	
<b>Impact of jets and jets propulsion:</b> Drawing of velocity triangle, Force exerted by the jet on	
stationary and moving plate	
Module 5:	
Hydraulic Machines: Turbines- Working principle of-Pelton Turbine, Francis Turbine&	
Kaplan Turbine, Draft Tube, Specific speed, Characteristics curves of turbines	[9]
<b>Pumps:</b> Centrifugal pumps, performance characteristic graph – design flow rate, Working	
principles of positive displacement pumps, Reciprocating and Vane pumps, Hydraulic Ram.	

Tex	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		
Re	Reference Books:		
1	Fluid Mechanics, Hydraulics and Fluid Machines S. RamamruthamDhanpat Rai		
2	https://nptel.ac.in/courses/105101082/		

Structural Mechanics-I	ECE42107	L:T:P-3-0-0	3 Credits	Contact Hours

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.  Module 2:  Bending Moment & Shear force: Different types of beams, nvarious types of loading, Relationship connecting intensity of loading, shearing force and bending moment, shear force diagrams for Cantilever beams, bending moment diagrams for Simply supported beams, shear force diagrams for Overhanging beams, bending moment diagrams for Simply supported beams, shear force diagrams for Overhanging beams, bending moment diagrams for Overhanging beam.  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 beams, Generalized theory of pure bending, shear centre of thin walled open cross sections.  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.  Module 5:  Thin and Thick Cylinders: Stresses in thin cylinders, thick cylinders, Lame's equation, stresses in thick cylinders due to internal and external pressures, Wire wound pipes and cylinders, compound Cylinders, shrink fit.  Deflection of b	Module 1:		
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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.  Module 5:  Thin and Thick Cylinders: Stresses in thin cylinders, thick cylinders, Lame'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	and stability, Euler's buckling/crippling load for columns with different end conditions,	[0]	
torsion, Close coiled helical springs, open coiled helical springs.  Module 5:  Thin and Thick Cylinders: Stresses in thin cylinders, thick cylinders, Lame'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	Rankine's formula, Eccentric loads and the Secant formula, Imperfections in columns.	[7]	
Module 5: Thin and Thick Cylinders: Stresses in thin cylinders, thick cylinders, Lame'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	<b>Torsion:</b> Torsion of solid and hollow circular shafts, Pure shear, strain energy in pure shear and		
Thin and Thick Cylinders: Stresses in thin cylinders, thick cylinders, Lame'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	torsion, Close coiled helical springs, open coiled helical springs.		
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	Module 5:		
cylinders, compound Cylinders, shrink fit.  Deflection of beams: Differential equation of the elastic curve, Method of successive	Thin and Thick Cylinders: Stresses in thin cylinders, thick cylinders, Lame's equation,		
Deflection of beams: Differential equation of the elastic curve, Method of successive	stresses in thick cylinders due to internal and external pressures, Wire wound pipes and	[0]	
1		[2]	
integration, Macaulay's method.	*		
	integration, Macaulay's method.		

Te	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		

De	sign Thinking-I	DGS11001	L: T: P-0-0-3	2 Credits	Contact Hours
M	odule 1:			!	
	hy Design Thinking and The Design	•	ontext and an introdu	ction to key	
	ncepts, terminology, and structure for the				[6]
	oping, The Design Brief and Visual			_	
_	pject and its intent, questions to explore	. •	, and establishes the	importance	
	pictures and storytelling in the overall p	process			
	odule 2:				
	ndamentals of Ethnography and Id			rve users in	
	ir "natural habitat" and efficiently extra	_			[8]
	tablishing Design Criteria and Brain	_	•	t	
	pression of the ideal end state of a proje	ect, and deliberately g	generate many fresh		
	ernatives to the status quo  odule 3:				
	ncept Development and The Napkin	Pitch details how to	choose the best ideas	•	
	emble them into detailed solutions, and			,	[6]
	pple, consistent format for summarizing	•		oc a	
	odule 4:	s una communicating	, new concepts		
	sumptions Testing and Prototyping in	ntroduces a tool for s	urfacing key assumpt	ions	
	derlying the attractiveness of a new cor				[5]
	true, as well as ways to create visual n			a mar mey	
	odule 5:		- · · · ·		
	-Creation, Learning Launches, and '	<b>'So What?"</b> highligh	its ways to engage		[5]
	keholders in the development of new co				[5]
	ickly and inexpensively, and lead innov	•			
Te	xt Books:				
1	Jeanne Liedtka, Tim Ogilvie, and Rac	hel Brozenske, The I	Designing for Growth	Field	
	Book: A Step-by-Step Project Guide (	Columbia University	Press, 2014).		
2	Jeanne Liedtka and Tim Ogilvie Desig	gning for Growth: A	Design Thinking Too	l Kit for	
	Managers (Columbia University Press	s, 2011)			
3	Design Thinking for Educators (IDEC	); https://designthink	xingforeducators.com	<u>/</u>	
Re	ference Books:				
1	Human-Centered Design Toolkit (IDE	EO); <a href="https://www.ideo">https://www.ideo</a>	o.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)	);			<u>.</u>
	https://www.frogdesign.com/wpconter	nt/uploads/2016/03/0	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	Contac t 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]	
Integration: Trapezoid rule, Simpson's rule (only methods), Newton-Cotes open formulas.  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]

Te	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.				
R	eference 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	Contac t 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,				[9]
Castigliano's 1st theorem  Module 2: Analysis of statically dete Moment Area Theorem, C Superposition, Application of	Conjugate Beam Method, M	Maxwell Betti's Theore	m, Method of	[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 bucking, 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, 9th 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			
Refe	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			

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				[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]

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3	"Soil Mechanics and Foundation Engineering", P. Purusothama Raj, PEARSON			
Re	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
<ul> <li>Module 1:</li> <li>Introduction: Objectives and Classification of surveying, Various applications and principle of surveying.</li> <li>Methods of Linear Measurements and Preparation of Maps:</li> <li>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.</li> </ul>				[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.	[12]
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.	

Te	Text Books:				
1	Surveying and Leveling. N.N. Basak,1st Edition,Tata McGraw Hill, 6 <sup>TH</sup> EDITION, 2017				
2	Surveying and Leveling, Vol I & II, Kanetkar and Kulkarni, 24th edition, Pune VidyarthiGriha, Pune.				
3	Engineering Surveying 2, W. Schofield, Butterworths				
Re	Reference Books:				
1	"Surveying, R Agor, Khanna Publishers.4 <sup>TH</sup> EDITION,2017				
2	https://nptel.ac.in/courses/105107122/				

Water Resources	ECE42108	L:T:P: 3-0-0	3 Credits	Contact
Engineering				Hours
Module 1:				
Introduction: Importance of water resource engineering, Management and development of				
Indian water resources, Wate			•	[8]
Advantages and Disadvantag		n, Techniques of water distri	bution in the	
farms, Quality of Irrigation &	Standards.			
Module 2:				
Water requirements of Irr			elta of crop –	
Relation between duty and de				[9]
Eva-transpiration –CIR. NI		-	ure irrigation	
Relationship, Important defin	itions- Plane irrigation	n or watering, Crop Rotation.		
Module 3:				
Ground water for Irrigation t	· ·		•	
of groundwater, Aquifers a		_		
equilibrium formula for unc		-	•	
Wells Yield of well, Efficiency of well, Tube wells—Types of tube wells, Yield of tube wells,				[10]
Pumps and types of Pumps				
Types of irrigation: Flow irrigation, Lift irrigation, Canal irrigation system—Types of canals,				
Alluvial and alluvial canals,	•		ain important	
definition, Losses of water in canals, System of Bandhara irrigation.				
Module 4:				
<b>Reclamation of water logged Soils</b> : Introduction of saline and alkaline soils, Water logging,				
its Causes, Water logging Con				
requirement, Surface and subsurface drainage, Drainage channel Design Estimation of				[9]
runoff				
Sediment transport and De	0	•		
of stable channels, Regime	channels, Kennedy's	theory, Lacy 's Theory, In	itial and final	

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.	[9]
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.	

Te	ext 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
Re	eference 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	SMA42211	L-T-P: 0-0-3	Credit: 2
<b>Techniques Lab</b>			
Exp. 1	The root of non-linear equation usi	ng Bisection method.	
Exp. 2	The root of non-linear equation usi	ng false position method	d.
Exp. 3	The root of non-linear equation usi	ng Newton Raphson me	thod.
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.		nethod.	
Exp. 8 Solve a system of linear equation using gauss-seidel method.			d.
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 Preparation of map	Distance between two inaccessible points by chain, Ranging, Preparation of map			
Exp. No.02	Getting outline of the	Getting outline of the structures and calculation of area			
Exp. No.03	Preparation of field bo	ook from field data.			
Exp. No.04		ng, closed traversing usi ch Rule. Preparation of G	• .		
Exp. No.05	Temporary adjustments of plane table, Radiation method, Intersection, Traversing and Resection methods of plane tabling				
Exp. No.06	leveling and plotting the	Temporary adjustment of Dumpy level, Differential leveling, Profile leveling and plotting the profile, Longitudinal and cross sectioning, Sensitiveness of Bubble tube			
Exp. No.07	0.	Direct contouring, Indirect contouring – Block leveling, Indirect contouring – Radial contouring, Demonstration of minor instruments.			
Exp. No.08	1 1	Temporary and permanent adjustment of theodolite, Observations of vertical, horizontal and deflection angle using Vernier Transit Theodolite			
Exp. No.09		al, horizontal and deflect area in Autocad from To	0		

Exp. No.10	Study of Global Positioning System and Accessories, Observations
	using GPS

Solid Mechanics Lab	ECE42204	L-T-P: 0-0-3	Credit: 2	
Exp. No. 01	Determination of Tensile str steel, HYSD bars)	ength of Structural Materia	als( e.g Mild Steel and Tor	
Exp. No. 02	Determination of Compressionand concrete cubes	ve strength of Structural N	Materials (e.g Timber, bricks	
Exp. No. 03	Determination of Bending s	trength 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 (Brinnel 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 str	ength of mild steel by Cha	rpy method	

Ref	Reference Books:			
1	1 Elements of Strength of Material S. P. Timoshenko & D. H. Young EWP Pvt. Ltd			
2	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.

De	sign 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]		
Th rel pla wi	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]	
Te	xt Books:				
1	IDEO Field Guide to Human Centere				
2	Brown, Tim. "What We Can Learn from Design Thinking 16 January 2015.		sign Thinking: Thou	ghts by Tim I	Brown.
3	Design Thinking, 16 January 2015. W Millenson, Alisson. "Design Research Peer Insight, 31 May 2013. Web. 9 Ju	n 101: Prototyping Yo	ur Service with a Sto	oryboard." Pe	er Insight.
Re	ference 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 spreadinghttps://www.ted.com/talks/david_kelley_on_human_centered_design?language=en				n	
3 Knapp, Jake. "The 8 Steps to Creating a Great Storyboard." Co.Design. Fast Company & Inc. 2013. Web. 9 July 2015					
4	van der Lelie, Corrie. "The Value of S and Ubiquitous Computing 10.203 (2)	•	-	" Journal of l	Personal

# 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]	
Reinforcement for Torsion, and detailing of a water tank Limit State of Serviceabi	e-Torsion: Critical section, Equivalent longitudinal mon with curved beam. lity: Deflection, Short term ag, Estimation of width of crace	nent, Design project f deflection, Long term	or the design	[9]
456-rectangular, square and uniaxial eccentricity using	-Compression: Analysis ar circular cross sections, Axia SP 16 design charts, Column slender columns, Design of i , Pedestal	ally loaded columns, C	Columns with city using SP	[9]

Tex	Text Books:		
1	"Plain and Reinforced Concrete", Vol. I, Jain & Jaikrishna, Nemchand Brothers.		
2	2 "Design of Reinforced Concrete Structures", Dayaratnam P,Oxford& IBH.		
3	3 "Reinforced concrete design", Pillai and Menon, McGraw Hill Publication.		
Rei	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 resistively 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 graft, 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]
support methods of Analysis, Braced Excavation.  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., 6the Edition				
2	Advanced Foundation Engineering, V.N.S. Murthy, CBS Publisher's &, Distributors				
3	Principles of Foundation Engineering, B.M. Das, Thomson Book				
Refere	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.				
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.				
Module 3: Intersection: At-grade and gr intersection.	ade separated inter	sections, Canalization	n, Design of rotary	[9]
Module 4:				[9]

<b>Traffic Engineering &amp; Control:</b> 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.),	
<b>Design of Traffic Signal:</b> Requirement and components, Phase, Design as per Webstar's	
approach.	
Module 5:	
<b>Design of pavements:</b> 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.	[9]
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.	

Highway Engineering by S.K.Khanna, C.E.G.Justo, A. Veeraragavan, Publisher - Nem

2 Traffic Engineering and Transport Planning by L.R.Kadiyali, Khanna Publishers.

Text Books:

Chand & Bros., Revised 10<sup>th</sup> Edition.

3	Highway Engineering by L.R. Kadiyali, Khanna Publishers.					
Refe	erence Books:					
Principles of Transportation Engineering by Partha Chakraborty, Animesh Das- Learning Pvt. Ltd., 01-Jan-2003.  https://nptel.ac.in/courses/105101087/						
	al & Urban Planning	СЕН43101	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:	
<b>Urban Planning - Theory:</b> 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 1	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				
Refer	rence Books:				
1	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
_	Interior Earth, Elastic rebou intensity and scales, Epicenter Structural Systems	•		[9]
comparison between static an	c loads, dynamic loads, d d dynamic loads, damping in gle degree freedom system, Na	structure, Undamped		[9]
freedom system, Damped single degree freedom system, Natural frequency.  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	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 Eathquake Engineering, Jai Krishna, A. R. Chandrashekhar and, Publisher - Brijesh Chandra South Asian Publishers				
Refer	Reference Books:				
1	https://nptel.ac.in/courses/105101004/				
2	Earthquake Resistant Design, D. J. Dowrick, Publisher - John Willey & 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	Contac t 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-effects- usage.	mineral and che	emical admixtures- proper	rties- dosages-	
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- Factor tests- Setting times of concrete- Eff bleeding- Mixing and vibration of mixing water.	ect of time and ter	mperature on workability-	Segregation &	[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: Con Flexure tests- Splitting tests- Pu provisions for NDT.	*		•	[10]
ELASTICITY, CREEP & SHRINKAGE- Modulus of elasticity- Dynamic modulus of elasticity- Posisson's ratio- Creep of concrete- Factors influencing creep- Relation between creep & time- Nature of creep- Effects of creep- Shrinkage - types of shrinkage.				
Module 4: Mix Design: Factors in the choice of concrete- Statistical Quality cont normal pumpable concretes by- BIS	rol- Acceptance c	criteria- Proportioning of c		[7]
Module 5: Special Concretes: Light weight con No-fines concrete- Fibre reinforced Self compacting concrete.				[8]

Te	Text Books:		
1	Properties of Concrete by A.M. Naville - 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
Re	ference 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	Contac t Hours
Module 1				t Hours
Introduction- Waste Management	Need of waste Ma	nagement Waste- Cl	assification of	
Waste (MSW, Industrial waste,		•		[9]
Environmental rules and regulation of solid, hazardous & biomedical waste, Impacts of waste				[/]
on Environmental and human health	•	·	<b>F</b>	
Module 2	,	,		
Solid waste management: Introdu	ction of solid waste m	anagement, Need of I	ntegrated solid	
waste management, Functional Ele		_	-	[9]
site waste storage, handling and p			-	2 2
solid waste management.			-	
Module 3				
Hazardous waste management: I	Disposal of Radioactiv	ve Disposal of e-was	te, Disposal of	[0]
waste- Land filling, Incineration,	Pyrolysis and Compo	sting, Disposal of ha	zardous waste,	[9]
Disposal methods of biomedical waste, (Chemical and thermal methods)				
Module 4				
Waste minimization: Objectives	of waste minimization	, Flow chart of waste	e minimization	ļ
(hierarchy process in detail), Wa	ste minimization met	hods- by source redu	action, process	[9]
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.				
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.				

### **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/

<b>Geotechnical Engineering</b>	ECE43201	L:T :P- 0-0-3	Credit: 2
Lab			
Experiment no. 1:	Determination of de	etermination of natural mo	isture content by Oven
	Drying method, Cal	cium Carbide method.	
	Determination of sp	ecific gravity of i) Cohesi	onless ii) cohesive soil
Experiment no. 2:	Determination of In	-situ density by core cutte	r method & sand
	replacement method	l	
Experiment no. 3:	Determination of G	rade of cohessionless soil	by sieving & fine grained soil
	by hydrometer analy	ysis	
Experiment no. 4:	Determination of A	tterberg's limits (liquid lin	nit, plastic limit & shrinkage
	limit)		
Experiment no. 5:	Determination of compaction characteristics of soil using Light		
	compaction.		
	Determination of D	etermination of co efficier	nt of permeability by
	constant head perme	eameter (coarse grained so	oil) & variable head
	parameter (fine grai	ned soil)	
Experiment no. 6:	Determination of Sl	near parameter of soil by I	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)		

Refe	rence Books :
1	Soil mechanics and Foundations, Dr. B.C Punmia, Er. Ashok Kumar Jain &Dr.Arun Kumar Jain,
	Laxmi Publications (P) Ltd., 6the 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	ECE43203	L:T :P- 0-0-3	Credit: 2		
Engineering Lab					
Experiment no. 1:	Determination of sp	ecific gravity and water abs	sorption of fine aggregate		
	and coarse aggregate	2			
Experiment no. 2:	Determination of bu	lking of sand and deleterior	us materials in fine		
	aggregate				
Experiment no. 3:	Determination of gra	adation and fineness modul	es of fine aggregate and		
	coarse aggregate by	Sieve analysis			
Experiment no. 4:	Determination of bu	lk density of fine aggregate	and Flakiness and		
	Elongation Index of	Elongation Index of coarse aggregate			
Experiment no. 5:	Determination of Im	pact value and Los-Angele	s Abrasion value of coarse		
	aggregate				
Experiment no. 6:	Determination of penetration value, specific gravity and softening point of				
	Bitumen & bitumino	ous 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 Te	est			

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

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

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	nmands of Autocad.

Ref	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.			
	LtdNoida; Third edition (2010)			

Rural and U	Jrban Planning LabCEH43201L:T :P- 0-0-3Credit:2					
Experiment No	Experiment					
1	ield Survey of the stud	dy area: Travers	sing, Levelling, Contouring	g etc.		
2	g: Elements of spatial data in CAD - Arcs, lines, rectangles, polylines, points, circles, donuts, layers, grids, snaps and object snaps, etc.					
3	;: Move, scale, copy, offset, change, trim, extend, mirror, divide, measure, array, break, hatch, block, zoom, view, pan, fontsetc.					
4	tudies 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 prototypa wire framing/UX prototyping tool, An user testing, Analytics and insight, Troubly Your customer discovery, Levels of a production of the control of t	natomy of an experier leshooting			[6]

Adamas Foundation (CSR Activity)		L: T: P-0-0-0	1 Credit
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#### 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:**

- Tadevosyan, Gohar&Schoenhuth, Michael. Participatory Research Approach: Principles, Challenges and Perspectives. <a href="http://ysu.am/files/01G">http://ysu.am/files/01G</a> Tadevosyan M Schoenhuth.pdf
- Bergold, Jarg& Thomas Stefan. Participatory Research Methods: A Methodological Approach in Motion <a href="http://www.qualitative-research.net/index.php/fgs/article/view/1801/3334">http://www.qualitative-research.net/index.php/fgs/article/view/1801/3334</a>

# 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 of structural steel, Metallurgy of The Basis of structural De Codes and specification, De hinge. Bolted Connections: River Design strength of ordinary by Welded Connection: Welding of joints, Design strength of	f steel, Manufacturing sign: Design considering philosophies, Fast and riveted connected black bolts, Eccentricing process, Symbols	leg of steel, Corrosion and fire lerations, Steps involved in a milure criteria for steel, Conce ection, Behaviour of bolted econnection, Truss connections, Classification, Welding pr	e on steel. construction, ept of plastic connection, ons.	[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]

<b>Design of Compression Member:</b> 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 codalprovisions, provide suitable sections of different components subjected to various type loads.	[9]

Te	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.			
Re	Reference Books:			
1	"Design of Steel Structures", N. Subramanian, Oxford University Press.			
2	Relevant IS Codes.			
3	https://nptel.ac.in/courses/105105162/			

Environmental	ECE43104	L:T :P- 3-0-0	3 Credits	Contact	
Engineering				Hours	
Module 1					
Water supply schemes : In	troduction- Necessit	ty of water supply systems, Co	mponents of		
water supply schemes, Lay o	out of water Supply sy	vstem			
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 Design period					
Module II					
<b>Sources of Water</b> – 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,		_	-		

Module III	
<b>Water Treatment</b> – Objectives Flow diagram of WTPS, Sedimentation – Theory, Estimation	
of settling velocity, Sedimentation with coagulation, Design	
<b>Filtration</b> – Theory Classifications of filters Construction, Working of Slow. Rapid sand filters, Disinfection of water- Objectives Necessity. Chlorination	[10]
<b>Miscellaneous treatment</b> —Aeration, Removal of iron and Manganese, Removal of colour and odour, Fluoridation DE fluoridation	
Module IV	
Conveyance of water Different types of Pipes used for Conveyance, Pipe materials, its	F01
advantages and Disadvantages, Appurtenances- Valves, water meters, Laying of pipes,	[8]
Hydraulics of flow and Design of Pipes, Testing of pipes.	
Module V	
<b>Distribution of water</b> -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. AarneVesilind, 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	Contac t 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.				
Module 2: Types and Radiation print Reflectance Signature, Ima Stephens Boltzmann Law, K	nges & their classificat		•	[8]

Module 3: Sensors and Applications: Sensors, SPOT HRV and HRVIR Instrument Characteristics, Remote sensing in the optical domain and their Application, Electromagnetic Spectrum	I
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	
Module 5: Application to Hydrology and Water Resources: Flood zoning and mapping, groundwater prospects and potential recharge zones, watershed management.	

Te	xt 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).		
Re	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
Modern Materials and Equipment functions of the special types of Chimney, Elevated service reservoir, structures, Industrial structures, Marine Effect of lateral forces on building like Admixtures and its Classification: Use of Waste products and Industrial Elevations and Equipment: Trucks, Wagon, Hoisting equipment: Derrick-Pole, Hand operated crane, Locomotive Winches, Elevators, ladders. Conveying equipment: Belt conveyor Pumping equipment: Water pumps are Compacting equipment: Rollers (earoller, pneumatic rollers, tamping rolle Pile Driving Equipment: including ty types of drill. Vibrators: for concrete consolidation vibrators.	Dams and retain and offshore struct Wind, Water and Edwind, Water and Edwind, Water and Edwind, Scrapers Gin Pole, Crane, I crane, Gentry crans, Buckets, Chutes and concrete pumps. The compaction of the compact	structures: Multistoried ing walls, Bridges and stures, Tall structures. Earthquake as, blocks, concrete and rand rippers. Power driven scotch deme, Tower crane, Latter Smooth surface roller, and compactors.	building, hydraulic mortar. rrick crane, ice Girder, sheep foot	[10]
Module 2:  Excavation and related Equipment Shallow and deep excavation, Dewater Excavations Machinery: Power S equipment, Wheel mounted belt loader Earth moving Vehicles: Tractors, Bott Earth moving machinery: Handling, driving, Drilling equipment, Plants for Plant, Ready Mix Plant.	hovel, Drag line, rs. ilders, Graders, Scr Hoisting, Conveyi	Calm Shell, Scoop, apers, Rippers. ng, Pumping, and Comp	Trenching pacting, Pile	[10]
Module 3: Pile Foundation Pile foundations, Classification, Sheet on materials like concrete, steel, timber Pre-stressed) including cased and unce type of piles, Pile accessories and too Under reamed piles including method efficiency.	er, composite, sand cased with advantage ls, Pile driving met	, concrete (pre-cast, Cas ges and disadvantages, S chods, Failure or settleme	Selection of ent of piles,	[10]
Module 4: Drilling and Blasting Drilling: Types, Drilling requirement air pressure on drilling operation, Eselection of drilling method and equipm Explosives for blasting: Dynamite, Estophole, Prime detonators, Process of using of explosives Erection of Steel Structures Formwork: Requirements of a good Column form work, Slab and beam for Trestles, Form work for domes and a	setonies/mud slurry ment clasting caps Prime ing explosive, Type d form work, Loa formwork, Slip from	line, Safety fuse, Stemn s of blasting, Precaution ads, guiding points for work, Hanging form w	ffecting the ning, Blast ns, Storage design, orks and	[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]

Te	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			
Re	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 o	f building frames-Canti	ilever and portal met	hod.	[5]
<b>Module 2:</b> 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]

Te	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.				
Re	Reference Books:				
1	"Advanced Structural Analysis", Devdas Menon, Narosa				
2	https://nptel.ac.in/courses/105106050/				

Intelligent Waste Management	СЕН43102	L:T :P- 3-1-0	4 Credits	Contact Hours
Module-1 Introduction: Introduction, Need of smart waste management system, working principle.	stem, Advantag	ges of smart waste manageme	ent system,	[12]
Module -2				[12]

<b>Solid Waste Management-</b> 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.	[12]
Disposal of Municipal Solid Waste: Landfill, Biochemical Processes and Composting,	
Energy Recovery from Municipal Solid Waste. Municipal Solid Waste (MSW) Rules 2016	
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	[12]
conceder before selecting one particular sewage disposal techniques, Liquid waste disposal	
methods at the rural communities/household level, Sewage/wastewater treatment.	
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,	[12]
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.	

Te	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			
Re	eference 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	СЕН43104	L:T :P- 3-0-0	3 Credits	Contac t Hours
Module-1				[9]

<b>Introduction:</b> 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	
<b>Sensors:</b> Sensing Technology, Types of Sensors, Physical Measurement using Piezo Electric Strain measurement – Inductively Read Transducers, The LVOT – 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	
<b>Actuators:</b> 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	
<b>Signal processing and control systems:</b> Data Acquisition and Processing, Signal Processing and Control for Smart Structures, Sensors as Geometrical Processors, Signal Processing – Control System – Linear and Non-Linear.	[9]

Te	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			
Re	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	ECE43202	L:T :P- 0-0-3	Credit: 2	
Engineering Lab				
EXP. NO.01	Determination of turbi	dity for a given samp	le of water	
EXP. NO.02	Determination of color	for a given sample of	of water	
EXP. NO. 03	Determination of soli	ds in a given samp	le of water: Total Solids,	
EXP. NO.04	Determination of Susp	ended Solids and Dis	solved Solids	
EXP. NO.05	Determination of pH for	or a given sample of	water	
EXP. NO.06	Determination of conc	entration of Chloride	s 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,	[10]
market value, Book Value, sinking fund, capitalised value, Y. P., depreciation, obsolescence,	[10]
deferred income, freehold and leasehold property, mortgage, rent fixation, valuation table	

Tex	Text Books:				
1	Estimating, Costing, Specification & Valuation M. Chakraborty Self				
2	Estimating Costing And Valuation N R RangwalaCharotar Publishing House Pvt.Ltd				
3	Civil Estimating & Costing: Including Quality Surveying, Tendering A.K. Upadhyay S K Kataria				
	and Sons				
Ref	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	ECE43206	L:T :P- 0-0-3	Credit: 2	
GIS Lab				
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
•	ection of STAAD for building structures.		
Exp. No.02	ng structural systems for symmetric and unsymmetric building structures.		
Exp. No. 03	ring and assigning of various types of loads on structural systems as per codal provisions.		
Exp. No.04	/ing analysis and performing analysis.		
Exp. No.05	Modelling and analysis of steel structures.		

Re	Reference Books:			
1	IS: 456 – 2000, "Indian Standard for Plain and Reinforced Cocrete – 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 Structu Bureau of Indian Standard.			
4	STAAD's tutorial help.			

Intelligent Waste	CEH43202	L:T :P- 0-0-3	Credit: 2
Management Lab			
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 w	aste disposal	

Re	Reference Books:			
1	George Tchobanoglous, Hilary Theisen and Samuel A Vigil, Integrated Solid Waste management, Tata McGraw Hill.			
2	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	Contac t Hours	
Module 1:					
Basic concepts of management: Definition, Essence, Functions, Roles, Level, Evolution and				101	
Foundations of Management Theories - Classical and Neo - Classical Theories, Systems			[8]		
Approach to organization, Modern Organization Theory.					
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:	
<b>Staffing</b> : 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.	[15]
<b>Directing</b> : 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.	
Module 4:	
Management and Society: Concept, External Environment, CSR, Corporate Governance,	
Ethical Standards. People Management: Overview, Job design, Recruitment & Selection,	[7]
Training & Development, Stress Management. Managerial Competencies: Communication,	
Motivation, Team Effectiveness, Conflict Management, Creativity, Entrepreneurship.	
Module 5:	
Management Control: Meaning, Nature, Features, Objectives and Process of Management	
Control and Behavioural Aspects of Management Control, Need for Control system,	[8]
techniques of control and linkage between planning and control.	[0]
Operations & Technology Management: Production & Operations Management, Logistics &	
Supply Chain Management, TQM, Kaizen & Six Sigma, MIS.	
Text Books:	
1   Management: Principles, Processes & Practices – A Bhat& A Kumar, Oxford University Processes	ress 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	ECE 44101	L:T :P- 3-0-0	3 Credits	Contact
Engineering				Hours
Module 1:		-		[9]
Introduction: Air Pollution: Definit	ions, Scope, S	ignificance 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.				
Module 2:				[8]
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.				

Module 3:	[9]
Meteorology: Thermodynamics and Kinetics of Air-pollution, Applications in the removal	
of gases like SOx; NOx; 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.	ı
Module 4:	[10]
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.	ı
Module 5:	[9]
General Methods of Control of NOx and SOx emissions: In-plant Control Measures,	
process changes, dry and wet methods of removal and recycling. Air Quality Management –	
Monitoring of SPM, SOx; NOx and CO Emission Standards.	

TE	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				
Ref	Ference 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, Cons Management, Tools of Constriction manager Methods of construction Management, Steps Structure, Coding	nent, Planning,	Scheduling and of	Controlling,	[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'sScraper, 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:	
<b>Design of Flat slab:</b> Introduction, classification, behaviour of flat slabs, direct design and	[11]
equivalent frame method of design, I.S codal provisions.	[11]
Yield Line Theory: Assumption, Rules and Method of Analysis.	
Module 2:	
RCC water tank: Design of rectangular and circular water tanks- Underground and	[10]
overhead.	
Module 3:	[0]
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	[15]
approximation, codal provisions, design of simply supported circular and cylindrical long	
shells and folded plates.	

Te	ext Books:
1	Krishnaraju, N., Advanced Concrete Design, CBS Publishers and Distributors, Delhi, 1986
2	Varghese, P.C., Advanced Reinforced Concrete Design, Pretince-Hall India, 2nd edition.
3	Ramaswamy, G.S., Design and Construction of Concrete Shell Roofs, CBS Publishers. 1986.
4	Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, Reinforced Concrete Structures, Laxmi
	Publications, New Delhi, 1988.
Re	eference 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=PLbQO4xhI7wEDIYv90NoF7veaJIohp
	uf0Q

Repair and Rehabilitation of Structures	ECE44107	L:T :P- 3-0-0	3 Credits	Contact Hours
Module 1:				
Deterioration of concrete in structure	es: Physical proc	cesses of deterio	oration like	
Freezing and Thawing, Wetting and D	rying, Abrasion,	Erosion, Pitting	, Chemical	
processes like Carbonation, Chloride ingress, Corrosion, Alkali aggregate reaction,				[9]
Sulphate attack Acid attack, temperature and their causes, Mechanism, Effect, preventive				
measures Cracks: Cracks in concrete,	type, pattern, qua	intification, meas	surement &	
preventive measures				
Module 2:				
Non Destructive Testing_Non-destructive	test methods for	concrete includir	ng Rebound	
hammer, Ultrasonic pulse velocity, Rebar	locator, Corrosion	meter, Penetratio	n resistance	[9]
and Pull out test, Core cutting- Corrosic	on: Methods for	corrosion measu	rement and	
assessment including half-cell potential and	ł resistivity, Mappi	ng of data.		
Module 3				
Failure of buildings: Definition of building	ng failure-types of	failures- Causes	of Failures-	
Faulty Design, Accidental over Loading, I				[9]
practices- Fire damage - Methodology for investigation of failures-diagnostic testing				
methods and equipment-repair of cracks in concrete				
Module 4:				
Materials for repair and rehabilitation	* *			
using admixtures- chemical composition-				
Carbon fibre wraps- Steel Plates-Concr				[9]
mechanisms- moisture effects and therm				
emission methods- Corrosion activity			•	
carbonation- Impact echo methods- Ultraso	ound pulse velocity	methods- Pull of	it tests.	
Module 5:	Chatanatina aut	مالير ام محما ما ساده	og Moiling	
Repair Techniques: Grouting, Jacketing,	-	•	-	
Underpinning and under water repair; Materials, Equipments, Precautions and Processes.  Investigation of structures: Distress, observation and preliminary test methods. Case			[9]	
studies: related to rehabilitation of brid		•		
	age piers, dams,	canais, neritage	suuciules,	
corrosion and erosion damaged structures				

Te	ext 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			
Re	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/			

<b>Prestressed Concrete</b>	ECE44109	L:T :P- 3-0-0	3 Credits	Contac t Hours
Module 1:				
Introduction: Basic concepts	s, High strength concrete, high	h tensile steel, termi	nology, system	F01
of pre-stressing, pre-tension	ning, post-tensioning, princ	iple of pre-stress	ing, types of	[8]
pre-stressing.				
Module 2:				
	imptions, analysis of pre-stres	•	•	
_	of pre-stressing - stress cor		•	
	of stresses of composite const	ruction of pre-stress	sed and in-situ	[10]
concrete.	C	. 1 . 1	C .	
	of pre-stress, types, losses due		on of concrete,	
,	of concrete, friction, anchorag	e slip.		
Module 3:	М		<b></b>	
	<b>Member:</b> Effect on tendor lculation of deflections – S	*	•	F01
			•	[8]
deflections, permissible limits of deflection. Check of deflection according to IS:1343 code recommendations.				
Module 4:				
	: Inadequacy of Ultimate loa	d method criteria f	or limit states	
_				[11]
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.				
Module - 5:				
Strength of Pre-Stressed Concrete: Types of flexural failure strain compatibility method, IS				
code procedure design for limit state of shear, torsion.				[10]
<b>Design of Pre-Stressed Concrete:</b> Types of Pre-stressed concrete slab, design of one-way				
slab, design of two-way slab.	Design of electric poles.			

Text Books:				
1	"Pre-stressed Concrete", N. Krishna Raju, Tata McGarw-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 Prractice for pre-stressed concrete structures, IS: 1343, BIS, 2009			
Referen	Reference Book:			
1	1 "Prestressed Concrete", S.Ramamrutham, Dhanpat Rai Publishing Company			
2	https://nptel.ac.in/courses/105106117/			

<b>Environment Impact Assessment</b>	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.				
<ul> <li>David P. Lawrence, Environmental Impact Assessment: Practical Solutions to Recurre Problems, John Wiley &amp; Sons,2003.</li> <li>Anjaneyulu.Y., and Manickam. V., Environmental Imapact Assessment Methodologies Publications, Hyderabad, 2007.</li> </ul>				
Reference Books:  1 "Environmental Impact Assessment", Dr.S. Ramachandran, AIRWALK Publications				

Artificial Intelligence in Infrastructure	СЕН44103	L:T :P- 3-0-0	3 Credits	Contact Hours	
Module 1:					
<b>Introduction:</b> Overview, Histor	y of AI, Evaluation of	AI application		[5]	
15.11.0					
Module 2:	otio accomple atmostacce. Coo	ash and autimication D	ال مدة حسنسما		
<b>Search:</b> Problem spaces, Heuris scheduling, Heuristic search st	•••	*	•		
optimization problem	rategy, Adversarial sec	arcii, Locai scarcii aige	oriumis and	[12]	
Planning: Time, schedule	and process hiera	rchical planning pl	anning in		
non-deterministic domain, multi	*	grennear prainting, pr			
Module 3:					
Learning: Forms of learning,	supervised learning,	Learning decision tress	s, Artificial	[10]	
Neural Network, Practical mach	ine learning				
Module 4:					
Communicating, perceiving	O		•	[10]	
communication- Language models, text classification, information retrieval and					
extraction; Syntactic analysis, machine translation, speech recognition					
Module 5:					
<b>Robotics</b> : Robot hardware, robotic perception, Robotic software architectures, application					
domains				[8]	
<b>Infrastructure for AI</b> : Parallel and distributed computing, Resolving technical tradeoffs,					
future application of AI, Case Studies					

Te	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. Nepolitan, Xi Jiang, Artificial Intelligence with an introduction to Machine Learning,			
	Chapman and Hall/ CRC			
Re	Reference Books:			
1	Artificial Intelligence Now", O'Reilly Media Inc.			
2	nptel.ac.in/courses/106106126/			

Air Pollution	ECE44201	L:T :P- 0-0-3	Credit: 2
Control Lab			
Exp. No.01	Stack monitoring		
Exp. No.02	Ambient air monitoring for PM <sub>10</sub> , SO <sub>2</sub> and NO <sub>2</sub>		
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 <sub>3</sub>		
Exp. No.06	Laboratory scale study on few air pollution control devices		

Re	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 ControlEngineering", 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.			

Re	Reference Books:			
1	IS: 456 – 2000, "Indian Standard for Plain and Reinforced Cocrete – 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	CEH44201	L:T :P-0-0-3	Credit: 2	
Infrastructure Lab				
Exp. No.01	Write a prolog program to study fact, verification, domain, predicate and clauses section			
Exp. No.02	Write a program for 8-Q	ueen problem		
Exp. No. 03	Write a program to solve	e Traveling Salesman I	Problem	
Exp. No.04	Write a program to read	address of a person us	ing 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. Nepolitan, Xi Jiang, Artificial Intelligence with an introduction to Machine Learning, Chapman and Hall/ CRC

# ADAMAS UNIVERSITY B. Tech Civil Engineering SEMESTER – VIII

Intelligent Transportation System	СЕН44102	L:T :P- 3-0-0	3 Credits	Contac t Hours
Module 1: Fundamentals of ITS:				
Definition of ITS, the historical economic perspectives, Types of I		1 1	and market	[6]
Module 2:	15, motoriour Buongre	ound, Benefits of 115.		
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 B	ooks:					
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.					
Refere	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: Cyclone, Earthquakes, Lar Pollution, Nuclear Disaster Structural failures (Buildin	ndslides etc., Man-made : , Biological Disasters, Ac g and Bridge), War & T	Disaster: such as Fi ecidents (Air, Sea, R	re, Industrial ail & Road),	[10]
module 2: Risk and Vulnerability An analysis, Risk Reduction, V for Vulnerability	alysis: Risk and Vulnerabi	•	•	[10]
Module 3: Disaster Response: Introduction and Activate Evacuation and Logistic Machine Bodies, Psychological Response: Relief and Recovery, Medic	tion of Emergency Prep Management, Role of Gov Jonse and Management (Tr	aredness Plan. Sear ternment, Internation rauma, Stress, Rumou	rch, Rescue, al and NGO	[13]
Module 4: Rehabilitation, Reconstruct Means of Development, Measures. Creation of Lon Resistant House Construct Dealing with Victims' Ps Educational Institute.	Damage Assessment, Pos g-term Job Opportunities tion, Sanitation and Hyg	t Disaster effects a and Livelihood Opti iene, Education and	nd Remedial ons, Disaster Awareness,	[12]

Te	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.				
Re	Reference Books:				
1	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	Contac t Hours
Module 1:	•	•	
Principles of Planning: Introduction to bui	ldings, Type of buildings, Principle	es of building	
planning, Principles of architecture compos	sition, Planning of earthquake resi	stant building	[9]
considering symmetry, simplicity, continuity,	, consideration of locating staircase	and overhead	
water tank, most sensitive to earthquake.			
Module 2:			
Scientific orientation of building and be	uilding components: Building by	–laws as per	[9]
National Building Code, Standards for re-	sidential buildings, Building by-	aws of local	
authority, and standards for industrial, public	, commercial and institutional build	lings.	
Module 3:			
Construction materials and properties:			
Stone- Classification and quarrying, propert	ties, structural requirements, dressir	ng,	
Bricks -Composition of Brick earth, man	ufacture and structural requirement	ents, Fly ash,	
Ceramics.			101
Cement and Aggregates -Different grades of		-	[9]
article shape & texture, strength & other me	1 1 00 0	Different tests	
of aggregates, grading curves, Grading of fin	66 6		
Concrete & its Properties - Workability,	-		
workability by different tests, Water / Cemen		sts for harden	
concrete, Fundamentals of concrete Mix desi	gn, Admixtures in Concrete		
Module 4:			
Construction Practices: Construction of	•	_	[0]
walls), Flooring (selection of materials, type			[9]
flooring, upper floors), Lintels, Arches, Ro	oofs, Framed structures, Concept o	f shallow and	
deep foundations.			

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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Tex	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		
Re	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.		
	Concrete reciniology by Wi. 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	Contac t Hours
Module 1: Introduction: Need for Prefabrication, Modular Coordination, Standardization,	• •	-	-	[8]
Module 2: Prefabricated Components: Behave Constructions, Constructions of waffle seems Shear wall	viour of structural slabs, Constructions of	•	•	[8]
Module 3:  Design Principle: Dismantling of structure materials used, Problems in design deformation			-	[9]
Module 4:  Joint in Structural Members: Joints Detailing, Design of expansion joints	for different structural	connections, Dim	ensions and	[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

Tex	xt 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
Re	ference 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	Contac t 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 of Sensitivity analysis - Financing options, Energy Monitoring and Targeting: and information-analysis, Techniques - e of differences (CUSUM).	Energy performand Elements of mo	ce contracts and roll onitoring & target	le of ESCOs eting, Data	[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]

Tex	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.				
Re	ference 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**

<b>Conservation of Water Resources</b>		L:T :P- 3-0-0	3 Credits	Contact
				Hours
Module 1:				
Ground and Surface Water Utilization-	Historical backgrou	nd, Hydrologic C	ycle, Water	[9]
Budget, Ground Water level fluctuations	and Environmental	influence.		
Module 2:				
Artificial Ground Water Recharge: Conc	ept & methods of art	rificial ground wa	ter recharge	[9]
mounds & induced recharge, wastewa	ter recharge for rea	use, Water Sprea	ding, Farm	I. I
Ponds and Percolation Tanks.				
Module 3:				
Water Harvesting: Rainwater harvesting, Catchment Harvesting, Harvesting Structures,				[9]
Soil Moisture Conservation, Check Dam	S.			
Module 4:				
Reuse & Recycle of Waste Water: Typ	es of reuse, Applica	ation of treated w	vaste water,	[9]
Purity of reclaimed water, Guidelines	s and Regulations,	New technologi	es used in	I. I
recycling of Waste Water	-			
Module 5:				[9]

Watershed management- Introduction, Concept of watershed Management, Watershed Management policies and decision making

Te	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.		
Re	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			[9]	
and environment  Module 2:				
Concept of sustainability, Factors among sustainable development, Environment, Envi	onment and poverty,	Determinants of	sustainable	[9]
development, Case studies on sustainable development, Population, income and urbanization, Health care, Food, fisheries and agriculture, Materials and energy flows				
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, Environm	ental Impact	Assessment,	[9]
Project categories based on environn	nental impacts, Impa	act identification	n methods,	
Environmental impact assessment proce	SS			
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

Te	xt 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

Re	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)

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</code>	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</code>	Learn how to derive the dynamic equations of motion for quadrotors.
CO- <code>-3</code>	Develop linear controllers for the planar and three-dimensional dynamic models of the quadrotor.
CO- <code>-4</code>	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, Polices 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-pase 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</code>	Design electric vehicle & HEV for various applications
CO- <code>-2</code>	Select appropriate motor and converter for EV applications
CO- <code>-3</code>	Select battery, battery indication system for EV applications
CO- <code>-4</code>	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</code>	Learn about the dimensions and performance of smart city
CO- <code>-2</code>	Learn about the energy management system of smart cities.
CO- <code>-3</code>	Learn about the implementation of STS components
CO- <code>-4</code>	Apply concept of various smart materials in the design of smart structure.