KUMARAGURU COLLEGE OF TECHNOLOGY,

COIMBATORE – 641 049

REGULATIONS 2017

CURRICULUM AND SYLLABUS

I – VIII Semesters

Department of Civil Engineering

Vision

Department of Civil Engineering is striving to become as a world class Academic Centre for quality education and research in diverse areas of Civil Engineering, with a strong social commitment

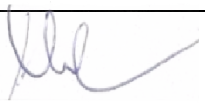
Mission

- Producing highly competent and technologically capable professionals and motivated young academicians
- Providing quality education in undergraduate and post graduate levels, with strong emphasis on professional ethics and social commitment.
- Developing a scholastic environment for the state – of –art research, resulting in practical applications.
- Undertaking professional consultancy services in diverse areas of Civil Engineering.

PROGRAM OUTCOMES

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.



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5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

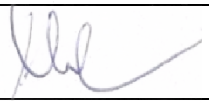
Programme Specific Outcomes

PSO1:

The graduates will be able to plan, analyse, design and prepare technical reports for Civil Engineering structures as per BIS.

PSO2:

The graduates will be able to apply technical and management skills for the execution.



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KUMARAGURU COLLEGE OF TECHNOLOGY
DEPARTMENT OF CIVIL ENGINEERING
Regulation 2017 - B.E CE - Curriculum

Semester I										Pre-requisite
S.No	Course code	Course Title	Course Mode	CT	L	T	P	J	C	
1	U17ENI1201	English for Cognizance	Embedded - Theory & Lab	HS	1	0	2	0	2	Nil
2	U17CSI1211	Structured Programming using C	Embedded - Theory & Lab	BS	3	0	2	0	4	Nil
3	U17MAT1101	Linear Algebra and Calculus	Theory	BS	3	1	0	0	4	Nil
4	U17PHT1004	Physics for Civil Engineering	Theory	BS	3	0	0	0	3	Nil
5	U17CHT1003	Chemistry for Civil Engineering	Theory	BS	3	0	0	0	3	Nil
6	U17MET1101	Engineering Graphics	Theory	ES	2	1	0	0	3	Nil
7	U17PHP1501	Physics Laboratory	Lab	BS	0	0	2	0	1	Nil
8	U17MEP1501	Engineering Practices Laboratory	Lab	ES	0	0	2	0	1	Nil
9	U17VEP1501	Human Excellence - Personal Values	Lab	HS	0	0	2	0	1	Nil
								Total Credits	22	
								Total Contact Hours/week	27	

Semester II										Pre-requisite
S.No	Course code	Course Title	Course Mode	CT	L	T	P	J	C	
1	U17ENE2201	Language Electives	Embedded - Theory & Lab	HS	1	0	2	0	2	U17ENI1201
2	U17MAT2101	Advanced Calculus and Laplace Transforms	Theory	BS	3	1	0	0	4	U17MAT1101
3	U17PHT2003	Material Science for Civil Engineering	Theory	BS	3	0	0	0	3	Nil
4	U17EET2012	Electrical and Electronics Engineering	Theory	ES	3	0	0	0	3	Nil
5	U17MET2102	Engineering Mechanics	Theory	ES	3	1	0	0	4	Nil
6	U17CET2001	Engineering Geology and Construction Materials	Theory	ES	3	0	0	0	3	Nil
7	U17CHP2501	Chemistry Laboratory	Lab	BS	0	0	2	0	1	Nil
8	U17CEP2501	Building Planning and Drawing	Lab	PC	0	0	2	0	1	Nil
9	U17ISR2001	Social Immersion Project	Lab	BS	0	0	2	0	1	Nil
10	U17VEP2502	Interpersonal Values	Lab	HS	0	0	2	0	1	Nil

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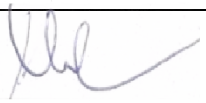
Total Credits	24
Total Contact Hours/week	31

Semester III										**Pre-requisite**
S.No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	
1	U17MAT3101	Partial Differential Equations and Transforms	Theory	BS	3	1	0	0	4	Nil
2	U17CEI3201	Solid Mechanics	Embedded - Theory & Lab	ES	2	1	2	0	4	Nil
3	U17CEI3202	Surveying & Geomatics	Embedded - Theory & Lab	PC	3	0	2	0	4	Nil
4	U17CEI3203	Fluid Mechanics	Embedded - Theory & Lab	ES	2	1	2	0	4	Nil
5	U17CET3004	Building Construction and Services	Theory	PC	3	0	0	0	3	Nil
6	U17INI3600	Engineering Clinic 1	Practical & Project	ES	0	0	4	2	3	Nil
								Total Credits	22	
								Total Contact Hours/week	28	

Semester IV										**Pre-requisite**
S.No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	
1	U17MAT4101	Numerical Methods and Probability	Theory	BS	3	1	0	0	4	Nil
2	U17CEI4201	Applied Hydraulics and Hydraulic Machinery	Embedded - Theory & Lab	PC	3	0	2	0	4	U17CEI 3203
3	U17CEI4202	Highway and Traffic Engineering	Embedded - Theory & Lab	PC	3	0	2	0	4	Nil
4	U17CEI4203	Soil Mechanics	Embedded - Theory & Lab	PC	3	0	2	0	4	Nil
5	U17CET4004	Mechanics of Materials	Theory	PC	3	0	0	0	3	U17CEI3 201
6	U17INI4600	Engineering Clinics -II	Practical & Project	ES	0	0	4	2	3	Nil
								Total Credits	22	
								Total Contact Hours/week	28	



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Semester V										Pre-requisite
S.No	Course code	Course Title	Course Mode	CT	L	T	P	J	C	
1	U17CEI5201	Environmental Engineering	Embedded - Theory & Lab	PC	3	0	2	0	4	Nil
2	U17CEI5202	Remote Sensing and Geographic Information Systems	Embedded - Theory & Lab	PC	2	0	2	0	3	Nil
3	U17CET5003	Irrigation and Water Resource Management	Theory	PC	3	0	0	0	3	Nil
4	U17CET5104	Structural Analysis	Theory	PC	3	1	0	0	4	U17CET4004
5	U17CET5005	Foundation Engineering	Theory	PC	3	0	0	0	3	U17CEI4203
6	U17_____	Open Elective I	Theory	OE	3	0	0	0	3	Nil
7	U17INI5600	Engineering Clinics -III	Practical & Project	ES	0	0	4	2	3	Nil
8	U17CER5606	Survey Camp*	Project	PC	0	0	0	0	1	U17CEI3202
								Total Credits	24	
								Total Contact Hours/week	28	

*10 days survey camp during the previous summer vacation

Semester VI										Pre-requisite
S.No	Course code	Course Title	Course Mode	CT	L	T	P	J	C	
1	U17MBT6000	Total Quality Management	Theory	HS	3	0	0	0	3	Nil
2	U17CEI6201	Design of Masonry and Reinforced Concrete Elements	Embedded - Theory & Lab	PC	3	0	2	0	4	U17CEI3201
3	U17CEI6202	Construction Project Management	Embedded - Theory & Lab	PC	3	0	2	0	4	Nil
4	U17CEE____	Professional Elective-I	Theory	PE	3	0	0	0	3	Nil
5	U17CEE____	Professional Elective-II	Theory	PE	3	0	0	0	3	Nil
6	U17_____	Open Elective II	Theory	OE	3	0	0	0	3	Nil
7	U17INI6600	Engineering Clinics -IV	Practical & Project	ES	0	0	4	2	3	Nil
8	U17CER6703	Inplant Training*	Project	HS	0	0	0	0	1	Nil
								Total Credits	24	
								Total Contact Hours/week	28	

*2 weeks in-plant training during the previous winter vacation.

Semester VII	

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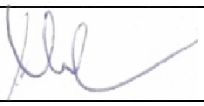
S.No	Course code	Course Title	Course Mode	CT	L	T	P	J	C	Pre-requisite
1	U17CET7001	Estimation Costing & Valuation	Theory	PC	3	0	0	0	3	Nil
2	U17CET7002	Design of Steel Structures	Theory	PC	3	0	0	0	3	U17CEI3201
3	U17CEE____	Professional Elective- III	Theory	PE	3	0	0	0	3	Nil
4	U17CEE____	Professional Elective- IV	Theory	PE	3	0	0	0	3	Nil
5	U17CEP7703	Project Phase-I	Project	PW	0	0	0	6	3	Nil
								Total Credits	15	
								Total Contact Hours/week	18	

Semester VIII									
S.No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**
1	U17CEP8701	Project Phase -II	Project	PW	0	0	0	24	12
								Total Credits	12
								Total Contact Hours/week	24

Total Credits	**165**

List of mandatory courses

S.No	Course Code	Course Title	Course Mode	CT	Sem
1	U17VEP3503	Human Excellence-Family Values	Lab	HS	3
2	U17VEP4504	Human Excellence-Professional Values	Lab	HS	4
3	U17CHT4000	Environmental Science & Engineering	Theory	MC	4
4	U17VEP5505	Human Excellence-Social Values	Lab	HS	5
5	U17INT6000	Constitution of India	Theory	MC	6
6	U17VEP6506	Human Excellence-National Values	Lab	HS	6
7	U17VEP7507	Human Excellence-Global Values	Lab	HS	7



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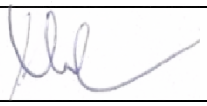
Professional Electives									
S.No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**
Structural Engineering									
1	U17CEE0001	Concrete Technology	Theory	PE	3	0	0	0	3
2	U17CEE0002	Prefabricated Structures	Theory	PE	3	0	0	0	3
3	U17CEE0003	Design of Reinforced Concrete structures	Theory	PE	3	0	0	0	3
4	U17CEE0010	Prestressed Concrete structures	Theory	PE	3	0	0	0	3
5	U17CEE0011	Maintenance and Rehabilitation of Structures	Theory	PE	3	0	0	0	3
6	U17CEE0012	Earthquake Engineering	Theory	PE	3	0	0	0	3
Environmental & Water Resources Engineering									
1	U17CEE0004	Environmental Impact Assessment and Life Cycle Analysis	Theory	PE	3	0	0	0	3
2	U17CEE0005	Surface water Hydrology	Theory	PE	3	0	0	0	3
3	U17CEE0006	Air and Noise Pollution Control	Theory	PE	3	0	0	0	3
4	U17CEE0013	Industrial Wastewater Treatment	Theory	PE	3	0	0	0	3
5	U17CEE0014	Climate change and Sustainable Management	Theory	PE	3	0	0	0	3
6	U17CEE0015	Waste Management	Theory	PE	3	0	0	0	3
Construction Management & Transportation Engineering									
1	U17CEE0007	Glass Façade Engineering	Theory	PE	3	0	0	0	3
2	U17CEE0008	Intelligent Transportation Systems	Theory	PE	3	0	0	0	3
3	U17CEE0009	Sustainable Construction Methods	Theory	PE	3	0	0	0	3
4	U17CEE0016	Building information Management	Theory	PE	3	0	0	0	3
5	U17CEE0017	Mass Transit Management	Theory	PE	3	0	0	0	3
6	U17CEE0018	Railways Airport Dock and Harbor Engineering	Theory	PE	3	0	0	0	3

Open Electives (OFFERED TO STUDENTS OF OTHER DEPARTMENTS)									
S.No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**
1	U17CEO0001	Climate Change Impact on Water Resources	Theory	OE	3	0	0	0	3
2	U17CEO0002	Energy Conservation in Buildings	Theory	OE	3	0	0	0	3
3	U17CEO0003	Traffic Engineering and Management	Theory	OE	3	0	0	0	3
4	U17CEO0004	Pre-engineered Buildings	Theory	OE	3	0	0	0	3



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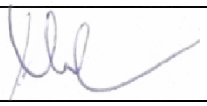
5	U17CEO0005	Metro Systems and Engineering	Theory	OE	3	0	0	0	3
6	U17CEO0006	Fundamentals of Soil and Water Conservation Engineering	Theory	OE	3	0	0	0	3
7	U17CEO0007	Green Building Concept and Design	Theory	OE	3	0	0	0	3
8	U17CEO0008	Landscape Designing	Theory	OE	3	0	0	0	3
9	U17CEO0009	Green Building Design- Civil Engineering Focused Tools and Techniques	Theory	OE	3	0	0	0	3
10	U17CEO0010	Sustainable Technologies and Circular Economy	Theory	OE	3	0	0	0	3



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SEMESTER I

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U17ENI1201 **English for Cognizance**

L	T	P	J	C
1	0	2	0	2

Course Outcomes

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

CO1: Understand and appreciate vocabulary and syntax with accuracy and clarity.

CO2: Communicate effectively by using appropriate grammar and technical parlance in a range of academic scenarios.

CO3: Interpret and critically evaluate discourses related to functional English.

CO4: Comprehend critical text leading to academic articulation.

CO5: Disseminate professional information through appropriate means of communication.

CO6: Demonstrate an understanding for innovative language learning strategies and write texts applying registers formats and language appropriate to the context.

Pre-requisites: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	W	M				W			M	S		M
CO2		W	M		W	S		W	M	S		S
CO3	W	S				W	W			S		M
CO4		M								S		M
CO5		S				W			M	S		S
CO6		W				W			W	S		S

Course Assessment methods

Direct
1. Continuous Assessment Test I,II 2. Assignment, Group Discussion 3. End semester Examination
Indirect
1. Course-end survey

INTRODUCTION TO LITERARY SKILLS **9 Hours**

Parts of Speech – Word Formation – Homonyms - Homophones and Homographs, One

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Word Substitutes, Acronyms and Abbreviations, Reading Aloud, Quick Reading,Sequencing of jumbled sentences, Reading to Predict.

TECHNICAL NUANCES **9 Hours**

Tense, Voice, Kinds of Syntax, Gerund and Infinitives, Cause and effect expressions, Purpose and functional expressions, Conditional clauses, Reported speech, Diary Writing, Editing (Grammar – Concord, Articles, Parts of Speech, Modifiers – Dangling participles, Misplaced, Squinting and Punctuation).

COMPREHENSION AND ANALYSIS **9 Hours**

Sub Skills of Reading, Reading Comprehension, Text Visualization, Peer Reading, Cloze Test, Inferring Technical Texts, Reading a Travelogue, Reading for Interrogation, Reading to Respond, Note making – Linear and Non-linear.

PRACTISING LITERARY SKILLS **9 Hours**

Instructions and Recommendations, Discourse markers – Process description, Writing a Paragraph – Descriptive, Narrative, Compare and Contrast, Persuasive, Creative Writing, Critical Reading, Twirl Reading, Google Reading.

TECHNICAL CORRESPONDENCE **9 Hours**

Technical Discourse, Modules of a letter, Professional Letters, Industrial Visit/ In-plant Training, Basics of E-Mail writing and E-mail etiquette, Writing Notices, Circulars, Memo and Notes, Report writing.

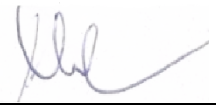
Theory: 15	**Tutorial: 0**	**Practical: 30**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. English for Engineers—Regional Institute of English, South India, Bangalore, published by Foundation Books, Chennai.

2. Effective Technical Communication—A Guide for Scientists and Engineers—BarunK.Mitra—Oxford University Press, New Delhi.

3. Interchange, Fourth Edition—Jack.C.Richards et.al,--Cambridge University Press, Sri Maitrey Print Tech., Noida.



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U17MAT1101 **Linear Algebra and Calculus**
(Common to AE, AUE, CE, MCE, ME)

L	T	P	J	C
3	1	0	0	4

Course Outcomes

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

CO1: Identify eigen values and eigen vectors, apply Cayley Hamilton theorem and convert quadratic form to canonical form (K3)

CO2: Determine the radius, centre, circle of curvature of functions (K4)

CO3: Discover the evolutes of curves and the envelope of a family of curves (K4)

CO4: Solve first order ordinary differential equation and apply in some physical situations.(K4)

CO5: Solve higher order ordinary differential equations and apply the knowledge to physical situations (K4)

CO6: Evaluate the total derivative of a function, expand the given function as series and locate the maximum and minimum for multivariate functions. (K4)

Pre-requisites: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S							M	M		M
CO2	S	S							M	M		M
CO3	S	S							M	M		M
CO4	S	S							M	M		M
CO5	S	S							M	M		M
CO6	S	S							M	M		M

Course Assessment methods

Direct
1. Continuous Assessment Test I, II 2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation,Prototype or Product Demonstrationetc. (as applicable) 3. End Semester Examination
Indirect
1. Course-end survey

MATRICES **9 + 3Hours**

Rank of a matrix – Linearly dependent and independent vectors – Eigenvalues and eigenvectors of a real matrix – Properties of eigenvalues and eigenvectors – Cayley Hamilton theorem (excluding proof) – Orthogonal matrices – Orthogonal transformation of a symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by orthogonal transformation.

GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS **4 + 1 Hours**

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Curvature – Radius, Centre and Circle of curvature in Cartesian, Parametric and Polar form

EVOLUTES AND ENVELOPES **5 + 2Hours**

Evolute – Envelope of family of curves with one and two parameters – Evolute as the envelope of normals – properties of evolute and envelope.

FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS **9 + 3 Hours**

Leibnitz's equation – Bernoulli's equation – Equations of first order and higher degree - Clairauts form – Applications: Orthogonal trajectories and Newton's law of cooling

HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS **9 +3 Hours**

Linear equations of second and higher order with constant coefficients – Euler's and Legendre's linear equations – Method of variation of parameters – First order Simultaneous linear equations with constant coefficients - Application - Mass-spring mechanical system. (Differential equations and associated conditions should be given).

FUNCTIONS OF SEVERAL VARIABLES **9 +3Hours**

Total derivative – Taylor's series expansion – Maxima and minima of functions of two variables – Constrained maxima and minima: Lagrange's multiplier method with single constraints – Jacobians.

Theory: 45 Tutorial: 15 Practical: 0 Project: 0 Total: 60 Hours

REFERENCES

1. Kreyzig E., "Advanced Engineering Mathematics", Eighth Edition, John Wiley and sons, 2010.
2. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition.
3. Veerarajan T., Engineering Mathematics (for First Year), Tata McGraw Hill Pub. Co. Ltd., New Delhi, Revised Edition, 2007.
4. Kandasamy P., Thilagavathy K., and Gunavathy K., "Engineering Mathematics",S. Chand & Co., New Delhi, (Reprint) 2008.
5. Arunachalam, T., Engineering Mathematics I, Sri VigneshPublications, Coimbatore. (Revised) 2009.
6. Venkataraman M.K., "Engineering Mathematics", The National Pub. Co., Chennai, 2003.
7. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, (2007).

E books and online learning materials

(1) Advanced Engineering Mathematics, P. V. O'Neil, 5th Indian reprint, 2009, Cengage Learning India Pvt. Ltd.

(2) Advanced Engineering Mathematics, Dennis Zill Warren S Wright Michael R. Cullen, 4th edition, 2011, Jones & Bartlett Learning.

Online Courses and Video Lectures:

www.mathworld.wolfram.com

http://nptel.ac.in

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U17PHT1004 **Physics for Civil Engineering**

L	T	P	J	C
3	0	0	0	3

Course Outcomes

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

CO1: To identify, formulate and to solve the engineering problems.
CO2: To determine a particular crystal structure, the crystallographic directions and planes, the linear and planar atomic densities.
CO3: Perceive the basics of quantum mechanics.
CO4: Describe the impact of acoustic engineering solutions in a constructional, environmental, and societal context.
CO5: To acquire knowledge of fundamentals of new engineering materials and nano materials.
CO6: Understand the concepts of nuclear models and reactor mechanisms.

Pre-requisites: NIL

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M										M
CO2	S	M			S							M
CO3	S	M			S							M
CO4	S	M			S							M
CO5	S	M			S							M
CO6	S	M					M					M

Course Assessment methods

Direct
1. Continuous Assessment Test I, II 2. Group Presentation, Project report, Poster preparation, End Semester Examination
Indirect
1. Course-end survey

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CRYSTAL PHYSICS **9 Hours**

Space lattice – unit cell – lattice planes – Bravais space lattices – Miller indices – calculation of inter-planar distances – atomic radius – co- ordination number – packing factor for SC, BCC, FCC and HCP structures - crystal imperfections – point defects – line defects – surface defects – volume defects – effect of crystal imperfections.

QUANTUM PHYSICS **9 Hours**

Introduction - Planck's quantum theory of black body radiation (derivation) - photo electric effect (qualitative description only) - Compton effect (derivation) and experimental verification of Compton effect - De-Broglie's concept - Schrodinger wave equation - time independent and time dependent equations (derivations) - physical significance of wave function - particle in a box (one dimensional case).

ACOUSTICS **9 Hours**

Classification of sound – characteristics of musical sound –loudness – Weber-Fechner law – decibel, phon – Reverberation – reverberation time – derivation of Sabine's formula for reverberation time (rate of growth and rate of decay) –Absorption coefficient and its determination - sound absorbing materials - factors affecting acoustics of buildings and their remedies.

NEW ENGINEERING MATERIALS AND NANOTECHNOLOGY **9 Hours**

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New Engineering Materials: Metallic glasses - preparation, properties and applications – Shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications - advantages and disadvantages of SMA.

Nano Materials: synthesis - Chemical vapour deposition – sol-gel - Electro deposition – ball milling – properties of nano particles and applications. – Carbon nano tubes – fabrication - pulsed laser deposition - structure, properties & applications.

ATOMIC AND NUCLEAR PHYSICS 9Hours

Introduction – Atomic spectra – Molecular spectra – Applications – Raman effect – Stokes lines and anti-stokes lines – Applications – Nuclear models – Liquid drop model –Nuclear fission –Theory – Energy released per fission – Chain reaction – Controlled chain reaction – uclear reactors – Condition for sustained chain reaction – Types of Nuclear reactors – Nuclear fusion –Thermo nuclear reactions – Differences between fission and fusion.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. Rajendran V., Applied Physics, Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
2. Gopal S., Engineering Physics, Inder Publications, Coimbatore, 2006.
3. Avadhanulu M.N. and Kshirsagar P.G., A textbook of Engineering Physics, S.Chand& Company Ltd, New Delhi,2005.
4. Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, DhanpatRai Publications (P) Ltd., New Delhi, 2003.
5. Palinisamy P.K., Engineering Physics I, Scitech Publications, Chennai, 2011.
6. Pillai S.O., Solid State Physics, 5th edition, New Age International Publication, New Delhi,2003.

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U17CHT1003 Chemistry for Civil Engineering

L	T	P	J	C
3	0	0	0	3

Course Outcomes

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

CO1: Discuss Basic concepts of electrochemistry involved in corrosion (K3)

CO2: Defend the Corrosion problems (K1)

CO3: Design a water purifier (K2)

CO4: Discuss the properties of Refractories and Abrasives suitable for desired engineering application (K2)

CO5: Select proper Lubricant for different applications (K3)

CO6: Discuss the thermodynamic concepts and predict the feasibility of chemical reaction (K2)

Pre-requisites: NIL

CO/PO Mapping (S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak												
COs	Programme Outcomes(POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	M					M						
CO2	S											
CO3	S	M				M						
CO4	M					M						
CO5	W											
CO6	M											

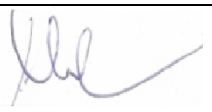
Course Assessment methods

Direct
1. Continuous Assessment Test I, II 2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, Prototype or Product Demonstration etc (as applicable) 3. End Semester Examination

ELECTROCHEMISTRY **9 Hours**

Introduction - Electrode potential - Nernst equation and problems - Electrochemical series - Application of EMF measurements and problems - Kohlrausch law of independent migration of ions and its application.

Electrodes: Standard and Reference electrode (Hydrogen and Calomel) - Types of electrodes (Metal - Metal ion; Metal - Metal insoluble salt, Redox electrode) - Ion selective (glass electrode) - Determination of pH, pO_2, pCO_2 - Classification of electrochemical cell.



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CORROSION SCIENCE 9 Hours

Corrosion: Principles and Mechanism of electrochemical corrosion - Factors influencing corrosion.

Types of corrosion: Galvanic corrosion - Differential aeration corrosion (pitting corrosion, water line corrosion) - Stress corrosion.

Corrosion control: Inhibitors - Dehumidifier gels - Cathodic protection (sacrificial anode) - Plating Techniques: Plating - Need for plating - Electroforming - Electropolishing - Electrochemical machining - Electrophoretic painting.

WATER TECHNOLOGY 9 Hours

Water hardness - Boiler feed water - formation of deposits in steam boilers and heat exchangers - Disadvantages (wastage of fuel, decrease in efficiency, priming, foaming, boiler explosion, boiler corrosion, caustic embrittlement) Prevention of scale formation: Internal treatment (phosphate, calgon, carbonate, colloidal),External treatment (Ion exchange method, desalination by reverse osmosis) - Treatment of common effluents.

ENGINEERING MATERIALS 9 Hours

Abrasives: Moh's scale of hardness - Natural abrasives (diamond, corundum, emery, [0- Application of abrasives.

Refractories: Characteristics - Classification (acid, basic and natural refractories) - Properties (refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling)

Lubricants: Classification - Functions - Properties (viscosity index, flash and fire point, oiliness, carbon residue, aniline point, cloud and pour point) - Semi solid lubricant (greases with calcium based, sodium based, lithium based) - solid lubricants (graphite, molybdenum disulphide)

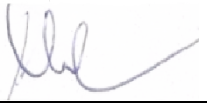
THERMODYNAMICS 9 Hours

Introduction - Thermodynamic process (isothermic, isobaric, isochoric and adiabatic processes) - Internal energy - First law of thermodynamics (Mathematical derivation and limitation) - Second law of thermodynamics - Third law and Zeroeth law of thermodynamics (statements only) - Work function - Gibbs Helmholtz equation (derivation, applications & problems) - Van't Hoff isotherm (derivation & problems) - Van't Hoff isochore - (derivation & problems)

Theory: 45 Tutorial: 0 Practical: 0 Project: 0 Total: 45 Hours

REFERENCES

1. Atkins, P. and de Paula, J., Atkins, Physical Chemistry, 9th ed., Oxford Univ. Press, 2009.
2. Glasstone S., An introduction to Electrochemistry, 10th Edition, Affiliated to East West Press Private Limited, 2007.
3. Ahmed Z., Principles of Corrosion Engineering and Corrosion Control, Butterworth Heinemann, 2006.
4. Bahl B.S., Tuli G.D. and Arun Bahl., Essential of Physical Chemistry, S.Chand & Co. Ltd., New Delhi, 2015.



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5. Syed Shabudeen, P.S. and Shoba U.S., Engineering Chemistry - I, Inder Publishers, Coimbatore, 2013
6. Jain P.C. and Jain. M., Engineering Chemistry, 16th Edition, Dhanpat Rai Publishing Company, New Delhi, Reprint 2017.
7. Syed Shabudeen P.S., Engineering Chemistry-II, Inder Publishers, Coimbatore, 2013
8. Ritwik Sarkar., Refractory Technology – Fundamental and Application, CRC Press, 2016

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U17MET1101 ENGINEERING GRAPHICS

L	T	P	J	C
2	1	0	0	3

Course Outcomes

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

CO1: Construct various plane curves.
CO2: Construct projection of points and projection of lines.
CO3: Develop projection of surfaces and solids.
CO4: Solve problems in sections of solids and development of surfaces.
CO5: Apply the concepts of isometric, and perspective projections
CO6: Apply free hand sketching in engineering practice.

Pre-requisites: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M										
CO2	S	S									W	
CO3	S	S									M	
CO4	S	S										
CO5	S											
CO6	S											

Course Assessment methods

Direct

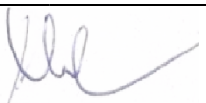
1. Continuous Assessment Test I, II (Theory component)
2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, Prototype or Product Demonstration etc (as applicable) (Theory component)
3. End Semester Examination (Theory component)

PLANE CURVES, PROJECTION OF POINTS AND LINES 6+3 Hours

Importance of graphics in design process, visualization, communication, documentation and drafting tools, Construction of curves - ellipse, parabola, and hyperbola by eccentricity method only. Orthographic projection of points.Projections of straight lines located in first quadrant - determination of true length and true inclinations.

PROJECTIONS OF SURFACES AND SOLIDS 6+3 Hours

Projections of plane surfaces - polygonal lamina and circular lamina, located in first quadrant and inclined to one reference plane. Projection of simple solids - prism, pyramid,



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cylinder and cone. Drawing views when the axis of the solid is inclined to one reference plane.

SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES 6+3 Hours

Sectioning of simple solids - prisms, pyramids, cylinder and cone. Obtaining sectional views and true shape when the axis of the solid is vertical and cutting plane inclined to one reference plane.Development of lateral surfaces of truncated prisms, pyramids, cylinders and cones.

PICTORIAL PROJECTIONS 6+3 Hours

Isometric projection, Isometric scale, Isometric views of simple solids, truncated prisms, pyramids, cylinders and cones.Perspective projection of prisms and pyramids when its base resting on the ground by vanishing point method.

FREE-HAND SKETCHING 6 + 3 Hours

Free hand sketching techniques, sketching of orthographic views from given pictorial views of objects, including free-hand dimensioning.Sketching pictorial views from given orthographic views.

Theory: 30	**Tutorial: 15**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. Bhatt ND, Engineering Drawing, Charotar Publishing house, 54th edition, 2014.
2. Venugopal K. and Prabhu Raja V., Engineering Graphics, New Age International (P) Limited, New Delhi, 2016.
3. Nataraajan K.V., Engineering Drawing and Graphics, Dhanalakshmi Publisher, Chennai, 2006.
4. Basant Agrawal and Agrawal C.M, Engineering Drawing and Graphics, McGraw Hill Edition (India), 2013.
5. Gopalkrishna K.R., Engineering Drawing (Vol. I & II), Subhas Publications, 2014.

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U17CSI1211 Structured Programming using C

L	T	P	J	C
3	0	2	0	4

Course Outcomes

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

CO1: Explain the basics of problem solving techniques

CO2: Select appropriate data types and control structures for solving a given problem

CO3: Illustrate the representation of arrays, strings and usage of string operations

CO4: Illustrate the importance of pointers and functions

CO5: Explain the fundamentals of structures and unions

CO6: Explain the fundamentals of file handling

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M										
CO2	S	M										
CO3	S	L			L				L	L		
CO4	M	L			L				L	L		M
CO5	M	L			L				L	L		M
CO6	L	L										

Course Assessment methods:

Direct
1. Continuous Assessment Test I, II (Theory Component)
2. Assignment (Theory Component)
3. Group Presentation (Theory Component)
4. Pre/Post - experiment Test/Viva; Experimental Report for each experiment (lab component)
5. Model examination (lab component)
6. End Semester Examination (Theory and lab component)

Theory Component contents

FUNDAMENTALS OF PROBLEM SOLVING **9 Hours**

Programs and Programming – Classification of Programming Languages based on Generations – Structured Programming Concept – Algorithm – Flowchart – Pseudo code

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STRUCTURED PROGRAMMING **9 Hours**

Introduction to C Programming – Operators and Expressions – Data Input and Output – Control Statements

ARRAYS AND STRINGS **9 Hours**

Defining an array – Processing an array – Passing arrays to functions –Multidimensional Arrays:Defining a string – NULL character – Initialization of Strings – Reading and Writing Strings– Processing Strings – Character Arithmetic – Searching and Sorting of Strings – Library functions for strings

FUNCTIONS, STORAGE CLASSES AND POINTERS **9 Hours**

Defining a function – Accessing a function – Function prototypes – Passing arguments to a function – Recursion – Storage classes – Pointer Fundamentals – Pointer Declaration – Passing Pointers to a Function – Pointers and one dimensional arrays – operations on pointers – Dynamic memory allocation

STRUCTURES, UNIONS AND FILES **9 Hours**

Structures and Unions: Defining a Structure – Processing a Structure – User defined data types (Typedef) – Unions

Files: Opening and Closing a Data File – Reading and writing a data file – Processing a data file – Unformatted data files – Concept of binary files – Accessing a file randomly using fseek

Theory: 45 hours	**Tutorial:0 hours**	**Practical:0 hours**	**Total Hours: 45 hours**

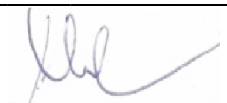
REFERENCES

1. Byron S Gottfried and Jitendar Kumar Chhabra, "Programming with C", Tata McGraw Hill Publishing Company, Third Edition, New Delhi, 2011.
2. PradipDey and ManasGhosh, "Programming in C", Second Edition, Oxford University Press, 2011.
3. Kernighan,B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2006
4. Ashok N. Kamthane, "Computer programming", Pearson Education, 2007.

Lab Component

List of Experiments **30 Hours**

1. Writing algorithms, flowcharts and pseudo codes for simple problems.
2. Programs on expressions and conversions
3. Programs using if, if-else, switch and nested if statements
4. Programs using while, do-while, for loops
5. Programs on one dimensional arrays, passing arrays to functions and array operations



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6. Programs using two dimensional arrays, passing 2D arrays to functions

7. Programs using String functions
8. Programs using function calls, recursion, call by value

9. Programs on pointer operators, call by reference, pointers with arrays
10. Programs using structures and unions.

11. Programs on file operations and modes.

12. Working with text files, random files and binary files

Theory: 0	**Tutorial: 0**	**Practical: 30**	**Project: 0**	**Total: 30 Hours**

REFERENCES

1. Byron S Gottfried and Jitendar Kumar Chhabra, "Programming with C", Tata McGraw Hill Publishing Company, Third Edition, New Delhi, 2011.

2. PradipDey and ManasGhosh, "Programming in C", Second Edition, Oxford University Press, 2011.
3. Kernighan,B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2006
4. Ashok N. Kamthane, "Computer programming", Pearson Education, 2007.

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U17PHP1501	Physics Laboratory (Common to AE, AU, BT, CE, CS, IT, MC,TX)	L	T	P	J	C
		0	0	2	0	1

Course Outcomes

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

CO1: Determine different physical properties of a material like thermal conductivity, thickness of the material.

CO2: Perform experiments involving the physical phenomena like interference and diffraction

CO3: Apply physical theories in real life situations by also taking into account its limitation.

Pre-requisites: NIL

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

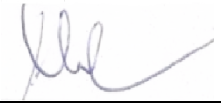
COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2		M	S									
CO3		S		M								

Course Assessment methods

Direct
1. Pre-or Post-experiment Test/Viva; Experimental Report for each experiment; Model Examination 2. End Semester Examination
Indirect
1. Course-end survey

List of Experiments 30 Hours

1. Determine thermal conductivity of the given cardboard by Lee's disc method.



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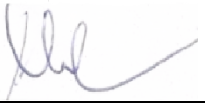
2. Determine the thickness of a thin sheet by air wedge method.
3. Determine the co-efficient of viscosity of the given liquid by Poiseuille's flow method.
4. Determine the value of acceleration due to gravity by compound pendulum.
5. Calculate the solar panel efficiency by using lux meter.
6. Determine the wavelengths of the violet, blue, green and yellow in mercury spectrum using spectrometer grating method (the green spectral line for which the wavelength is 5461 A^0).
7. Determine Young's modulus of the given bar using non-uniform bending method.
8. Calculate the frequency of the given tuning fork by longitudinal and transverse mode of vibrational methods.
9. Determine the velocity of ultrasonic sound and compressibility of the given liquid by using ultrasonic interferometer.
10. Acceptance angle & numerical aperture of optical fiber (grating element: N=5,00,000 By using semiconductor laser determine: i) Wavelength of LASER using grating. ii) lines/meter).

Theory: 0	**Tutorial: 0**	**Practical: 30**	**Project: 0**	**Total: 30 Hours**

REFERENCES

1. Laboratory Manual of Engineering Physics by Dr. Y. Aparna & Dr. K. Venkateswara Rao (V.G.S Publishers)
2. "Practical Physics", G.L. Squires, Cambridge University Press, Cambridge, 1985. 11. 12.
3. "Great Experiments in Physics", M.H. Shamos, Holt, Rinehart and Winston Inc., 1959.
4. "Experiments in Modern Physics", A.C. Melissinos, Academic Press, N.Y., 1966. Gupta S.C, and Kapur, J.N.



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U17MEP1501 Engineering Practices Laboratory

L	T	P	J	C
0	0	2	0	1

Course Outcomes

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

CO1: Select the various tools and equipment's used in the fabrication workshop.
CO2: Develop various models in carpentry and fitting
CO3: Make components using sheet metal work.
CO4: Select the various tools and joints for different applications in plumbing.
CO5: Demonstrate and evaluate the parameters of basic electronic components (wires, resistors, capacitors, diodes etc.) and test the components.
CO6: Estimate DC and AC Voltage and currents using appropriate measuring instruments.

Pre-requisites: Nil

CO-PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POS)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2					M							
CO3			M									
CO4						W						
CO5	M											
CO6	M											

Course Assessment methods

Direct
1. Pre-or Post-experiment Test/Viva; Experimental Report for each experiment; Comprehensive report / Model Examination 2. End Semester Examination
Indirect
1. Course-end survey

List of Experiments **30 Hours**

GROUP – I (CIVIL & MECHANICAL ENGINEERING) A. CIVIL ENGINEERING

1. Carpentry

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- Study of carpentry tools
- Preparation of T joint
- Preparation of dovetail joint

2. Plumbing
   - Study of pipeline joints

B. MECHANICAL ENGINEERING

1. Fitting
   - Study of fitting tools
   - Preparation of L joint
   - Preparation of square joint

2. Sheet Metal Working
   - Study of sheet metal working tools
   - Preparation of cone
   - Preparation of tray

GROUP - II (ELECTRICAL & ELECTRONICS ENGINEERING)

C. ELECTRICAL ENGINEERING PRACTICE

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair-case wiring.
4. Measurement of electrical quantities–voltage, current, power & Power factor in RLC circuit.
5. Measurement of energy using single phase energy meter.

D. ELECTRONIC ENGINEERING PRACTICE

1. Testing of Electronic components and Measurements using a digital multimeter.
2. Study of CRO and Function generator.
3. PCB Design and Fabrication.
4. Soldering simple electronic circuits and checking continuity

Theory: 0	**Tutorial: 0**	**Practical: 30**	**Project: 0**	**Total: 30 Hours**

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U17VEP1501 **Personal Values**

L	T	P	J	C
0	0	2	0	1

Course Outcomes

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

CO 1: Become an individual in knowing the self
CO 2: Acquire and express Gratitude, Truthfulness, Punctuality, Cleanliness &fitness.
CO 3: Practice simple physical exercise and breathing techniques
CO 4: Practice Yoga asana which will enhance the quality of life.
CO 5: Practice Meditation and get benefited.
CO 6: Procure Self-Healing techniques for propagating healthy society

Pre-requisites: NIL

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

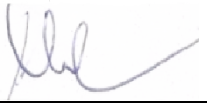
COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												M
CO2										S		
CO3						M						
CO4						S			M			
CO5										M		
CO6								W				S

Course Assessment methods

Direct
1. Group Activity / Individual performance and assignment 2. Assessment on Value work sheet / Test
Indirect
1. Mini project on values / Goodwill Recognition

Values through Practical activities: 30 hours

1.Knowing the self : Introduction to value education - Need & importance of Value education – Knowing the self – realization of human life – animal instinct vs sixth sense.



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2. Mental Health : Evolution of senses – functioning steps of human mind – Body and Mind coordination - Analysis of thoughts – moralization of desires– autosuggestions – power of positive affirmations. – Meditation and its benefits.

3.Physical Health: Physical body constitution– Types of food - effects of food on body and mind – healthy eating habits – food as medicine– self healing techniques.

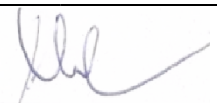
4.Core value : Self love& Self care Gratitude - Happiness - Optimistic –Enthusiasm – Simplicity – Punctual - Self Control - Cleanliness & personal hygiene - Freedom frombelief systems.

5.Fitness: Simplified physical exercises – Sun salutation - Lung strengthening practices: Naadi suddhi pranayama – Silent sitting and listening to nature – Meditation.

Theory: 0	**Tutorial: 0**	**Practical: 30**	**Project: 0**	**Total: 30 hours**

REFERENCES

1. KNOW YOURSELF — SOCRATES – PDF format at www.au.af.mil/au/awc/awcgate/army/rotc_self-aware.pdf
2. STEPS TO KNOWLEDGE: The Book of Inner Knowing – PDF format at www.newmessage.org/wp-content/uploads/pdfs/books/STK_NKL_v1.5.pdf
3. PROMOTING MENTAL HEALTH - World Health Organization – PDF format at www.who.int/mental_health/evidence/MH_Promotion_Book.pdf
4. LEARNING TO BE: A HOLISTIC AND INTEGRATED APPROACH TO VALUES – UNESCO PDF format at www.unesdoc.unesco.org/images/0012/001279/127914e.pdf
5. PERSONALITY DEVELOPMENT By SWAMI VIVEKANANDA www.estudantedavedanta.net/Personality-Development.pdf



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SEMESTER II

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L	T	P	J	C
3	1	0	0	4

U17MAT2101 Advanced Calculus and Laplace Transforms (Common to AE, AUE, CE, MCE, ME)

Course Outcomes

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

CO1 : Evaluate multiple integrals and apply them to find area, moment of inertia, centre of mass and volume K3

CO2 : Apply various vector differential operators and integral theorems for solving Engineering problems involving cubes and rectangular parallelepipeds. K4

CO3 : Construct analytic functions of complex variables and transform functions from z-Plane and w-plane and vice-versa, using conformal mappings K4

CO4 : Use the fundamentals of residues, complex integration to evaluate real integrals K3

CO5 : Transform functions in time domain to frequency domain using Laplace transform K4

CO6 : Convert ordinary differential equations into algebraic equations using Laplace Transform and solve them using inverse Laplace transform K4

Pre-requisites :

Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

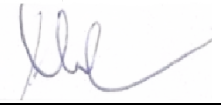
COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S							M	M		M
CO2	S	S							M	M		M
CO3	S	S							M	M		M
CO4	S	S							M	M		M
CO5	S	S							M	M		M
CO6	S	S							M	M		M

Course Assessment methods

Direct
1. Continuous Assessment Test I, II 2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, Prototype or Product Demonstration etc. (as applicable) 3. End Semester Examination
Indirect
1. Course-end survey

MULTIPLE INTEGRALS **9 + 2 Hours**

Double integration – Cartesian and polar coordinates – Change of order of integration – Change of variables between cartesian and polar coordinates - Triple integration in cartesian coordinates – Application : Area as double integral –- Moment of inertia - Centre of mass - Volume as triple integral.



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VECTOR CALCULUS **9 + 3 Hours**

Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields - Green's theorem in a plane, Gauss divergence theorem and Stoke's theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelepipeds.

ANALYTIC FUNCTION **9 + 3 Hours**

Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy-Riemann equations in Cartesian coordinates and sufficient conditions (excluding proofs) – Properties of analytic function – Construction of analytic function by Milne Thomson method – Conformal mapping : $w = z + c$, cz , $1/z$ and bilinear transformation.

COMPLEX INTEGRATION **9 + 2 Hours**

Statement and applications of Cauchy's integral theorem and Cauchy's integral formula (excluding proofs) – Taylor's and Laurent's series expansions – Singularities – Residues – Cauchy's residue theorem (excluding proof) – Application of residue theorem to evaluate real integrals - Unit circle and semi-circular contours (excluding poles on real axis).

LAPLACE TRANSFORM **5 +3 Hours**

Definition - Properties – Superposition - Shift in t - Shift in s - Time Derivatives - Time Integral – Initial and Final Value Theorems – Periodic functions: sine wave, saw-tooth, square and triangular waves

INVERSE LAPLACE TRANSFORM **4 +2 Hours**

Inverse Laplace Transform – Simple system dynamic models – Transfer Functions – Poles and Zeroes - Response of First-Order Systems - Solution of RC Free, Step and Sinusoidal Responses; Response of Second-Order Systems - Free Response, step Response - Convolution theorem.

Theory: 45	**Tutorial: 15**	**Practical: 0**	**Project: 0**	**Total: 60 Hours**

REFERENCES

1. Kreyzig E., Advanced Engineering Mathematics, John Wiley & Sons (Asia), Pvt, Ltd., Singapore, 10th Edition, 2010
2. Grewal B.S., Higher Engineering Mathematics, Khanna Publishers, Delhi, 42nd Edition, 2012.
3. Philip D. Cha, James J. Rosenberg, Clive L. Dym, Fundamentals of Modelling and Analyzing Engineering Systems, Cambridge University Press, United Kingdom, 2000.
4 Veerarajan T., Engineering Mathematics (for First Year), Tata McGraw Hill, Pub. Co. Ltd., New Delhi, Revised Edition, 2007.
5 Venkataraman M.K., Engineering Mathematics, Volume - II, The National Pub. Co., Chennai, 2003.
6 Kandasamy P., Thilagavathy K. and Gunavathy K., Engineering Mathematics, S. Chand & Co., New Delhi, 2008.
7 Arunachalam T. and Sumathi K., Engineering Mathematics II, Sri Vignesh Publications, Coimbatore, Third Edition, 2011.
8 Weir .MD, Hass J, Giordano FR: Thomas Calculus Pearson education 12th ED, 2015.

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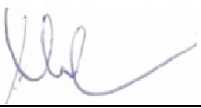
9 N.P.Bali., Dr. Manish Goyal., ―Transforms and partial Differential equations, University science Press, New Delhi, 2010.

E books and online learning materials

(1) Advanced Engineering Mathematics, P. V. O'Neil, 5th Indian reprint 2009, Cengage Learning India Pvt. Ltd.

(2) Advanced Engineering Mathematics, Dennis Zill Warren S Wright Michael R. Cullen, 4th edition, 2011, Jones & Bartlett Learning.



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U17PHT2003 Materials Science for Civil Engineering

L	T	P	J	C
3	0	0	0	3

Course Outcomes

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

CO1: Explore the knowledge on the properties, production, and application of ultrasound.

CO2: Apply the NDT techniques and modern engineering tools necessary for Engineering practice

CO3: Categorize the magnetic materials based on their properties.

CO4: Understand the mechanism of dielectrics and its engineering applications.

CO5: Practice green energy concepts in the energy generation.

CO6: Obtain knowledge about geothermal energy and biomass.

Pre-requisites : NIL

CO/PO Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	S	M										M
CO2	S	M										M
CO3	S	M										M
CO4	S	M										M
CO5	S	M			M							M
CO6	S	M										M

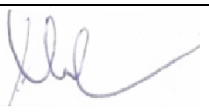
Course Assessment methods

Direct
1. Continuous Assessment Test I, II 2. Cooperative learning report, Assignment; Group Presentation, Project report, Poster preparation 3. End Semester Examination

ULTRASONICS AND NDT **9 Hours**

Ultrasonics: Production of ultrasonics - magnetostriction oscillator - piezo electric method –properties –detection – acoustic grating – applications - SONAR.

NDT: Liquid penetrant method – ultrasonic flaw detector: A scan, B scan and C scan – X-ray radiography and fluoroscopy – thermography.



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MAGNETIC MATERIALS **9 Hours**

Properties of dia, para, ferro, anti ferro and ferri magnetic materials - Domain theory of ferromagnetism - hysteresis – soft and hard magnetic materials – Ferrites – properties - Applications

DIELECTRIC MATERIALS **9 Hours**

Electronic, ionic, orientation and space charge polarization - Frequency and temperature dependence of polarization – Dielectric constant, Dielectric loss – Internal field – Classius – Mossotti equation- Dielectric breakdown – different types of break down mechanism - Ferro electric materials - properties and applications.

GREEN ENERGY PHYSICS **9 Hours**

Introduction to Green energy – Solar energy: Energy conversion by photovoltaic principle – Solar cells – Wind energy: Basic components and principle of wind energy conversion systems – Ocean energy: Wave energy – Wave energy conversion devices – Tidal energy – single and double basin tidal power plants – Ocean Thermal Electric Conversion (OTEC)

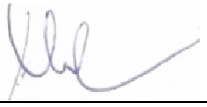
GEOTHERMAL ENERGY AND BIOMASS **9 Hours**

Geothermal energy: Geothermal sources (hydrothermal, geo-pressurized hot dry rocks, magma) – Biomass: Biomass and bio-fuels – bio-energies from wastages – Fuel cells: H_2O_2 – Futuristic Energy: Hydrogen – Methane Hydrates – Carbon capture and storage (CCS).

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. Pillai S.O., Solid State Physics, 5th edition, New Age International Publication, New Delhi, 2003.
2. Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, Dhanpat Rai Publications (P) Ltd., New Delhi, 2003.
3. William D CallisterJr, ―Materials Science and Engineering-An Introduction‖, John Wiley and Sons Inc., Sixth Edition, New York, 2010.
4. Van Vlack, ―Elements of Material Science and Engineering‖, Pearson Education India, 2008.
5. Raghavan V. Materials Science and Engineering, Prentice Hall of India Pvt. Ltd., 1999



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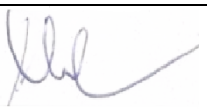
6. Rajendran V. and Marikani A., Materials science, 5th edition, Tata Mc-Graw-Hill publishing company Ltd., 2004
7. James F Shackelford S, ―Introduction to Materials Science for Engineers‖, Third Edition, Macmillan Publishing Company, New York. 1992
8. Gopal S., Materials Science, Inder Publications, Coimbatore, 2007.
9. Godfrey Boyle, "Renewable Energy: Power sustainable future", 2nd edition, Oxford University Press, UK, 2004.
10. Engg. Physics by K. Rajagopal, Prentice Hall of India Pvt. Ltd.



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U17EET2012 Electrical and Electronics Engineering

L	T	P	J	C
3	0	0	0	3

Course Outcomes

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

CO1: Acquire basic knowledge on DC and AC circuits.

CO2: Identify electronics components and use them to design circuits.

CO3: Understand the operation of DC machines, characteristics and their applications. **CO4:** Understand the operation of AC machines, characteristics and their applications. **CO5:** Acquire basic knowledge on semiconductor devices and their applications.

CO6: Gain basic of knowledge logic gates.

Pre-requisites :

Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2	S	S										
CO3	S	M										
CO4	S	M										
CO5	S		W									
CO6	S		M									

Course Assessment methods

Direct
1. Continuous Assessment Test I,II 2. Assignment, Group Discussion 3. End semester Examination
Indirect
1. Course-end survey

ELECTRICAL CIRCUITS **9 Hours**

Ohm's Law – Kirchhoff's Laws – series, parallel DC circuits – Introduction to AC Circuits – Waveforms and RMS Value – Single Phase series RLC circuits- Power and Power factor- solving simple AC circuits.

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DC MACHINES **9 Hours**

Construction, Principle of Operation-Types, characteristics - Applications of DC Generators, DC Motors - Principle of Operation- types – back emf – torque equation - speed torque characteristics – speed control of DC motor.

AC MACHINES **9 Hours**

Single Phase Transformer- Construction, Principle of Operation- Types, Emf equation-3 phase Induction Motor -construction– Principle of operation – types – torque equation - speed torque characteristics – 1 phase Induction Motor – Principle of operation- types- Applications.

SEMICONDUCTOR DEVICES AND APPLICATIONS **9 Hours**

Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation, Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics.

DIGITAL ELECTRONICS **9 Hours**

Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops –Registers and Counters – A/D and D/A Conversion.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

TEXT BOOKS

1. Mittle N., “Basic Electrical Engineering”, Tata McGraw Hill Edition, New Delhi, 1990.
2. Sedha R.S., “Applied Electronics”, S. Chand & Co., 2006.

REFERENCES

1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, “Basic Electrical, Electronicsand Computer Engineering”, Tata McGraw Hill, Second Edition, 2006.
2. Nagsarkar T K and Sukhija M S, “Basics of Electrical Engineering”, Oxford press 2005.
3. Mehta V K, “Principles of Electronics”, S.Chand& Company Ltd, 1994.
4. MahmoodNahvi and Joseph A. Edminister, “Electric Circuits”, Schaum’ Outline Series, McGraw Hill, 2002.
5. Premkumar N, “Basic Electrical Engineering”, Anuradha Publishers, 2003.

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U17MET2102 **Engineering Mechanics**

L	T	P	J	C
3	1	0	0	4

Course Outcomes

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

CO1: Explain the concept of equilibrium of particles subjected to concurrent forces. **CO2**: Determine the reactions in different types of support and loading conditions. **CO3**: Estimate the moment of inertia for various shapes and sections.

CO4: Make use of various concepts of friction.

CO5: Solve problems using the concepts in kinematics

CO6: Solve problems in kinetics.

Pre-requisites : Nil

	CO-PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak											
COs	**Programme Outcomes(POS)**											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2		S										
CO3		S										
CO4		M										
CO5	S											
CO6	S											

Course Assessment methods

Direct
1. Continuous Assessment Test I, II 2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, Prototype or Product Demonstration etc (as applicable) 3. End Semester Examination
Indirect
1. Course-end survey

BASICS & STATICS OF PARTICLES **12 Hours**

Introduction - Units and Dimensions - Laws of Mechanics Lame's theorem, Parallelogram and triangular Laws of forces – Coplanar Forces - Resolution and Composition of forces – Free body diagram - Equilibrium of a particle.

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EQUILIBRIUM OF RIGID BODIES **12 Hours**

Moment of a force about point – Varignon s theorem- Moment of a couple-Resolution of force in to force couple system-Resultant of coplanar non concurrent system - Types ofsupports and their reactions- Requirements of stable equilibrium - Equilibrium of Rigid bodies in two dimensions.

PROPERTIES OF SURFACES AND SOLIDS **12 Hours**

First moment of area and the Centroid of sections Rectangle, circle, triangle, T section, I section Angle section and Hollow section. Second and product moments of plane area Rectangle, triangle, circle. T Section, I section, Angle section and Hollow section, Parallel axis theorem and perpendicular axis theorem - Polar moment of inertia.

FRICTION **12 Hours**

Frictional force-Law of coulomb friction, simple contact friction, Rolling resistance and Belt friction, Ladder friction, Wedge friction.

DYNAMICS OF PARTICLES **12Hours**

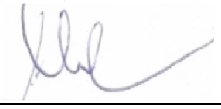
Kinematics: Rectilinear & Curvilinear motion of particles, Displacements Velocity and acceleration.

Kinetics: Newton's law, Work Energy method, Impulse and Momentum, Impact of elastic bodies.

Theory: 45	**Tutorial: 15**	**Practical:**	**Project: 0**	**Total: 60Hours**

REFERENCES

1. Beer F.P. and Johnson Jr. E.R., Vector Mechanics for Engineers, Vol. I Statics and Vol. II Dynamics, McGraw-Hill International Edition, 2004
2. Hibbeller, R.C., Engineering Mechanics, Vol. I Statics and Vol. II Dynamics, Pearson Education, Asia Pvt. Ltd., 2000.
3. Ashok Gupta, Interactive Engineering Mechanics Statics A Virtual Tutor, Pearson Education, Asia Pvt. Ltd., New Delhi, 2002.
4. Palanichamy M.S., and Nagan S., Engineering Mechanics (Statics & Dynamics) Tata McGraw Hill, 2001.
5. Irving H. Shames, Engineering Mechanics – Statics and Dynamics, IV Edition, Pearson Education, Asia Pvt. Ltd., 2003.
6. Sukumar T.R. and Sridhar S., Engineering Mechanics, Inder Publications, Coimbatore.



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U17CET2001 Engineering Geology and Construction Materials

L	T	P	J	C
3	0	0	0	3

Course Outcomes

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

CO1: Understand the concepts of Physical Geology and Petrology.
CO2: Acquire the basic knowledge of Structural Geology and Investigations in Geology.
CO3: Compare the properties of most common and advanced building materials.
CO4: Understand the typical and potential applications of these materials.
CO5: Understand the quality test procedures for various materials and their structural forms.

Course Objectives

At the end of this course the student should have learnt about the various materials, both conventional and modern, that are commonly used in Civil Engineering construction. Further he should be able to appreciate the criteria for choice of the appropriate material and the various tests for quality control in the use of these materials.

Pre-requisites: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			S				M					
CO2			S	M			M					M
CO3			S				S					
CO4			S				S					
CO5			S	S			M					S

Course Assessment methods

Direct

1. Continuous Assessment Test I,II
2. Assignment, Group Discussion
3. End semester Examination

Indirect

1. Course-end survey

PHYSICAL GEOLOGY AND PETROLOGY 9 Hours

Geology in civil engineering; branches of geology; structure of earth and its composition; weathering of rocks; scale of weathering; Soils - landforms and processes associated with water bodies.

Classification and the distinction of rock types; Engineering properties, distribution and uses of: Granite, basalt, sandstone, limestone, laterite, shale, quartzite, marble, slate, gneiss and schist.

STRUCTURAL GEOLOGY AND GEOLOGICAL INVESTIGATION 9 Hours

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Geological maps – attitude of beds, study of structures – folds, faults and joints – relevance to civil engineering.Remote sensing for civil engineering applications; Geological conditions necessary for design and construction of dams, reservoirs, tunnels, and road cuttings. Coastal protection structures. Investigation of landslides and earthquakes - causes and mitigation, seismic zonation and seismic zones of India.

STONES-BRICKS-CONCRETE BLOCKS 9 Hours

Stones– Bricks – Concrete blocks (Solid, hollow and Light weight) - Manufacturing – Quality –Properties –Field and laboratory Tests - Selection – Types- IS Code of Practices.

CEMENT, FINE AND COARSE AGGREGATES, LIME 9 Hours

Materials for making Concrete: Cement: Portland cement –Chemical Composition of raw materials –Composition of Cement clinker –Hydration –Rate of Hydration -Water requirement for Hydration –Manufacture –Testing –Types –Storage –Admixtures. Aggregates: Classification –Characteristics –M Sand. Water: Quality of mixing Water – Lime: Introduction –Impurities in Lime stones –Classification –Lime Vs Cement – Pozzolans - Flyash .

TIMBER AND OTHER MATERIALS 9 Hours

Steel- Aluminium - Timber- Glass –Glass Wool –Rubber –Plastics –Paints, Enamels and Varnishes - Composites-Roofing sheets, insulated wall p a n e l s -floor finish materials for residential/industrial buildings Geosynthetic -Composition-uses-market forms-properties and applications.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. Varghese P.C., Building Materials, PHI Learning Pvt. Ltd., 2005.
2. Rangwala S.C., Engineering materials, Charotar Publishing House, 2008.
3. Premalatha J., Building materials, Inder Publications, 2010.
4. Shetty M.S., Concrete Technology (Theory and Practice), S. Chand & Co Ltd.
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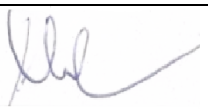

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U17CHP2501 **Chemistry Laboratory (COMMON TO AE, AU, BIO, CE & MCE)**

L	T	P	J	C
0	0	2	0	1

Course Outcomes

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

CO1: Prepare standard solutions (S1)

CO2: Analyse the properties of water by applying the chemical concepts (S2)

CO3: Analyse the solutions by electrochemical techniques and apply it in real life situations like corrosion, soil, water testing etc (S2)

CO4: Analyse the solutions by spectroscopic techniques and apply it in real life situations like corrosion, soil, water testing etc (S2)

Pre-requisites: NIL

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2	M											
CO3	M					M						
CO4	M					M						

Course Assessment methods

Direct
1. Post-experiment Test/Viva; Experimental Report for each experiment; Model Examination 2. End Semester Examination
Indirect
1. Course-end survey

List of Experiments **30 hours**

1. Preparation of normal solutions of the following substances - Sodium carbonate, Hydrochloricacid and Buffer solution

WATER TESTING

2. Determination of total, temporary and permanent hardness by EDTA method.
3. Estimation of DO by Winkler'smethod
4. Estimation of alkalinity by Indicatormethod.
5. Estimation of chloride by Argentometricmethod.

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ELECTRO CHEMICAL ANALYSIS

6. Estimation of hydrochloric acid by pHmetry.
7. Conductometric estimation of mixture of acids and strongbase
8. Estimation of corrosion of Iron byPotentiometry

PHOTOMETRY

9. Estimation of the extent of dissolution of Copper / Ferrous ions by Spectrophotmetry.
10. Estimation of sodium and potassium in water by Flamephotometry.

DEMONSTRATION

11. Determination of Fire point and Flash point
12. Determination of Cloud and Pour point
13. Microscopic usage in Metallurgy.
14. Determination of Molecular weight by Viscometer

Theory: 0 Tutorial: 0 Practical: 30 Project: 0 Total: 30 Hours

REFERENCES

1. Jeffery G.H., Bassett J., Mendham J. and Denny R.C., Vogel's Text Book of Quantitative Chemical Analysis, Oxford, ELBS, London, 2012.
2. Shoemaker D.P. and C.W. Garland., Experiments in Physical Chemistry, Tata McGraw-Hill Pub. Co., Ltd., London, 2003.
3. Shoba U.S., Sivahari R. and Mayildurai R., Practical Chemistry, Inder Publications, Coimbatore, 2011.

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U17CEP2501 Building Planning and Drawing

L	T	P	J	C
0	0	2	0	1

Course Outcomes

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

CO1: Prepare the building plans satisfying the principles of planning and byelaws.

CO2: Develop drafting skills in drawing plan, section and elevation of residential buildings using AutoCAD software

CO3: Develop drafting skills in drawing plan, section and elevation of public buildings using AutoCAD software.

Pre-requisites : Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						S						W
CO2					S							W
CO3					S							W

Course Assessment methods

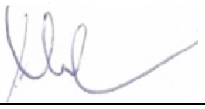
Direct
1. Pre-or Post-experiment Test/Viva; Experimental Report for each experiment; Comprehensive report / Model Examination 2. End Semester Examination
Indirect
1. Course-end survey

Building Planning

Provisions of National Building Code - Building bye-laws - open area - setbacks- FAR terminology - Principles of planning - orientation - ventilation and lighting.

Building Elements

Foundations - Plinth beam - Column- Beam - Slab- Lintel - Staircase -Roof- doors and windows - Types - Specifications - Standard sizes - Notations.



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Planning of Residential and commercial buildings

Single bed room - double bed-room - multi-storey buildings - Hospitals buildings with Pharmacy and Dispensaries- School Building with Hostel- Factory buildings with steel truss

List of Experiments **30 Hours**

Preparation of line sketches in accordance with functional requirements and building rules for the following types of building as per National Building Code:

1. Flat roof residential building
2. Pitched roof residential building

Detailed Drawings (Plan, Elevation and section for the following) by manual and by using AutoCAD :

1. Flat roof building with load bearing wall
2. Pitched roof with load bearing wall
3. Framed structures
4. Industrial Building

Theory: 0	Tutorial: 0	Practical: 30	Project: 0	Total: 30 Hours

REFERENCES

1. Shah, M.G, Kale, C.M, Patki, S.Y, "Building Drawing - With an Integrated Approach to Built Environment", Tata McGraw-Hill, 2007.
2. Randy Shih, "Autocad 2016 Tutorial First Level - 2D Fundamentals", Schroff Development Corp, 2015.
3. Mark W. Huth Delmar, "Understanding Construction Drawings", Cengage Publishers, 2013.
4. Donald Watson, "Time-Saver Standards for Building Materials & Systems: Design Criteria and SelectionData", Tata McGraw Hill Education, 2009.
5. National Building Code of India 2016, Third edition, Bureau of Indian Standards, Govt. of India, 2016.

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U17ISR2001 **Social Immersion Project**

L	T	P	J	C
0	0	0	4	2

Course Outcomes

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

CO1: Achieve the desirable awareness regarding significant social problems and identify the needs to provide a possible and innovative solution.

CO2: Acquire and demonstrate effective professional and technical skills to deal with social issues through innovative leadership and sustainable services / approaches.

CO3: Provide students with rich practical and socially oriented team work approach.

CO4: Explain how to make leadership decisions concerning organizational structure and the role of project resources on a project's team.

CO5: Enhance technical knowledge in addressing the needs of a community problem.

CO6: Identify tools and techniques for planning and working on a project

Pre-requisites : NIL

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

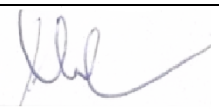
COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			S			S	S					
CO2			M	S		S	M	M	M			
CO3			S	W		S	S		S			M
CO4			S			S	S		W		M	
CO5	S		M			S	M					
CO6			S			S	S					

Course Assessment methods

Direct
1. Project Review 2. General report preparation 3. Team Presentation
Indirect
1. Impact study 2. Field Visit & Observation Skill 3. Course end survey

SOCIAL BONDING AND ENGINEERING

Society and its impact on the individual – Responsibility of individuals towards community building – Essential requirement of the society – Role of an engineering graduate in approaching the requirements - Developing social consciousness.



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ENGINEERING PREREQUISITE FOR ENHANCED SOCIAL LIVING

Theoretical reading (Based on the project / general – Books to be identified by the team) - Inculcating Social immersion and Leadership- Study on the society and identifying problems - Social immersion and Engineering implementation - Analysis of problems on issue based -Identification of causes and effects of the social issue identified.

ESSENTIAL ENGINEERING INNOVATION

Essential Engineering Concepts - Multiple approaches towards the problem &Selection for addressing- Addressing a theoretical social problem -Providing multiple solutions for the problem

PROJECT PLANNING AND APPROACHES

Knowledge on budgeting and fund raising - Approaching agencies related to problems. Partnering with agencies- Presentation Skills -Report preparation

BROAD AREA OF PROJECTS

(Students can also identify their own social issue)

Water / Sanitation and Hygiene - Waste Management -Women Empowerment- Community health- Child health/ Poverty/Education/others - Energy management -Environment Management - Adult Education - -Youth Empowerment - Green Industry - Given above are the broad areas of projects recommended. Projects may vary to individuals/ groups/ class/ branch.

Theory: 0	Tutorial: 0	Practical: 0	Project: 30	Total: 30 Hours

REFERENCES:

1. Nicholls Alex and Murdock Alex, Social Innovation Blurring Boundaries to reconfigure markets, Palgrave Macmillan., New York, 2012. :
2. Osburg Thomas and Schmidpeter Rene`, Social Innovation Solutions for sustainable Future. Springer, Germany 2013.
3. Adedeji B. Badiru, STEP Project Management: Guide for Science, Technology, and Engineering Projects. Taylor and Francis Group., Florida 2009.

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U17VEP2502 **Interpersonal Values**

L	T	P	J	C
0	0	2	0	1

Course Outcomes

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

CO 1: Develop a healthy relationship & harmony with others

CO 2: Practice respecting every human being

CO 3: Practice to eradicate negative temperaments

CO 4: Acquire Respect, Honesty, Empathy, Forgiveness and Equality

CO 5: Practice Exercises and Meditation to lead a healthy life

CO 6: Manage the cognitive abilities of an Individual

Pre-requisites:

1. U17VEP1501 / PERSONAL VALUES

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1										S		
CO2									S			
CO3											M	S
CO4						M						
CO5												M
CO6											M	

Course Assessment methods

Direct
1.Group Activity / Individual performance and assignment 2.Assessment on Value work sheet / Test
Indirect
1. Mini project on values / Goodwill Recognition

Values through Practical activities: **30 hours**

1. Introduction: Introduction to interpersonal values – Developing harmony with others – Healthy relationship – Need & importance of interpersonal values for dealing with others and team - Effective communication with others.

2. Maneuvering the temperaments: From Greed To Contentment - Anger To Tolerance -

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Miserliness To Charity – Ego To Equality - Vengeance To Forgiveness.

3. Core value : **Truthfulness -**Honesty –Helping–Friendship – Brotherhood – Tolerance – Caring & Sharing – Forgiveness – Charity –Sympathy — Generosity – Brotherhood - Adaptability.

4.Pathway to Blissful life :

Signs of anger – Root cause – Chain reaction – Evil effects on Body and Mind – Analyzing roots of worries – Techniques to eradicate worries.

5.Therapeutic measures: Spine strengthening exercises - Nero muscular breathing exercises - Laughing therapy - Mindfulness meditation.

Theory: 0	Tutorial: 0	Practical: 30	Project: 0	Total: 30 hours

REFERENCES

1. INTERPERSONAL SKILLS Tutorial (PDF Version) – Tutorials Point www.tutorialspoint.com/interpersonal_skills/interpersonal_skills_tutorial.pdf
2. INTERPERSONAL RELATIONSHIPS AT WORK - KI Open Archive - Karolinska www.publications.ki.se/xmlui/bitstream/handle/10616/39545/thesis.pdf?sequence=1
3. VALUES EDUCATION FOR PEACE, HUMAN RIGHTS, DEMOCRACY – UNESCO www.unesdoc.unesco.org/images/0011/001143/114357eo.pdf
4. MANEUVERING OF SIX TEMPERAMENTS - Vethathiri Maharishi www.ijhssi.org/papers/v5(5)/F0505034036.pdf
5. THE BLISS OF INNER FIRE: HEART PRACTICE OF THE SIX ... - Wisdom Publications - www.wisdompubs.org/sites/.../Bliss%20of%20Inner%20Fire%20Book%20Preview.pd...

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ENGLISH ELECTIVES

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U17ENE2501 **Academic English**
(Common to all branches of Engineering and Technology)

L	T	P	J	C
0	0	4	0	2

Course Outcomes

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

CO1: Maintain the standards of communal communication and acquire excellent listening skills with good Received Pronunciation.

CO2: Accommodate with speaking skills with fluency in communication obtaining levels of competency.

CO3: Project desirable research oriented skills to interface the corporate and meet out the challenges of the modern trends.

CO4: Familiarising with learner-centred strategies and improve writing activities through proper analysis.

CO5: Develop the ability in procuring information and effectiveness in communication based on situations.

CO6: Ability to present the individuals opinions, persuasion skills and academic curricular along with career profiles.

Pre-requisites : Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				M		S	M		M	S	S	M
CO2				M		S	M		M	S	S	M
CO3				M		S	M		M	S	S	M
CO4				M		S	M		M	S	M	M
CO5				M		S	M		M	S	M	M
CO6				M		S	M		M	S	M	M

Course Assessment methods

Direct

1. Continuous Assessment
2. Cooperative learning
3. Assignment
4. Presentation
5. End Semester Examination

Indirect

1. Course-end survey

AUDITORY PERCEPTION **12 Hours**

Listening for understanding & information - short announcements, short conversations, telephonic conversation; Listening to British, American, Australian and Neutral Accent of Indian English; Listening and synthesizing information; Listening to TED/INK Talks (General); Critical review of short films, documentaries.

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ORAL FLUENCY **12 Hours**

Informal introduction of self and others, conversation starters, articulating simple thoughts and ideas with clarity,Seeking Permission, Talking about People and Places. Describe an object or event. Retelling an incident, voicing opinions, persuasion skills, speaking from a single perspective (debate) - preparing and delivering an informal talk, Introduction to Presentation Skills – Formal tone – Impersonal style - Structuring and Presenting information. Transcodegraphics orally.

FOUNDATIONS OF ACADEMIC WRITING **12 Hours** Plan and write a library-based coursework assignment on an Engineering topic. Read academic textbooks and journal articles. Research and analyse scientific data and express understanding. Procuring information - Identifying research papers in a specific discipline, reading abstracts of research papers, reading the abstract of projects, reading articles from journals and publications and documenting/ archiving information.

TRAITS OF RESEARCH WRITING **12 Hours**

Reading research articles and summarizing. Review of Secondary sources - Writing an abstract - Writing an introduction to a paper in academic writing - Avoiding plagiarism – Bibliography – International Academic Styles of writing a research paper - Peer Evaluation.

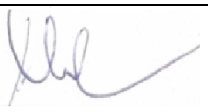
PROCESS OF PREPARING A RESEARCH ARTICLE **12 Hours**

Research Projects – Converging areas of interest into field of research - Identifying the problem of research – Formulating hypothesis –Research Objectives –Literature Review – Identifying the research gap - Research methodology – Requirements –Plan of work – Result and Discussion – Conclusion – References – Appendices.

Theory: 0	**Tutorial: 0**	**Practical: 60**	**Project: 0**	**Total: 60 Hours**

REFERENCES

1. English and Communication Skills—S.P.Dhanavel—Orient Blackswan Pvt Lted, Hyderabad.
2. Effective Technical Communication—Ashraf Rizvi—Tata McGraw Hill, New Delhi.
3. A Course in Communication Skils—KiranmaiDutt, GeethaRajeevan, .L.N.Prakash—Foundation Books, New Delhi.



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U17ENE2502 **Professional English** *(Common to all branches of Engineering and Technology)*

L	T	P	J	C
0	0	4	0	2

Course Outcomes

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

CO1: Formulate an understanding for effective use of short telephonic and oral conversations.

CO2: Analyse and identify necessary interpersonal and persuasive skills for effective oral presentation.

CO3: Employ appropriate strategies to articulate random thoughts and ideas in Brain storming sessions.

CO4: Analyse and review technical and non-technical contents.

CO5: Compose and compile effective written documents needed in a professional scenario.

CO6: Recognize and establish dynamic corporate communication and relationship.

Pre-requisites : Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1										M		
CO2										S		M
CO3										S		M
CO4	M	S	M	S						S		M
CO5				M						S		
CO6						M	M	S	S			S

Course Assessment methods

Direct
1. Continuous Assessment 2. Cooperative learning 3. Assignment 4. Presentation 5. End Semester Examination
Indirect
1. Course-end survey

AUDITORY PERCEPTION **12 Hours**

Listening for understanding & information - short announcements, short conversations, telephonic conversation; Listening to British, American, Australian and Neutral Accent of

Indian English; Listening and synthesizing information; Listening to TED/INK Talks (General); Critical review of short films, documentaries

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ORAL FLUENCY **12 Hours**

Informal introduction of self and others, conversation starters, articulating simple thoughts and ideas with clarity, Seeking Permission, Talking about People and Places, Describe anobject or event. Retelling an incident, voicing opinions, persuasion skills, speaking from a single perspective (debate) - preparing and delivering an informal talk, Introduction to Presentation Skills – Formal tone – Impersonal style - Structuring and Presenting information. Transcode graphics orally

FOUNDATIONS OF PROFESSIONAL COMMUNICATION **12 Hours**

Focused listening, Listening to lectures and talks on science and technology, Listening in international seminars, Video Documentary review, Receiving compliments and sharing information in a corporate scenario, Speaking in Formal Context. Business Vocabulary. Speaking practice in a variety of registers, Giving and Getting Product and Service Information. Product Review. Recording equipment and safety checklist. Business Itinerary, Presenting a Company Profile, Encoding and decoding advertisements

CORPORATE DYNAMICS **12 Hours**

Corporate Social Responsibility, Crisis Management - handling issues and situations, Creating a powerful first impression, Goal Setting - Immediate goals, short term goals, long term goals, smart goals, strategies to achieve goals, Time Management - Types of time, Identifying time wasters, time management skills, Stress Management - Reasons, Strategies to cope up with stress, Stress-busters, Emotional Intelligence –Mental health, Job performance, Managing emotions.

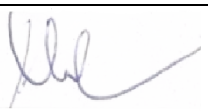
PROFESSIONAL WRITING **12 Hours**

Writing Agenda and minutes of the meetings, Writing daily/periodic reports, Writing business / professional letters, Business E-mail - Writing an Email Announcing a Meeting - Writing an Email Announcing the modifications in a Meeting - Writing an Email Announcing the cancellation/ postponement of Meeting

Theory: 0	**Tutorial: 0**	**Practical: 60**	**Project: 0**	**Total: 60 Hours**

REFERENCES

1. Soft Skills for Young Managers—Prof.M.S.Rao—Biztantra Publications, New Delhi.
2. Soft Skills—Dr.K.Alex—S.Chand and Co, New Delhi.
3. Professional Communication—ArunaKoneru—Oxford University Press, New Delhi.



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U17ENE2503 **English for Competency**

(Common to all branches of Engineering and Technology)

L	T	P	J	C
0	0	4	0	2

Course Outcomes

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

CO1: Recognize the inventory of listening strategies by various proposed listening activities.

CO2: Construct learning situations and increase speaking skills based on strong educational and communication theories.

CO3: Invent and practice effective reading strategy to enhance competent communication

CO4: Honing the strengths of writing skills and set objectives for future development

CO5: Showcase industry-ready attitude along with corporate communication

CO6: Develop imaginative and critical thinking abilities, and improve the problem solving aptitude.

Pre-requisites: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				M		S	M		M	S	S	M
CO2				M		S	M		M	S	S	M
CO3				M		S	M		M	S	S	M
CO4				M		S	M		M	S	M	M
CO5				M		S	M		M	S	M	M
CO6				M		S	M		M	S	M	M

Course Assessment methods

Direct
1. Continuous Assessment 2. Cooperative learning 3. Assignment 4. Presentation 5. End Semester Examination
Indirect
1. Course-end survey

AUDITORY PERCEPTION **12 Hours**

Listening for understanding & information - short announcements, short conversations, telephonic conversation; Listening to British, American, Australian and Neutral Accent of Indian English; Listening and synthesizing information; Listening to TED/INK Talks (General); Critical review of short films, documentaries

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ORAL FLUENCY **12 Hours**

Informal introduction of self and others, conversation starters, articulating simple thoughts and ideas with clarity, Seeking Permission, Talking about People and Places, Describe an object or event. Retelling an incident, voicing opinions, persuasion skills, speaking from a single perspective (debate) - preparing and delivering an informal talk, Introduction to Presentation Skills – Formal tone – Impersonal style - Structuring and Presenting information. Transcode graphics orally

FOUNDATIONS OF ETS **12 Hours**

Analogy, Synonyms and antonyms, Morphemes –Derivational and Inflectional, Affixes – Prefix and Suffix, strategies to improve high frequency vocabulary

VERBAL BASED COMPETENCY **12 Hours** Verbal Reasoning - Critical Reasoning & Verbal Deduction - Statement and Assumptions**,** Statement and Arguments, Statement and Inference, Strong and Weak Arguments, Sentence Correction,; Sentence Equivalence, Text Completion, Word Groups, Integrated Reasoning – Graphics Interpretation, Two-part Analysis, Table Analysis, Multi-source Reasoning.

SKILL BASED COMPETENCY **12 Hours**

Analytical writing – Argumentative writing, a 30-minute Analyse an argument, a 30- minute Analyse an issue, Listening and Speaking Tasks in ETS, Reading Comprehension – GRE, GMAT, TOEFL, IELTS, GATE

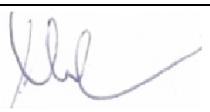
Theory: 0	**Tutorial: 0**	**Practical: 60**	**Project: 0**	**Total: 60 Hours**

REFERENCES

1. Personality Development and Soft Skill—Barun.K.Mitra—Oxford University Press, New Delhi.

2. A Modern Approach to Verbal and Non-verbal Reasoning—R.S.Agarwal—S.Chand & Co., New Delhi.

3. Soft Skills—Dr.K.Alex—S.Chand& Co., New Delhi



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SEMESTER III

U17MAT3101 **PARTIAL DIFFERENTIAL EQUATIONS AND TRANSFORMS (Common to AE/AUE/CE/ME/MCE/EEE)**

L	T	P	J	C
3	1	0	0	4

Course Outcomes (COs):

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

CO1: Form partial differential equations and solve certain types of partial differential equations.

CO2: Know how to find the Fourier Series and half range Fourier Series of a function

CO3: To know how to solve one dimensional wave equation, one dimensional heat equation in steady state using Fourier series.

CO4: Apply Fourier series to solve the steady state equation of two dimensional heat equation in Cartesian coordinates.

CO5: Apply the Fourier transform, Fourier sine and cosine transform to certain functions and use Parseval's identity to evaluate integrals..

CO6: Evaluate Z – transform for certain functions. Estimate Inverse Z – transform of certain functions and to solve difference equations using them.

Pre-requisite: NIL

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M			M				M	M		S
CO2	S	M		M								
CO3	S	S	S		S				M	M		S
CO4	S	M	M									M
CO5	S	M	M		S							
CO6	S	S			S				M	M		S

Course Assessment methods:

Direct
1. Continuous Assessment Test I, II 2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, Prototype or Product Demonstration etc. (as applicable) 3. End Semester Examination
Indirect
1. Course-end survey

PARTIAL DIFFERENTIAL EQUATIONS **9+3 Hours**

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Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions - Solution of PDE by variable separable method – Solution of standard types of first order partial differential equations (excluding reducible to standard types) – Lagrange's linear equation – Linear Homogeneous partial differential equations of second and higher order with constant coefficients.

FOURIER SERIES **9+3 Hours**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval's identity – Harmonic Analysis.

BOUNDARY VALUE PROBLEMS – ONE DIMENSIONAL EQUATIONS **5+2 Hours**

Classification of second order quasi linear partial differential equations – Formulation of wave and heat equations using physical laws - Solutions of one dimensional wave equation – One dimensional heat equation (excluding insulated ends)

BOUNDARY VALUE PROBLEMS – TWO DIMENSIONAL EQUATIONS **4+1 Hours**

Steady state solution of two-dimensional heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

FOURIER TRANSFORM **9+3 Hours**

Fourier Integral Theorem – Representation of Functions – Infinite Fourier transforms – Sine and Cosine Transforms – Properties – Transforms of simple functions – convolution theorem – Parseval's identity.

Z –TRANSFORM **9+3 Hours**

Z-transform - Elementary properties – Convolution theorem- Inverse Z – transform (by using partial fractions, residue methods and convolution theorem) – Solution of difference equations using Z - transform.

Theory : 45 Hours **Tutorial: 15 Hours** **Total:60 Hours**

References:

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition. 2014.
2. Veerarajan. T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.
3. Kandasamy P., Thilagavathy K. and Gunavathy K., "Engineering Mathematics Volume III", S.Chand & Company ltd., New Delhi, 2006.
4. Ian Sneddon., "Elements of partial differential equations", McGraw – Hill, New Delhi, 2003.
5. Arunachalam T., "Engineering Mathematics III", Sri Vignesh Publications, Coimbatore 2009.

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U17CEI3201	SOLID MECHANICS	L	T	P	J	C
		2	1	2	0	4

Course Objectives

- The objective of this course is to know the basics of solid mechanics.
- To understand the concepts of mechanics of structures.
- To understand the behavior.
- Determine the internal forces and analyses the stresses of various structural elements under action of different types of forces.

Course Outcome

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

CO1: Apply the fundamental concepts of stress and strain in the analysis of various structural components and machines.
CO2: Analyse the beams to determine shear forces, bending moments.
CO3: Determine the bending, shear stresses and deflection produced in a beam
CO4: Analyse and design shafts and springs used in vehicles and structures
CO5: Find out the design forces in truss members.

Pre-requisites: Engineering Mechanics

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S			M					W		M
CO2	S	S		S	M					W		
CO3	S	S		S	M							S
CO4	S	S	S	M		S						M
CO5	S	S		S								M

Course Assessment methods:

1. Continuous Assessment Test I, II
2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Discussion.
3. End Semester Examination

SIMPLE STRESSES AND STRAINS	**5+3Hours**

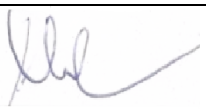
Stresses - Strain - Strain energy due to axial force, impact and suddenly applied load- Hooke's law- Relationship among elastic constants- Factor of safety-Thermal stresses- Compound bars- 2 D State of stresses- Mohr's circle.

SHEAR AND BENDING IN BEAMS	**5+3Hours**

Beams and bending - Shear force and bending moment diagrams for statically determinate beams with different loading conditions.

FLEXURAL AND SHEAR STRESSES	**5+2Hours**

Theory of simple bending- Analysis of determinate beams for stresses- Shear and Bending Stress distribution at a cross section with different loading conditions.



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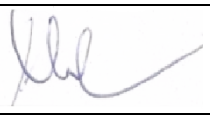
SLOPE AND DEFLECTION IN BEAMS	**5+3Hours**
Deflection of determinate beams - Double integration method-Macaulay's methods- Area moment method- Conjugate beam method for the computations of slopes and deflections.	
SHAFTS AND SPRINGS	**5+2Hours**
Elastic theory of Torsion –Solid and hollow circular shafts - Combined bending moment and torsion of shafts- strain energy due to torsion- Modulus of rupture- Power transmitted to shaft- Closed and open coiled helical springs- Leaf springs.	
PLANE AND SPACE TRUSSES	**5+2Hours**
Plane trusses- Analysis of trusses - Method of joints – Method of sections; Space truss – Tension Co-efficient Method	
PRACTICALS	**30 Hours**

List of Experiments

1. Sketch the stress strain curve for the given Mild/Cast iron steel specimen by conducting tension test and the modulus of Elasticity of the given specimen.
2. Determine the Rockwell hardness number for the given specimens and identify the hardest material.
3. Determine the Brinell hardness number for the given specimens and identify the hardest material.
4. Calculate the Modulus of rupture, Modulus of elasticity of the simply supported wooden beam with center point load.
5. Identify the test to determine the impact strength for the given mild steel specimen under horizontal position.
6. Determine the maximum shear stress and rigidity modulus of the given specimen by conducting Torsion test.
7. Identify the test to determine the impact strength for the given mild steel specimen under vertical position.
8. Determine the Vickers hardness number for the given specimen with different loading condition.
9. Verify the Maxwell reciprocal theorem and calculate the Stiffness and Young's Modulus of the given Steel beam or virtual study.
10. Determine the Stiffness and Young's Modulus of the given Cantilever steel Beam or virtual study.
11. Calculate the compressive strength of the given wooden specimen under which case you will get the maximum compressive strength and why.
12. Case 1 – Load is parallel to grains
13. Case 2 - Load is perpendicular to grains
14. Determine the ultimate shear strength of the given materials by conducting Double shear test.
15. Determine the maximum shear stress, rigidity modulus and stiffness of the Compression spring
16. Determine the maximum shear stress, rigidity modulus and stiffness of the Tension spring
17. Calculate Normal, Shear stress and Resultant stress by using Mohr's Circle (Both Graphical and Virtual Work)
18. Calculate Bending stress by using Virtual Work



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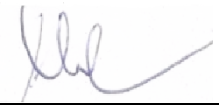
19. Model Making: Plane Truss(Pin Jointed Simply supported/Cantilever Truss)				
Theory: 30	**Tutorial: 15**	**Practical: 30**	**Project: 0**	**Total: 75 Hours**

REFERENCES

1. Popov, E.P, "Engineering Mechanics of Solids", Prentice-Hall of India, New Delhi, (2009).
2. Punmia.B.C, Ashok Kumar Jain, Arun Kumar Jain., Mechanics of Materials, Laxmi Publications (P) Ltd., 2017.
3. Timoshenko. S and Gere. J. M. Mechanics of Materials, A&C, Black 2 Ed.,2013.
4. Rajput. R. K., Strength of Materials: Mechanics of Solids., Edition 4, S. Chand Limited, New Delhi, 2015.
5. Ramamrutham. S, Narayan. R. Strength of Materials, Dhanpat Rai Publishing Company (P) Limited. 2017.
6. Kazmi, S. M. A., Solid Mechanics, TMH, Delhi, India., 2008.
7. Hibbeler. R. C., Mechanics of Materials. 6th ed. East Rutherford, NJ: Pearson Prentice Hall.2012.



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U17CEI3202	SURVEYING AND GEOMATICS	L	T	P	J	C
		3	0	2	0	4

Course Outcomes

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

CO1: Carry out area and volume measurements for the given land.
CO2: perform angular measurement, elevation and distance of an object.
CO3: Set out the curves of given size on the field and conduct hydrographic survey.
CO4: Conduct survey works using total station
CO5: Apply the concepts of satellite and characteristics of different platforms of GPS surveying

Course Objectives

- Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveying activities
- Translate the knowledge gained for the implementation of Civil infrastructure facilities
- Relate the knowledge on Surveying to the new frontiers of science like Hydrographic surveying, Electronic Distance Measurement, Global Positioning System, Photogrammetry and Remote Sensing

Pre-requisites : Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S	M										M		M
CO2		M	S			M								S
CO3					S	M								M
CO4					S	M				M				M
CO5					S					M				

Course Assessment methods

1. Continuous Assessment Test I, II
2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Discussion.
3. End Semester Examination

SURVEYING AND LEVELLING — **9 Hours**

Principles, Linear measurements- Chain – Tape – Ranging. Compass surveying – types – Error Corrections. Levelling – Types – Reducing Levels – missing readings- Contours- Areas and volume calculation.

THEODOLITE AND TACHEOMETRY SURVEYING — **9 hours**

Theodolite survey: Measurement of horizontal angle, vertical angle and distance; Horizontal and vertical control -triangulation - Signals. Baseline - choices - Satellite station - reduction to center – Tacheometric surveying- types

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CURVES & HYDROGRAPHIC SURVEY	**9 Hours**
Elements of simple and compound curves –Reverse curve - Transition curve - Method of setting out - Vertical curves- Introduction to hydrographic surveying- Tides-MSL- Sounding methods- Three-point problem.	
MODERN FIELD SURVEY SYSTEMS	**9 Hours**
Principle of Electronic Distance Measurement, Modulation, and Types of EDM instruments, Total Station – Parts of a Total Station – Accessories –Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey. Care and maintenance of Total Station instruments.	
GPS SURVEYING	**9 Hours**
Basic concepts – Different segments- space, control and user segments-satellite configuration- signal structure- orbit determination and representation -Task of control segment- Hand held and Geodetic receivers-data processing-Traversing and triangulation. Fundamentals of Photogrammetry and Remote sensing.	

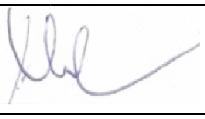
Practical Work:

1. Determine the Area of the field by Aligning, Ranging and Chaining and traversing
2. Determine the Area of the field compass Traversing
3. Find the gradient between two points by using Fly levelling
4. Find the Reduced level of points using Check levelling
5. Measurement of horizontal angles by reiteration and repetition
6. Determination of gradient of line by Tacheometric surveying - Tangential system - Stadia system - Subtense system.
7. Setting out the Foundation marking and Simple curve (right/left-handed) in the field
8. Determine the area of the given location using Total station
9. Determine the height and distance of the point by Single plane method and Double plane method using Total Station
10. Mark the column points in the field by using Total Station
11. Demonstration of Auto plotter.

Theory: 45 Tutorial: 0 Practical:30 Project: 0 Total: 75Hours

REFERENCES

1. Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2008.
2 .Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011
3 .Dr. B.C. Punmia, Ashok Kumar Jain, Ashok Kr. Jain, Arun Kr. Jain, Surveying (Volume –I and II), Lakshmi Publications,2016
4. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010
5. Basak N N, Surveying& Levelling, Tata McGraw-Hill Education, 2014
6. Anji Reddy, M., Remote sensing and Geographical information system, B.S. Publications, 2001.
7. Arora, K.R., Surveying, Vol-I, II and III, Standard Book House, 2015.



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U17CEI3203 **FLUID MECHANICS**

L	T	P	J	C
2	1	2	0	4

Course Outcomes

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

CO1: Measure the pressure of a fluid and fluid pressure on a plane and curved surface.
CO2: Analyse the stability of floating and submerged bodies.
CO3: Formulate the functional relationships that exist between dependent and independent variables of fluid flow
CO4: Understand the kinematics that exists in the fluid flow
CO5: Apply the working concepts of various devices used to measure the velocity and discharge of fluid.
CO6: Apply inter-relationship of various properties of fluid in practical problems

Course Objectives

To introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering

Pre-requisites: Nil

CO/POMapping

(S/M/Windicates strength of correlation) S-Strong, M-Medium,W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2		M										
CO3			M									
CO4		M										
CO5	W											
CO6	M											

Course Assessment methods

1. Continuous AssessmentTestI,II
2. Assignment, Group Discussion
3. End semester Examination

PROPERTIES OF FLUID & FLUID STATICS 6+3Hours

Units of measurement, Newtonian and Non-Newtonian fluids; Vapour pressure, compressibility and Elasticity; Surface Tension and Capillarity. Variation of static pressure; Pascal's law; Atmospheric, Absolute and gauge pressure; Pressure measurement by mechanical gauges and manometers; pressure on plane surfaces and curved surfaces

BUOYANCY AND FLOATATION 4+2Hours

Buoyancy; Buoyant force and Centre of Buoyancy; Stability of submerged bodies and floating bodies; Metacentre; Determination of Metacentric height-Experimental and Theoretical methods

DYNAMICS OF FLUID 6+3Hours

Euler's equation of motion; Bernoulli's equation – Application of Bernoulli's equation - Discharge and velocity measurements – Venturimeter, orificemeter, nozzle, Pitottube; Energy correction factor; momentum principle

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FLOW THROUGH PIPES **5+2Hours**

Laminar and turbulent flows through pipe – Hagen-Poiseuille equation – Darcy-Weishbach equation –Major and Minor losses –Pipes in series and in parallel

KINEMATICS OF FLUID **4+2Hours**

Methods of describing fluid motion; Classification of flow; Steady, unsteady, uniform and non-uniform flows; Laminar and turbulent flows; Three, two and one-dimensional flows; irrotational and rotational flows; Streamline; pathline; Streakline; Equation for acceleration; Continuity equation; Velocity potential and stream function; flownet; Vortexflow-Free vortex and forced vertex flow.

DIMENSIONALANALYSIS **5+3Hours**

Rayleigh's method–Buckingham's π theorem –Geometric, Kinematic, and Dynamic similitudes – Scale effect–Distorted models.

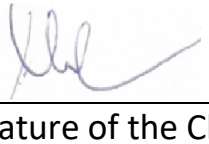
Practical Work:

1. Assessing stability of floating body-Meta centric height
2. Determination of minor loss coefficient for fixtures in pipes
3. Estimation of friction loss in pipes
4. Evaluation of coefficient of discharge of Venturimeter
5. Evaluation of coefficient of discharge of Orificemeter
6. Calibration of mouth piece and orifice for discharge measurement.
7. Verification of Bernoulli's Theorem.
8. Verification of Reynolds Number.

Theory: 30 Tutorial:15 Practical:30 Project: 0 Total: 75Hours

REFERENCES

1. Fox and McDonald's, "Introduction to Fluid Mechanics", 8th Edition, 2011, Wiley.
2. Modi & Seth, "Hydraulics and Fluid Mechanics", Standard Publishers.
3. R K Bansal, "A Textbook of Fluid Mechanics and Hydraulic Machines", 9th Edition, 2017, Laxmi Publications.
4. C.S.P.Ojha, P.N.Chandramouli, and R.Berndtsson, "Fluid Mechanics and Machinery", 2010, OXFORD University Press.



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U17CET3004 Building Construction and Services

L	T	P	J	C
3	0	0	0	3

Course Outcomes

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

CO1: suggest a suitable type of foundation for a given building and soil condition.
CO2: supervise for the quality construction of brick and stone masonry works.
CO3: select suitable type of floors and roof as per the field condition.
CO4: select suitable scaffolding and formworks for the construction activity.
CO5: Understand the concepts of fire safety arrangement
CO6: Bring about an exposure to air conditioning.

Course Objectives

Pre-requisites : Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M		M									M
CO2						M	M					
CO3			M			M						
CO4			M			M						
CO5					S	M	M					M
CO6	S					M						

Course Assessment methods

1. Continuous Assessment Test I,II
2. Assignment, Group Discussion
3. End semester Examination

FOUNDATIONS & MASONRY 9 Hours

Concept of foundations; Factors affecting selection of foundations; Types of foundations – Shallow & Deep foundations; Piles and their classification; Foundation on black cotton soils. Brick masonry and Stone masonry: Terminologies-types of bonds and their suitability.

WALLS, FLOORS AND ROOFS 9 Hours

Classification of walls – Load bearing & Non-Load bearing – Hollow – Reinforced Brick Walls. Floors - Types of flooring. Roofs - Classification of roofs- Types of Pitched & Flat roofs; Roof covering materials.

SUPPORTING STRUCTURES AND DAMPNESS 9 Hours

Types of scaffolding; types of shoring; Methods of underpinning; Types of formwork; centering. DPC- Causes of dampness; Methods of preventing dampness; Damp proofing materials and their classification- weather and water proof courses

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SAFETY REGULATIONS 9 Hours

Causes of fire in buildings-safety regulations-NBC-planning considerations in buildings like Non-combustible materials, construction, staircases and A.C. systems, special features required for physically handicapped and elderly in building types-heat and smoke detectors-dry and wet risers-Automatic sprinklers

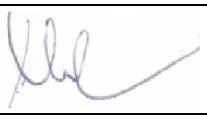
VENTILATION AND ITS IMPORTANCE 9 Hours

Ventilation and its importance-natural and artificial systems-Window type and packaged air-conditioners-chilled water plant –fan coil systems-water piping –cooling load –air conditioning systems for different types of buildings –protection against fire to be caused by A.C. Systems.

Theory: 45	Tutorial: 0	Practical: 0	Project: 0	Total: 45 Hours

REFERENCES

1. B.C.Punmia, “Building Construction”, Laxmi Publications, New Delhi. 2016.
2. Varghese. P.C. “Building Construction”, Prentice hall of India Pvt.Ltd. New Delhi, 2015.
3. G.S.Birdie, T.D.Ahuja, “Building Construction and construction materials”, Dhanpatrai publishing company, New Delhi,2012
4. SK Duggal, “Building Materials,” New Age Publications 4th Edition, April, 2014
5. Hopkinson .R.G and Kay .J .D, “The Lighting of buildings”, Faber and Faber, London, 2015.
6. “Hand book for Building Engineers in Metric systems”, NBC, New Delhi, 2008.
7. Derek Phillips “Philips Lighting in Architecture Designs”, McGraw Hill, New York, 2011.
8. Callendar JH “Time saver Standards for Architecture Design Data”, McGraw Hill, 2011.
9. William H.Severns and Julian R.Fellows, “Air conditioning and refrigeration”, John Wily and sons, London, 2013.



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U17INI3600 ENGINEERING CLINIC - I

L	T	P	J	C
0	0	4	2	3

Course objectives

- To help the students look into the functioning of simple to complex devices and systems
- To enable the students to design and build simple systems on their own
- To help experiment with innovative ideas in design and team work
- To create an engaging and challenging environment in the engineering lab

Course Outcomes

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

CO1: Identify a practical problems and find a solution
CO2: Understand the project management techniques
CO3: Demonstrate their technical report writing and presentation skills

Pre-requisite:U18INI2600

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO	PSO2
CO1	S	S	S	S	S	M	W		S			S		M
CO2											S			
CO3										S				M

Course Assessment methods:

1. Project reviews 50%
2. Workbook report 10%
3. Demonstration & Viva-voce 40%

Content:

The course will offer the students with an opportunity to gain a basic understanding of computer controlled electronic devices and apply the concepts to design and build simple to complex devices. As a practical project based embedded course, the students will be taught the concepts using a variety of reference material available in the public domain. While the course will start with formal instruction on hardware, programming and applications, the major portion of the course will provide the students with ample opportunity to be innovative in designing and building a range of products from toys to robots and flying machines.

In the third semester, students will focus primarily on IOT with C programming using Audino

GUIDELINES:

1. Practical based learning carrying credits.
2. Multi-disciplinary/ Multi-focus group of 5-6 students.
3. Groups can select to work on a specific tasks, or projects related to real world problems.
4. Each group has a faculty coordinator/Instructor who will guide/evaluate the overall group as well as individual students.
5. The students have to display their model in the 'Engineering Clinics Expo' at the end of semester.
6. The progress of the course is evaluated based on reviews and final demonstration of Prototype.

Total Hours: 90

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U17VEP3503 **FAMILY VALUES**

L	T	P	J	C
0	0	2	0	1

Course Outcomes

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

CO 1: Develop skills in maintaining the harmony in the family.

CO 2: Create impulsive activities for healthy family

CO 3: Be receptive to troubled Individuals

CO 4: Gain healthy life by practicing Kundalini Yoga & Kayakalpa

CO 5: Possess Empathy among family members.

CO 6: Reason the life and its significance

Pre-requisites :

1. U17VEP1501 / PERSONAL VALUES
2. U17VEP2502 / INTERPERSONAL VALUES

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1									S			
CO2							M					
CO3										M		
CO4												S
CO5						S						
CO6								M				

Course Assessment methods

Direct
1.Group Activity / Individual performance and assignment 2.Assessment on Value work sheet / Test
Indirect
1. Mini project on values / Goodwill Recognition

30 hours

Values through Practical activities:

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1. Family system: Introduction to Family Values – elements of family values - Adjustment, Tolerance, Sacrifice - Family structure in different society – work life balance.
2. Peace in Family : Family members and their responsibility - Roles of parents, children, grant parents -. Respectable women hood
3. Core value: Empathy: Unconditional love - Respect - Compassion - sacrifice–Care &share - helping – emotional support- hospitality – cleanliness
4. Blessing: Blessing - methods - Vibration effect - Benefits - Reason for misunderstanding in the Family and resolution through blessings.
5. Healthy Family: Good relationship with neighbors - Counseling - Simplified Kundalini Yoga - Kaya Kalpa Yoga

Theory: 0	Tutorial: 0	Practical: 30	Project: 0	Total: 30 hours

REFERENCES

1. FAMILY - www.download.nos.org/331courseE/L-13%20FAMILY.pdf
2. FRAMEWORK FOR ACTION ON VALUES EDUCATION IN EARLY CHILDHOOD – UNESCO – PDF –www.unesdoc.unesco.org/images/0012/001287/128712e.pdf
3. TRUE FAMILY VALUES Third Edition - Tparents Home www.tparents.org/Library/Unification/Books/TFV3/_TFV3.pdf
4. FAMILY VALUES IN A HISTORICAL PERSPECTIVE - The Tanner Lectures on www.tannerlectures.utah.edu/_documents/a-to-z/s/Stone95.pdf
5. PROBLEMS OF INDIA'S CHANGING FAMILY AND STATE ... - the United Nations - www.un.org/esa/socdev/family/docs/egm09/Singh.pdf

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SEMESTER IV

U17MAT4101

NUMERICAL METHODS AND PROBABILITY

(Common to AE/AUE/CE/ME/MCE/EEE)

L	T	P	PJ	C
3	1	0	0	4

COURSE OUTCOMES

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

- **CO1:** Apply the concepts of various numerical techniques for solving non-linear equations and systems of linear equations.
- **CO2:** Analyze and apply the knowledge of interpolation and determine the integration and differentiation of the functions by using the numerical data.
- **CO3:** Predict the dynamic behaviour of the system through solution of ordinary differential equations by using numerical methods.
- **CO4:** Apply the concepts of probability, conditional probability and total probability.
- **CO5:** Analyze random or unpredictable experiments and investigate important features of random experiments.
- **CO6:** Construct probabilistic models for observed phenomena through distributions which play an important role in many engineering applications.

Pre-requisite:

System of equations, Frequency distribution, mean, median, mode.

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S										
CO2	S	S										
CO3	S	S							M			
CO4	S	S										
CO5	S	S							M			
CO6	S	S										

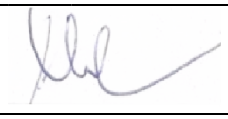
COURSE ASSESSMENT METHODS

Direct

1. Continuous Assessment Test I, II
2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, Prototype or Product Demonstration etc. (as applicable)
3. End Semester Examination

SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS 9+3 Hours

Linear interpolation method – Iteration method – Newton's method – Solution of linear system by



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Gaussian elimination and Gauss-Jordan methods - Iterative methods: Gauss Jacobi and Gauss - Seidel methods – Inverse of matrix by Gauss – Jordan method – Eigenvalues of a matrix by Power method.

INTERPOLATION, NUMERICAL DIFFERENTIATION AND INTEGRATION 9+3 Hours

Lagrange's and Newton's divided difference interpolation – Newton's forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials – Numerical integration using Trapezoidal and Simpson's rules.

NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9+3 Hours

Single step methods: Taylor's series method – Euler and Improved Euler methods for solving a first order equations – Fourth order Runge – Kutta method for solving first and second order equations – Multistep method: Milne's predictor and corrector method.

PROBABILITY 3+1 Hours

Axioms of probability - Conditional probability – Total probability – Bayes' theorem

RANDOM VARIABLES 6+2 Hours

Random variable – Distribution function – properties – Probability mass function-
Probability density function – moments and moment generating function – properties.

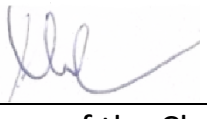
STANDARD DISTRIBUTIONS 9+3 Hours

Binomial, Poisson and Normal distributions – Moments, Moment Generating functions and properties for the above distributions - Fitting of Binomial and Poisson distributions.

Theory: 45 Hours Tutorials: 15 Hours Total: 60 Hours

REFERENCES

1. Grewal, B.S. and Grewal,J.S., " Numerical methods in Engineering and Science", 9th Edition, Khanna Publishers, New Delhi, 2007.
2. Gerald, C. F. and Wheatley, P. O., "Applied Numerical Analysis", 7th Edition, Pearson Education Asia, New Delhi, 2007.
3. Chapra, S. C and Canale, R. P. "Numerical Methods for Engineers", 7th Edition, Tata McGraw-Hill, New Delhi, 2016.
4. R.A. Johnson and C.B. Gupta, "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 9th Edition, 2016.
5. R.E. Walpole, R.H. Myers, S.L. Myers, and K Ye, "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia, 9th edition, 2017.



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U17CEI4201 APPLIED HYDRAULICS AND HYDRAULIC MACHINERY

L	T	P	J	C
2	1	2	0	4

Course Outcomes

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

CO1: Design most economical section for an open channel.
CO2: Analyse critical flow condition in channels.
CO3: Determine GVF profiles under non-uniform flow.
CO4: Select appropriate type of turbines for the given conditions.
CO5: design the characteristics of the pump and turbine for a given efficiency

Course Objectives

To introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering

Pre-requisites : Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2		S										
CO3	M											
CO4	M											
CO5		M										

Course Assessment methods

1. Continuous Assessment Test I,II
2. Assignment, Group Discussion
3. End semester Examination

INTRODUCTION TO OPEN CHANNEL FLOW 4+2 Hours

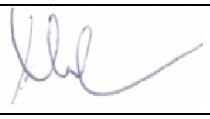
Comparison between open channel flow and Pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section..

UNIFORM FLOW 8+4 Hours

Continuity Equation, Energy Equation and Momentum Equation, Characteristics of uniform flow, Chezy's formula, Manning's formula. Factors affecting Manning's Roughness Coefficient 'n'¬. Most economical section of channel- Rectangular, Trapezoidal, Circular. Computation of Normal depth.

NON-UNIFORM FLOW 9 + 5 Hours

Specific energy, Specific energy curve, critical flow, discharge curve Specific force Specific depth, and Critical depth. Gradually Varied Flow-Dynamic Equation of Gradually Varied Flow, Classification of channel bottom slopes, Classification of surface profile,



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Characteristics of surface profile. Computation of water surface profile -Direct Step method, Graphical Integration method. Hydraulic jump –Sequent depths -Flow through transitions (local bed rise and width contraction)-Introduction to positive and negative surge

HYDRAULIC MACHINES **9+4 Hours**

Impact of Jets on moving plates; Classification of turbines and pumps; turbines – Pelton, Franics, Kaplan- draft tube; Pumps – Centrifugal, Reciprocating- indicator diagram- Air vessels- cavitation

Practical Work:

1. Discharge estimation in weir
2. Hydraulic jump
3. Turbines – Kaplan, francis, pelton, turgo impulse
4. Pumps- centrifugal, reciprocating, gear oil, submersible

Theory:30	**Tutorial: 15**	**Practical: 30**	**Project: 0**	**Total: 75 Hours**

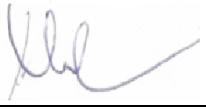
REFERENCES

1 . RK Bansal," A Textbook of Fluid Mechanics and Hydraulic Machines", 9th Edition, 2017, Laxmi Publications

2.C.S.P. Ojha, P.N. Chandramouli, and R. Berndtsson, "Fluid Mechanics and Machinery", 2010,OXFORD University Press

3.Ven Te Chow, "Open Channel Hydraulics", McGraw Hill, New York, 2009.

4.P. N. Chandramouli,"Applied Hydraulic Engineering", 2017, yesdee



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U17CEI4202 **HIGHWAY AND TRAFFIC ENGINEERING**

L	T	P	J	C
3	0	2	0	4

Course Objectives

This course aims at providing a comprehensive insight of various elements of Highway and traffic engineering. Topics related to the highway development, characterisation of different materials needed for highway construction, structural and geometric design of highway pavements along with the challenges and possible solutions to the traffic related issues will be covered as a part of this course.

On completion of the course, the students will be able to:

CO1: Acquire knowledge about the surveys involved in planning and highway alignment
CO2: Design the geometric elements of highways and expressways
CO3: Apply the knowledge of the traffic studies and implement traffic regulation and control measures and intersection design
CO4: Characterize pavement materials and design flexible and rigid pavements as per IRC
CO5: Understand the concepts of pavement distress and methods to evaluate and maintain the pavement

Pre-requisites : Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)												Programme Specific Outcome(PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		S	S									S	S	
CO2	S		S									M	S	
CO3	S	S	S	S								M	S	
CO4	S		S	S								S	S	
CO5	S	M	S	S								M	S	M

Course Assessment methods

1. Continuous Assessment Test I,II
2. Assignment, Group Discussion
3. End semester Examination

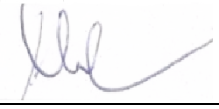
Highway Planning and Alignment **9 hours**

Introduction to Highway Engineering - Highway development in India – Jayakar committee recommendations –road development plans- road classifications; Role of transportation in society; Institutions for highway development at national level-Current road programmes in India; highway alignment and surveys- Highway projects, Highway drawings and reports, Detailed Project Report preparation, PPP schemes of Highway Development in India, Government of India initiatives in developing the highways and expressways -Rural road development.

Geometric Design **9 hours**

Highway cross section elements; sight distance, design of horizontal alignment; design of vertical alignment; problems, Special considerations for Hill roads. Clearance for Underpass.

Traffic Studies **9 hours**



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Traffic Characteristics, Fundamentals of Traffic flow ; Traffic surveys - Speed, journey time and delay surveys -volume survey-origin-destination survey- Accident analysis- Level of Service and capacity, Channelization and intersections- types of at grade and grade separated intersections- design of rotary intersections; design of parking facilities; Traffic signs and road marking-highway lighting and road furniture –Traffic signal design.

Pavement Material and Design **9 hours**

Factors affecting pavement design- Pavement materials- Soil, Aggregate, bitumen; Bituminous paving mixes-Marshall stability mix design-Superpave mix design; Alternate materials for road construction-polymer modified bitumen-geotextiles-plastic roads;

Rigid and Flexible pavement- components and functions- design principles and factors – design of flexible pavement (IRC method only)-problem; design practice for rigid pavement-IRC recommendations.

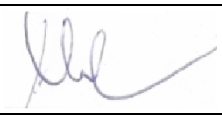
Pavement Evaluation and Maintenance **9 Hours**

Pavement distress in flexible and rigid pavements; pavement condition survey- present serviceability index- pavement evaluation-roughnesss, skid resistance, structural evaluation, and evaluation by deflection measurements- Strengthening of pavements-overlay design. Highway Project formulation.

Theory: 45 Tutorial: 0 Practical: 30 Project: 0 Total: 75 Hours

LIST OF EXPERIMENTS **30 Hours**

1. **TESTS ON AGGREGATE**
    1. Determination of Aggregate Crushing Value
    2. Determination of Aggregate Abrasion Value
    3. Determination of Aggregate Impact Value
    4. Determination of Aggregate Soundness Value
    5. Determination of Aggregate Shape Value
    6. Determination of Aggregate-Bitumen Adhesion Value
    7. Determination of Specific gravity of Aggregate
    8. Determination of Aggregate Water absorption Value
2. **TESTS ON BITUMEN**
    9. Determination of Penetration value of Bitumen
    10. Determination of Softening Point of Bitumen
    11. Determination of Ductility Value of Bitumen
    12. Determination of Flash and fire points of Bitumen
    13. Determination of Viscosity of Bitumen
    14. Determination of Specific gravity of Bitumen
3. **TESTS ON BITUMINOUS MIXES**
    15. Determination of Binder Content by Centrifuge extractor
    16. Determination of Flow value of Bitumen by Marshall Stability Apparatus
4. **PAVEMENT EVALUATION**
    17. Determination of Deflection of pavement using Benkelman beam equipment



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18. Determination of Roughness value of pavement using Bump Integrator apparatus
19. Determination of Skid Resistance of the pavement

5. TRAFFIC SURVEY

20. Determination of Traffic Speed Characteristics
21. Determination of Traffic Volume Characteristics

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1. Khanna, S.K., Justo C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
2. Kadiyali L.R. and Lal N B, Principles and Practices of Highway Engineering; Seventh Edition, First Reprint; Khanna Publishers, New Delhi, 2018
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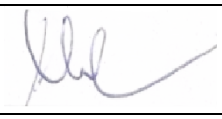
Code of Provisions:

Design Codes: IRC 37-2012, IRC 58-2015, IRC 81-1997



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U17CEI4203	SOIL MECHANICS	L	T	P	J	C
		3	0	2	0	4

Course Objectives

The objective of the course is to understand, soil as an engineering material, its index and engineering properties with and without the presence of static and flowing water.

Course Outcomes

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

CO1: identify and classify soils as per Bureau of Indian Standards (B IS)

CO2 :estimate effective stress and vertical stress below ground level

CO2: determine the permeability, calculate yield of an aquifer and seepage through soil

CO3: estimate soil stresses and prepare flow net diagram.

CO4: understand compaction and compressibility parameters and estimate the total, time rate settlement of soil.

CO5: analyze shear properties of cohesive and cohesionless soils.

Pre-requisites :Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M	S	M								
CO2	M	M	S	M								
CO3	M	M	S	M								
CO4	M	M	S	M								
CO5	M	M	S	M								

Course Assessment methods

1. Continuous Assessment Test I,II
2. Assignment, quiz
3. End semester Examination

CLASSIFICATION OF SOIL 8Hours

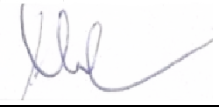
Historical development of soil Engineering- Origin and general types of soils- soil structure, clay minerals- Three phase systemand interrelationships- Identification and classification of soils(BIS classification).

EFFECTIVE STRESS AND VERTICAL STRESS DISTRIBUTION 10Hours

Soil water-capillary phenomena- concept of effective and neutral stresses- Vertical stress distribution in soil –Boussinesq and Westergaard's equation- Newmark'sinfluence chart – principle and application - equivalent point load and other approximate methods- pressure bulb.

PERMEABILITY AND WELL HYDRAULICS 9Hours

Permeability- determination of coefficient of permeability in the laboratory- Aquifer – types-estimation of yield of a well; Seepage flow- Head, gradient, pressure- steady state flow- two dimensional- flow net.



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COMPACTION, COMPRESSIBILITY AND CONSOLIDATION 10Hours

Compaction, Compressibility and consolidation- Terzaghi's one dimensional consolidation theory – pressure void ratio relationship- pre-consolidation pressure- Total settlement and time rate of settlement- coefficient of consolidation- curve fitting methods.

SHEAR STRENGTH 8 Hours

Shear strength- Mohr- Coulomb failure criterion- shear strength tests- Different drainage conditions- Shear properties of cohesive and cohesionlesssoils- Use of Mohr's circle- Principal stresses - Skempton's pore water pressure parameters.

PRACTICALS 30 Hours

LIST OF EXPERIMENTS

I. DETERMINATION OF INDEX PROPERTIES

1. Specific gravity of soil solids
2. Grain size distribution – Sieve analysis
3. Grain size distribution Hydrometer analysis
4. Liquid limit and plastic limit tests
5. Shrinkage limit and Differential free swell tests.

II. DETERMINATION OF INSITU DENSITY AND COMPACTION CHARACTERISTICS

6. Field density Test (Sand replacement method, Core cutter method)
7. Determination of moisture – density relationship using standard Proctor compaction test.

III. DETERMINATION OF ENGINEERING PROPERTIES OF SOIL

8. Permeability determination (constant head and falling head methods)
9. One dimensional consolidation test (Determination of co-efficient of consolidation only)
10. Direct shear test in cohesionless soil
11. Unconfined compression test in cohesive soil
12. Laboratory vane shear test in cohesive soil
13. Tri-axial compression test in cohesion-less soil (Demonstration).

Theory: 45 Tutorial: 0 Practical: 30 Project: 0 Total: 45Hours

REFERENCES

1. Arora K.R., Soil Mechanics and Foundation Engineering, Standard Publishers and Distributors, New Delhi., 2014.
2. Punmia B. C., Jain A. K., and Jain A. K. "Soil Mechanics and Foundations", Laxmi Publications, New Delhi.
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U17CET4004	MECHANICS OF MATERIALS	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1: understand the deformation and strains under different load action and response in terms of forces and moments

CO2: apply engineering principles to calculate the reactions, forces and moments

CO3: analyze the state of stress in three dimension and structural members using various theories of failure

CO4: analyse the long and short columns and determine the design loads.

CO5: analyse the unsymmetrical sections and curved beams

Course Objectives

- To calculate the deflection in beams and trusses
- To assess the state of stress in three dimensions
- To determine the design loads for short and long column

Pre-requisites : Solid Mechanics

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S		S	M					M		M
CO2	S	S	M		S	M			W	M		M
CO3	S	S	S	S	S	S			M	M		S
CO4	S	S	S	S	S					M		M
CO5	S	S	M	S	M				M	M		M

Course Assessment methods

1. Continuous Assessment Test I&II
2. Assignment/Group Presentation
3. End semester Examination

ENERGY PRINCIPLES — **9 Hours**

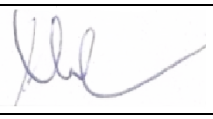
Strain energy and strain energy density-strain energy in traction, strain energy in shear, flexure - Castigliano's theorems -principle of virtual work - application of energy theorems for computing deflections in beams and trusses - Maxwell's Bettie's reciprocal theorems.

INDETERMINATE BEAMS — **9Hours**

Static indeterminacy - analysis of propped cantilever and fixed beams - Theorem of three moments - continuous beam.

GENERALIZED STATE OF STRESS AND STRAIN — **9 HOURS**

Generalized state of stress and strain: Stress and strain tensor, principal stresses and principal planes (3D) – Stress and Strain analysis using various theories of failures.



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COLUMNS	**9 Hours**
Stability of columns, Euler's formula, end conditions and effective length factor-eccentric and lateral load; Rankine – Gordon formula for eccentrically loaded columns.	
ADVANCED TOPICS IN BENDING OF BEAMS	**9 Hours**
Unsymmetrical bending of beams of symmetrical and unsymmetrical sections – shear flow - shear centre - channel section - curved beams – Winkler Bach formula - stress concentration - fatigue, fracture and creep	
Theory:45 Tutorial: 0 Practical: 0 Project: 0 Total: 45 Hours	

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1. Timoshenko, S. "Strength of Materials: Elementary theory and Problems", DVNC, New York, USA, 2004.
2. Kazmi, S. M. A., 'Solid Mechanics" Tata Mc- raw-Hill Publications Ltd, Delhi, 2009.
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U17CHT4000 **Environmental Science and Engineering**
(Common to All branches)

L	T	P	J	C
3	0	0	0	0

Course Outcomes

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

CO 1: Analyze the impact of engineering solutions in a global and societal context.
CO 2: Discuss contemporary issues that results in environmental degradation and would attempt to provide solutions to overcome those problems.
CO 3: Highlight the importance of ecosystem and biodiversity.
CO 4: Consider issues of environment and sustainable development in his/her personal and professional undertakings.
CO 5: Paraphrase the importance of conservation of resources.
CO 6: Play an important role in transferring a healthy environment for future generations.

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1		M					S		M			
CO 2						M				M		
CO 3							M					
CO 4						M	S					
CO 5							S					
CO 6			W				S					M

Course Assessment Methods

1. Continuous Assessment Test I&II
2. Assignment/Group Presentation
3. End semester Examination

INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES **14 Hours**

Definition, scope and importance – Need for public awareness – Forest resources: Use and over-exploitation, deforestation, case studies – Timber extraction, mining, dams and their effects on forests and tribal people.

Water resources: Use and overutilization of surface and ground water, conflicts over water, dams – benefits and problems – Water conservation, rain water harvesting, watershed management.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, case studies.

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Energy resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources, case studies.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification, Wasteland reclamation – Role of an individual in conservation of natural resources.

ECOSYSTEMS AND BIODIVERSITY **9 Hours**

ECOSYSTEM: Concept of an ecosystem – Structure and function of an ecosystem: Producers, consumers and decomposers, Food chain, Food web, Energy flow in the ecosystem and Ecological pyramids – Ecological succession – Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

BIODIVERSITY: Introduction to Biodiversity – Definition: genetic, species and ecosystem diversity – Bio geographical classification of India – Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic values – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

ENVIRONMENTAL POLLUTION **8 Hours**

Definition – Causes, effects and control measures of: (a) Air pollution – Organic and inorganic pollution – cyclone separator, electrostatic precipitator (b) Water pollution (c) Heavy metal pollution (d) Noise pollution (e) Thermal pollution (f) Nuclear hazards – Role of an individual in prevention of pollution – Pollution case studies – Solid waste and hazardous Management: Causes, effects and control measures from factories, small scale and large scale industries – Waste minimization – Disaster management: floods, earthquake, cyclone and landslides.

SOCIAL ISSUES AND THE ENVIRONMENT **7 Hours**

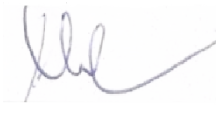
From Unsustainable to Sustainable development – Urban problems related to energy – Resettlement and rehabilitation of people; its problems and concerns, case studies – Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion – Environment Production Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Human Rights.

HUMAN POPULATION AND THE ENVIRONMENT **7 Hours**

Population growth and explosion – Welfare Program – Environment and human health – Communicable disease – Role of Information Technology in Environment and human health – Case studies.

Theory: 45 Hours		**Total: 45 Hours**

REFERENCES



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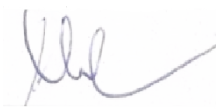

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U17INI4600 ENGINEERING CLINIC - II

L	T	P	J	C
0	0	4	2	3

Course objectives

- To help the students look into the functioning of simple to complex devices and systems
- To enable the students to design and build simple systems on their own
- To help experiment with innovative ideas in design and team work
- To create an engaging and challenging environment in the engineering lab

Course Outcomes

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

CO1: Identify a practical problems and find a solution
CO2: Understand the project management techniques
CO3: Demonstrate their technical report writing and presentation skills

Pre-requisite:U17INI3600

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO	PSO2
CO1	S	S	S	S	S	M	W		S			S		M
CO2											S			
CO3										S				M

Course Assessment methods:

1. Project reviews 50%
2. Workbook report 10%
3. Demonstration & Viva-voce 40%

Content:

The course will offer the students with an opportunity to gain a basic understanding of computer controlled electronic devices and apply the concepts to design and build simple to complex devices. As a practical project based embedded course, the students will be taught the concepts using a variety of reference material available in the public domain. While the course will start with formal instruction on hardware, programming and applications, the major portion of the course will provide the students with ample opportunity to be innovative in designing and building a range of products from toys to robots and flying machines.

In the fourth semester, students will focus primarily on Raspberry pi based controllers with Python programming.

GUIDELINES:

1. Practical based learning carrying credits.
2. Multi-disciplinary/ Multi-focus group of 5-6 students.
3. Groups can select to work on a specific tasks, or projects related to real world problems.
4. Each group has a faculty coordinator/Instructor who will guide/evaluate the overall group as well as individual students.
5. The students have to display their model in the 'Engineering Clinics Expo' at the end of semester.
6. The progress of the course is evaluated based on reviews and final demonstration of Prototype.

Total Hours: 90

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SEMESTER V

U17CEI5201 ENVIRONMENTAL ENGINEERING

L	T	P	J	C
3	0	2	0	4

Course Objectives

- To perform water characterization and to study the various water demand
- To learn the various unit process and operation of water and wastewater
- To understand the water distribution networks and plumbing system
- To estimate the sewage weather flow conditions and hydraulics of sewers

Course Outcome

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

CO1: Plan and estimate public water supply system
CO2: Design the various components of water treatment plants
CO3: Design water distribution networks and service supply to buildings
CO4: Estimate and design of sewage flow and plumbing system
CO5: Design of septic tanks and the various components of sewage treatment plants

Pre-requisites: NIL

COs	Programme Outcomes(POs)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S	S											M	
CO2	S	S											M	
CO3	S	S											M	
CO4	S	S											M	
CO5	S	S											M	

Course Assessment methods:

1. Continuous Assessment Test I,II
2. Assignment, Group Discussion
3. End semester Examination

PLANNING FOR WATER SUPPLY SYSTEM **10 Hours**

Public water supply system – Planning - Objectives – Estimation of population forecasting and water demand – Sources of water and their characteristics – Surface and ground water- Water supply intake structures – types of pumps and its location- pipes and conduits for water. Pipe materials – transmission main lines – laying, jointing and testing of pipes

WATER TREATMENT **9 Hours**

Objectives of unit operations and processes – Principles, functions and design of plain sedimentation tanks, sedimentation cum coagulation tanks and sand filters – disinfection – Operation and maintenance of water treatment plants. Principles and functions of aeration – Iron and manganese removal, Defluoridation and demineralization – water softening - desalination – Reverse Osmosis.

WATER DISTRIBUTION AND SUPPLY TO BUILDINGS **7 Hours**

Service reservoirs –Network design – Analysis of distribution networks- Operation and maintenance – leak detection, methods. Principles of water supply in buildings – House service connection– Systems of plumbing and types of plumbing

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SEWER DESIGN **9 Hours**

Sources of wastewater generation – Estimation of DWF & WWF –Hydraulics of flow in sewers – Design of sanitary and storm sewers –sewers appurtenances – Sewage plumbing system for buildings - Effluent standards - Reclamation and Reuse of sewage

TREATMENT OF SEWAGE **10 Hours**

Objectives of unit operations – physico chemical treatments – Design of Screens, Grit chambers - Primary Sedimentation tanks. Types of secondary Treatment - Design of Activated sludge process and Trickling filter – Design of Septic tank with effluent disposal arrangements. Basic concepts on Advanced sewage treatment methods: SBR, UASBR and Hybrid Reactors – Theory on Sludge digestion and disposal.

PRACTICALS	**30 Hours**

LIST OF EXPERIMENTS (for Water & Wastewater):

1. Introduction to Standards, Collection, Preservation of samples and Sampling Techniques – A Study Experiment
2. Determination of pH
3. Determination of Conductivity
4. Determination of Turbidity
5. Determination of Acidity & Alkalinity
6. Determination of Hardness
7. Determination of Residual Chlorine and Available Chlorine
8. Determination of Sulphates
9. Determination of Chlorides
10. Determination of Optimum Coagulant Dosage
11. Determination of Solids
12. Determination of Oil and Grease
13. Determination of Dissolved Oxygen
14. Determination of Biochemical Oxygen Demand (BOD)
15. Determination of Chemical Oxygen Demand (COD)
16. Determination of Iron
17. Determination of Fluoride

Theory: 45	**Tutorial: 0**	**Practical: 30**	**Project: 0**	**Total: 75 Hours**

REFERENCES

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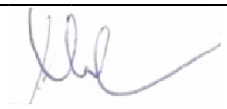

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U17CEI5202 **REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEMS**

L	T	P	J	C
2	0	2	0	3

Course Objectives

At the end of this course the student should have knowledge on concepts and applications leading to modelling of earth resources management using remote sensing and acquire skills in storing, managing digital data for planning and development skills in advance techniques for mapping, modelling and monitoring.

Course Outcomes

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

CO1: Analyze the principles and components of photogrammetry and remote sensing.
CO2: process of data acquisition of satellite images and their characteristics.
CO3: Analyze an image visually and digitally with digital image processing techniques.
CO4: Explain the concepts and fundamentals of GIS.
CO5: Apply the knowledge of remote sensing and GIS in different civil engineering filed.

Pre-requisites : Surveying and Geomatics

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S		M										M	
CO2	S		M										M	
CO3	S		M										M	
CO4	S		M		M								M	
CO5	S		M		M									S

Course Assessment methods

1. Continuous Assessment Test I,II
2. Assignment, Group Discussion
3. End semester Examination

INTRODUCTION TO REMOTE SENSING **6 Hours**

Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory, Stefan- Boltzman and Wein's Displacement Law – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts –typical spectral reflective characteristics of water, vegetation and soil

PLATFORMS AND SENSORS **6 Hours**

Types of platforms – orbit types, Sun- synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and space borne TIR and microwave sensors

IMAGE INTERPRETATION AND ANALYSIS **6 Hours**

Types of Data Products – types of image interpretation- basic elements of image interpretation- visual interpretation keys – Digital image processing – Pre-processing –

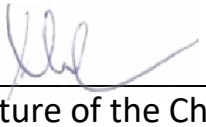

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image enhancement techniques – multispectral image classification – supervised and unsupervised.

GEOGRAPHIC INFORMATION SYSTEM **6 Hours**

Introduction – Maps- Definitions – Map projections – types of map projections – map analysis – GIS definition – basic components of GIS – standard GIS software – data type – Spatial and non-spatial (attribute) data – measurement scales- Data base Management Systems (DBMS).

DATA ANALYSIS **6 Hours**

Data models – vector and raster data – data compression – data input by digitization and scanning – attribute data analysis – integrated data analysis – Application of GIS in highway-alignment studies, Environmental and water resources – land Information system.

PRACTICALS

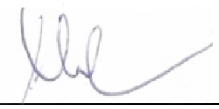
LIST OF EXPERIMENTS **30 Hours**

1. Projection, Re-projection and Coordinate Transformation of Maps
2. Data Input – Onscreen Digitisation – Creation of Point, Line and Polygon layers
3. Attribute data input and Measurement of Distance, Area
4. Linking External Database and Tabular Data Analysis using SQL commands
5. Generating Graphs, Charts and Diagrams from Tabular data
6. Data Conversion – Vector to Raster and Raster to Vector
7. Map Joining, Edge Matching and Layout Design

Theory: 30	Tutorial: 0	Practical: 30	Project: 0	Total: 60 Hours

REFERENCES :

1. Ian Heywood "An Introduction to GIS", Pearson Education, Asia, 4th Edition 2012.
2. Lo.C.P and A.K.W.Yeung, "Concepts and Techniques of Geographic Information Systems", Prentice Hall of India Pvt. Ltd., New Delhi, 2nd Edition 2010.
3. Burrough P.A. and Rachel A. McDonell, "Principles of Geographical Information Systems", Oxford Publication, 3rd Edition 2016.
4. Thomas. M.Lillesand and Ralph. W. Kiefer, "Remote Sensing and Image Interpretation", John Wiley and Sons, 7th Edition 2015.
5. Basudeb Bhatta "Remote sensing and GIS" Oxford Publication, 2nd Edition 2011.



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U17CET5003 **IRRIGATION AND WATER RESOURCES MANAGEMENT**

L	T	P	J	C
3	0	0	0	3

Course Objectives

- To learn about the water resources and water budget
- To learn various types of irrigation methods adopted
- To gain knowledge on various components of dam structures

Course Outcome

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

CO1: Plan the water resource requirement.
CO2: Perform water resources and prepare water budget.
CO3: Estimate the irrigation efficiencies of crop requirement & design of canal lining.
CO4: Understand the various components of hydraulic structures.
CO5: Prepare irrigation scheduling and water distribution for various crops.

Pre-requisites:

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		M		S							S		M	
CO2		M		S							S		M	
CO3		M		S							M		M	
CO4		M	S	S							M		M	
CO5		M		S							S			

Course Assessment methods:

1. Continuous Assessment Test I,II
2. Assignment, Group Discussion
3. End semester Examination

WATER RESOURCES **9 Hours**

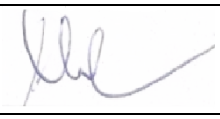
Water resources of India and Tamilnadu - Description of water resources planning – Estimation of water requirements for irrigation and drinking- Types of Reservoirs & Operation - Strategies for reservoir operation – Design flood – levees and flood walls.

WATER RESOURCE MANAGEMENT **9 Hours**

National water policy- Concept of basin as a unit for development - scope and aims of master plan - Economics of water resources planning – Conjunctive use of surface and ground water - Consumptive and non-consumptive water — Water budget – Cost – benefit analysis

IRRIGATION ENGINEERING & IMPOUNDING STRUCTURES **11 Hours**

Need – Merits and Demerits- Duty, Delta and Base period – Irrigation efficiencies – Crops and seasons- Crop water Requirement –Types of Impounding structures: Gravity dam – Diversion



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Head works- Canal drop – Cross drainage works – Canal outlets – Canal lining – Kennady's and Lacey's Regime theory.

IRRIGATION METHODS **8 Hours**

Lift irrigation – Tank irrigation - Well irrigation – irrigation methods: Surface and Sub-surface - Micro irrigation – Merits and demerits- Design of pipeline distribution – Preparation of DPR for the project

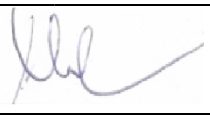
IRRIGATION MANAGEMENT **8 Hours**

Irrigation scheduling and distribution – Water User Association - Participatory irrigation management- on farm development - Irrigation Management Practices.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. Linsley R.K. and Franzini J.B, " Water Resources Engineering", McGraw-Hill Inc, 4th Edition 2013.
2. Punmia B.C, Pande Brij Basi Lal, Jain A.K "Irrigation and water power Engineering", Laxmi Publications, New Delhi 16th Edition, 2018.
3. Garg S.K., "Irrigation Engineering and Hydraulic structures", Khanna Publishers, New Delhi, 23rd Revised Edition, 2017.
4. Duggal, K.N. and Soni, J.P., "Elements of Water Resources Engineering", New Age International Publishers, 3rd Edition, 2008.
5. Chaturvedi M.C., "Water Resources Systems Planning and Management", Tata McGraw-Hill Inc., New Delhi, 1998.
6. Michael A.M., "Irrigation Theory and Practice", Vikas Publishing House Pvt. Ltd., Noida, 2nd Edition, 2008.



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U17CET5104 STRUCTURAL ANALYSIS

L	T	P	J	C
3	1	0	0	4

Course Objectives

- To understand the concept of indeterminacy, analyze beams and frames using matrix methods and moment distribution method
- To learn the concepts of moving loads and its effect on structures
- To learn the concept and analysis of cable stayed bridges
- To analyze the behavior of parabolic arches

Course Outcome

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

CO1: Calculate static and kinematic indeterminacy of structures
CO2: Analyse beams and frames using moment distribution method
CO3: Analyse beams and frames using matrix flexibility method
CO4: Analyse beams and frames using matrix stiffness method
CO5: Use the influence line diagram for analysis of determinate and indeterminate beams
CO6: Analyse arches and cable suspension bridges

Pre-requisites: -

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S	S											M	
CO2	S	S											M	
CO3	S	S											M	
CO4	S	S											M	
CO5	S	S											M	
CO6	S	S											M	

Course Assessment methods:

1. Continuous Assessment Test I,II
2. Assignment, Group Discussion.
3. End semester Examination.

BASIC CONCEPTS **5 Hours**

Introduction –Static Indeterminacy and Kinematic Indeterminacy – Determinate vs Indeterminate Structures - Equilibrium and Compatibility conditions.

MOMENT DISTRIBUTION METHOD **8 Hours**

Distribution and carryover of moments – Stiffness and carry over factors - Analysis of continuous beams - sinking of supports - Single storey portal frames with and without sway.

MATRIX FLEXIBILITY METHOD **8 Hours**

Analysis of indeterminate pin-jointed plane frames, continuous beams, rigid jointed plane frames (with redundancy restricted to two).

MATRIX STIFFNESS METHOD **8 Hours**

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Element and global stiffness matrices – Analysis of continuous beams – Co-ordinate transformations – Rotation matrix – Transformations of stiffness matrices, load vectors and displacement vectors – Analysis of pin-jointed plane frames, continuous beams and rigid frames (with redundancy limited to two)

MOVING LOADS AND INFLUENCE LINES **8 Hours**

Introduction – Moving loads for statically determinate structures - Construction of Influence lines for reaction, SF and BM for rolling loads for simply supported and overhanging beams - Computation of load positions for maximum bending moment and maximum shear force - absolute maximum bending moment. Muller-Breslau's principle, Construction of ILD for continuous beams.

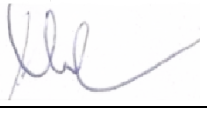
ARCHES AND CABLES **8 Hours**

Arches as structural forms – Types of arches – Analysis of three hinged and two hinged parabolic arches- Settlement and temperature effects. Analysis of suspension cables - cables with two hinged stiffening girders, cables with three hinged stiffening girders.

Theory: 45	**Tutorial: 15**	**Total: 60 Hours**

REFERENCES

1. Punmia B.C, Ashok Kumar Jain and Arun Kumar Jain, "Theory of structures", Laxmi Publications Pvt. Ltd., New Delhi, 13th Edition 2017.
2. Reddy.C.S., "Basic Structural Analysis", Tata McGraw Hill Education Pvt.Ltd., New Delhi, 3rd Edition 2013.
3. Vaidyanadhan R and Perumal, P, "Comprehensive Structural Analysis-Vol.1 &Vol.2", Laxmi Publications Pvt.Ltd, New Delhi,4th Edition 2018.
4. Bhavikatti.S.S, "Structural Analysis-Vol.1 & Vol.2", Vikas Publishing Pvt Ltd., New Delhi. 4th Edition 2014.
5. Chandramouli P.N., "Structural Analysis I", Yesdee Publishing Pvt Ltd., Chennai, 1st Edition 2015.
6. R.C. Hibbeler, Structural Analysis, 5th Edition, Pearson Education, 6th Edition, 2010.
7. Devadas Menon, "Structural Analysis", Narosa Publishing House, 2nd Edition 2014.
8. Wang C.K. , "Indeterminate Structural Analysis", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 3rd Edition 2014.



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U17CET5005 **Foundation Engineering**

L	T	P	J	C
3	0	0	0	3

Course Objectives

The objective of the course is :

- To learn the different techniques of site investigation, prepare soil report and to select a suitable foundation based on the type of soil.
- To study various bearing capacity theories and to calculate bearing capacity for different types of soils.
- To analyse different types of shallow footings based on intensity of load and arrive at a suitable dimension.
- To understand various types of piles and their behavior in single and in a group.
- To understand the theory of earth pressure and its types to carry out stability analysis.

Course Outcomes

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

CO1: Perform soil investigation work, prepare the soil report and select a suitable type of foundation for the given soil condition,

CO2: Estimate bearing capacity of soil using various theories and by in-situ testing methods.

CO3: Design the overall dimensions of different types of foundations,

CO4: Assess the behaviour of single pile and group of piles in different types of soils.

CO5: Estimate the earth pressure behind retaining walls and to carry out stability analysis of retaining walls.

Pre-requisites : U17CEI4203-Soil Mechanics

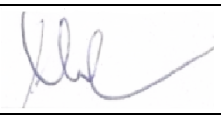
		CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
COs			Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	M	M		S									S	M
CO2		S											S	M
CO3			S										S	M
CO4			S	M									S	M
CO5		M		S									S	M

Course Assessment methods

1. Continuous Assessment Test I,II
2. Assignment, quiz
3. End semester Examination

SITE INVESTIGATION AND SELECTION OF FOUNDATION 8 Hours

Scope and objectives – Methods of exploration – auguring and boring – wash boring and rotary drilling – Depth of boring- spacing of bore hole – sampling techniques – representative and undisturbed sampling- methods- different types of samplers– Bore log report –data interpretation- strength parameters and liquefaction potential – Selection of foundation based on soil condition.



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BEARING CAPACITY AND SETTLEMENT **10 Hours**

Introduction- Location and depth of foundation – Codal provisions – bearing capacity of shallow foundation on homogeneous deposits – Terzaghi's formula and BIS formula – factors affecting bearing capacity – problems – Bearing capacity from in-situ tests (plate load, SPT and SCPT) Allowable bearing pressure – Seismic considerations in bearing capacity evaluation. Determination of settlement of foundations on granular and clay deposits – Total and differential settlement.

SHALLOW FOUNDATION **7 Hours**

Types of footings – Contact pressure distribution, isolated footing – combined footings – proportioning – Mat foundation – Types and applications- Floating foundation – Seismic force consideration – Codal provision (No structural design).

PILE FOUNDATION **10 Hours**

Types of piles and their function – Factors influencing the selection of pile – Load carrying capacity of single pile in granular and cohesive soil – static formula - dynamic formula – Capacity from insitu tests – negative skin friction – uplift capacity – Group capacity by different methods (Feld's rule, Converse-Labarre formula and block failure criterion) – Settlement of pile groups – interpretation of pile load test – Under reamed piles.

RETAINING WALLS **10 Hours**

Plastic equilibrium in soils – active and passive states- Rankine's theory – cohesionless and cohesive soil – Condition for critical failure plane – Earth pressure on retaining walls of simple configurations – Culmann's Graphical method – pressure on the wall due to line load – Stability analysis of retaining walls - Use of geosynthetics in retaining wall.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45Hours**

REFERENCES

1. Arora K.R. "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, new Delhi, 7th Edition 2014.
2. Punmia, B. C., Jain, A. K., and Jain, A. K. "Soil Mechanics and Foundations", Laxmi Publications, New Delhi, 17th Edition: 2017
3. Gopal Ranjan and Rao A.S.R. "Basic and Applied soil mechanics", Wiley eastern ltd, New Delhi, 2nd Edition 2014.
4. Murthy, V.N.S., "Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd., New Delhi. 5th Edition 2011.
5. Das, B.M, "Principles of Geotechnical Engineering", Thompson Brooks/ Coles Learning, Singapore, 5th Edition, 2002.

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U17INI5600 ENGINEERING CLINIC - III

L	T	P	J	C
0	0	4	2	3

Course objectives

- To help the students look into the functioning of simple to complex devices and systems
- To enable the students to design and build simple systems on their own
- To help experiment with innovative ideas in design and team work
- To create an engaging and challenging environment in the engineering lab

Course Outcomes

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

CO1: Identify a practical problems and find a solution
CO2: Understand the project management techniques
CO3: Demonstrate their technical report writing and presentation skills

Pre-requisite:U17INI5600

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO	PSO2
CO1	S	S	S	S	S	M	W		S			S		M
CO2											S			
CO3										S				M

Course Assessment methods:

1. Project reviews 50%
2. Workbook report 10%
3. Demonstration & Viva-voce 40%

Content:

The course will offer the students with an opportunity to gain a basic understanding of computer controlled electronic devices and apply the concepts to design and build simple to complex devices. As a practical project based embedded course, the students will be taught the concepts using a variety of reference material available in the public domain. While the course will start with formal instruction on hardware, programming and applications, the major portion of the course will provide the students with ample opportunity to be innovative in designing and building a range of products from toys to robots and flying machines.

In the fifth semester, students will focus primarily on Design project combining concepts learnt in Engineering clinics I and II

GUIDELINES:

1. Practical based learning carrying credits.
2. Multi-disciplinary/ Multi-focus group of 5-6 students.
3. Groups can select to work on a specific tasks, or projects related to real world problems.
4. Each group has a faculty coordinator/Instructor who will guide/evaluate the overall group as well as individual students.
5. The students have to display their model in the 'Engineering Clinics Expo' at the end of semester.
6. The progress of the course is evaluated based on reviews and final demonstration of Prototype.

Total Hours: 90

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U17CER5606 **SURVEY CAMP**

L	T	P	J	C
0	0	0	0	1

Course Outcomes

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

CO1: perform survey as per the field condition

CO2: conduct LS and CS by using advanced equipment

CO3: prepare contour map for the given area

CO4: measure inaccessible distance and height using total station

Course Objectives

- Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveying activities
- Translate the knowledge gained for the implementation of Civil infrastructure facilities

Pre-requisites : Nil

COs	Programme Outcomes(POs)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1				S	S					M			S	
CO2				S	S					M			S	
CO3				S	S					M			S	
CO4				S	S					M			S	

Course Assessment methods

Course Type	End semester components		
	Average of Pre/post-test/ Viva for each experiments	Average of marks for experiment report for each Exp.	Practical exam Viva -voce
Lab	20	30	50

One week survey camp carried out over a large area for area measurements, leveling and angular measurements. At the end of the camp, each student will independently complete the office work for the survey works done in the field. The camp record shall include all original field observations, calculation and plots.

a. Conventional surveying for civil Engineering project works
b. Triangulation.
c. Contour Surveying, L.S/C.S for road works.
d. Trilateration
e. Total station surveying to plot a boundary

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U17VEP5505 **SOCIAL VALUES**

L	T	P	J	C
0	0	2	0	0

Course Outcomes

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

CO 1: Understand the transformation from self to society

CO 2: Acquire knowledge about disparity among Human Beings

CO 3: Realize the new ethics in creating a more sustainable Society

CO 4: Develop skills to manage challenges in social issues

CO 5: Acquire the skills for Management of Social work & Holistic Society

CO 6: Validate the social liabilities at dissimilar situations

Pre-requisites :

1. U17VEP1501 / PERSONAL VALUES
2. U17VEP2502 / INTERPERSONAL VALUES
3. U17VEP3503 / FAMILY VALUES
4. U17VEP4504 / PROFESSIONAL VALUES

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						S						
CO2							S					
CO3								M				
CO4											S	
CO5												S
CO6									M			

Course Assessment methods

Direct
1.Group Activity / Individual performance and assignment 2.Assessment on Value work sheet / Test
Indirect
1. Mini project on values / Goodwill Recognition

Values through Practical activities: **30 hours**

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1. Self and Society: Relation between self and society – Different forms of society - Elements of Social structures – Realization of Duties and Responsibilities of Individual in the Society

2. Social Values: Tolerance – Responsibility – Sacrifice – Sympathy - Service – peace-nonviolence - right conduct- Unity – forgive – dedication – Honest

3. Social issues : Disparity among Human beings- Poverty-Sanitation -corruption- un employment-superstition – religious intolerance & castes – terrorism.

4. Emerging Ethics for Sustainable Society: Unison of Men in Society - Positive Social Ethics - Cause and Effect - Ensuring an Equitable Society- Effect of Social Media in society - development of Education and Science in the Society

5. Social Welfare: Social welfare Organization - Programme by Government and NGO's - Benefits of Social Service - Balancing the Family and Social Life – Development of Holistic Society

Theory: 0	Tutorial: 0	Practical: 30	Project: 0	Total: 30 hours

REFERENCES

1. SOCIAL PROBLEMS IN INDIA - ForumIAS.com – PDF
   discuss.forumias.com/uploads/File upload/.../711b18f321d406be9c79980b179932.pd...

2. INVESTING IN CULTURAL DIVERSITY AND INTERCULTURAL DIALOGUE: UNESCO ...
   www.un.org/en/events/culturaldiversityday/pdf/Investing_in_cultural_diversity.pdf

3. INDIAN SOCIETY AND SOCIAL CHANGE - University of Calicut
   www.universityofcalicut.info/SDE/BA_sociology_indian_society.pdf

4. CULTURE, SOCIETY AND THE MEDIA - E- class
   www.eclass.uoa.gr/.../MEDIA164/.../%5BTony_Bennett,_James_Curran,_Michael_G

5. SOCIAL WELFARE ADMINISTRATION - IGNOU
   www.ignou.ac.in/upload/Bswe-003%20Block-2-UNIT-6-small%20size.pdf

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SEMESTER VI

U17MBT6000

TOTAL QUALITY MANAGEMENT

L	T	P	J	C
3	0	0	0	3

Course Objectives

- The objective of this course is to know the basics of quality management.
- To understand the TQM tools and principles.
- To understand the management statistical techniques.
- To understand the quality system documentation and auditing.

Course Outcome

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

CO1: Apply & analyze quality concepts and philosophies of TQM.

CO2: Apply concepts of continuous improvement.

CO3: Apply TQM concepts to enhance customer satisfaction and deal with customer related aspects.

CO4: Apply and analyze the quality tools, management tools and statistical fundamentals to improve quality.

CO5: Understand quality systems, procedures for its implementation, documentation and auditing.

Pre-requisites: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		M		M							M			M
CO2		M		M							M			M
CO3		M		M							M			M
CO4					S						M			M
CO5					W						M			M

Course Assessment methods:

1. Continuous Assessment Test I,II
2. Assignment, Group Discussion
3. End semester Examination

INTRODUCTION 9 Hours

Definition of Quality, Dimensions of Quality, Quality costs, Top Management Commitment, Quality Council, Quality Statements, Barriers to TQM Implementation, Contributions of Deming, Juran and Crosby, Team Balancing

TQM PRINCIPLES 9 Hours

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Continuous Process Improvement,5S, Kaizen, Just-In-Time and TPS

STATISTICAL PROCESS CONTROL 9 Hours

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The seven tools of quality, New seven Management tools, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Concept of six sigma.

TQM TOOLS **9 Hours**

Quality Policy Deployment (QPD), Quality Function Deployment (QFD), Benchmarking, Taguchi Quality Loss Function, Total Productive Maintenance (TPM), FMEA

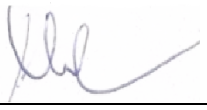
QUALITY SYSTEMS **9 Hours**

Need for ISO 9000 and Other Quality Systems, ISO 9001:2008 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, ISO 14001:2004.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. Dale H.Besterfiled, "Total Quality Management", Pearson Education, 2016 .
2. James R.Evans& William M.Lidsay, "The Management and Control of Quality", South-Western (Thomson Learning), 2008.
3. Feigenbaum.A.V. "Total Quality Management", McGraw Hill, 2013.
4. Oakland.J.S. "Total Quality Management", Butterworth – Hcinemann Ltd., Oxford, 2011.
5. Narayana V. and Sreenivasan, N.S. "Quality Management – Concepts and Tasks", New Age International 2007.
6. Zeiri. "Total Quality Management for Engineers", Wood Head Publishers.2009
7. Bhaskar S. "Total Quality Management", Anuradha Agencies, Chennai. (2007-revised edition).



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U17CEI6201 **DESIGN OF MASONRY AND REINFORCED CONCRETE ELEMENTS**

L	T	P	J	C
3	0	2	0	4

Course Outcomes

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

CO1: design masonry walls subjected to axial and eccentric loads.
CO2: design rectangular and flanged reinforced concrete beams under flexure.
CO3: design reinforced concrete staircase.
CO4: design rectangular and flanged reinforced concrete beams shear and torsion.
CO5: design reinforced concrete short and slender columns.
CO6: design isolated and combined footing for columns.

Pre-requisites : Solid mechanics

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	M		S	S									M	
CO2	M		S	S									M	
CO3	M		S	S									M	
CO4	M		S	S									M	
CO5	M		S	S									M	
CO6	M		S	S									M	

Course Assessment methods:

1. Continuous Assessment Test I,II
2. Assignment, Group Discussion
3. End semester Examination

MASONRY **8 Hours**

Introduction, Classification of walls, Lateral supports and stability, effective height of wall an columns, effective length of walls, design loads, load dispersion, permissible stresses, design c axially and eccentrically loaded brick walls.

METHODS OF DESIGN OF CONCRETE STRUCTURES **5 Hours**

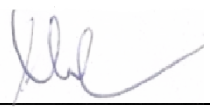
Methods of design - advantages of Limit State Method over other methods- Design codes and specification

DESIGN FOR FLEXURE **8 Hours**

Analysis and design of singly and doubly reinforced rectangular and flanged beams- Analysis and design of one way, two way and continuous slabs subjected to uniformly distributed load for various boundary conditions.-design of staircase

DESIGN FOR BOND, ANCHORAGE, SHEAR & TORSION **9 Hours**

Behaviour of RC members in bond and Anchorage- Design requirements as per IS code- Behaviour of RC beams in shear and torsion- Design of RC members for combined bending,



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shear and torsion.

DESIGN OF COLUMNS **9 Hours**

Types of columns- Braced and unbraced columns – Design of short Rectangular and circular columns for axial, uniaxial and biaxial bending – Design of slender compression members

DESIGN OF FOOTING **6 Hours**

Design of wall footing – Design of axially and eccentrically loaded rectangular isolated footing– Strap footing -Design of combined footing- rectangular and trapezoidal

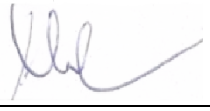
LIST OF EXPERIMENTS	**30 HOURS**

1. Introduction about design software.
2. Analysis and Design of Simply supported beams ,Fixed beams, Continuity beams.
3. Analysis and Design of Columns for various supporting conditions.
4. Analysis and Design of RCC framed multi-storied building.

Theory:45	**Tutorial:0**	**Practical:30**	**Total: 75Hours**

REFERENCES

1. Gambhir.M.L., Fundamentals of Reinforced Concrete Design", Prentice Hall of India Private limited, New Delhi, 4th Reprint 2011.
2. Varghese, P.., "Limit state Design of Reinforced Concrete", Prentice Hall of India, Pvt. Ltd., New Delhi, 2nd Edition 2013.
3. Subramanian, N. Design of Reinforced Concrete Structures", Oxford University Press, New Delhi, 1st Edition 2013.
4. Punmia, B.C., Ashok Kumar jain, Arun Kumar jain, "Limit state Design of Reinforced concrete, Laxmi Publications Pvt. Ltd., New Delhi, 1st Edition 2007.
5. Sinha, S.N., " Reinforced Concrete Design", Tata McGraw Hill Publishing Company Ltd., New Delhi, 3rd Edition 2004.
6. I.C.Syal and A.K.Goel, "Reinforced Concrete Structures", S.Chand and Company Ltd, New Delhi, 4th Edition 2007.



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U17CEI6202 **CONSTRUCTION PROJECT MANAGEMENT**

L	T	P	J	C
3	0	2	0	4

Course Objectives

- The objective of this course is to know the basics of construction management.
- To understand the concepts of construction planning and scheduling.
- To understand the concepts of machinery and equipment management.
- To understand the various steps involved in tender and contract process.

Course Outcome

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

CO1: carry out resource planning, pre-contract planning and prepare cost estimates and time scheduling for projects.

CO2: smoothen and level the resource demand during project execution.

CO3: handle resource management and perform time cost optimization.

CO4: manage equipment and machinery requirements.

CO5: prepare tender and contract documents.

Pre-requisites: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1					S					S	S			S
CO2										S	S			M
CO3										S	S			S
CO4										S	S			S
CO5										S	S		M	

Course Assessment methods:

1. Continuous Assessment Test I,II
2. Assignment, Group Discussion
3. End semester Examination

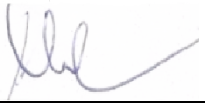
PROJECT PLANNING AND SCHEDULING **9 Hours**

Concept and functions of management – need for management in construction projects. Bar chart planning – CPM Network construction : Activities and events, logic and interdependence in network, time computations, critical period and path, floats – PERT Network : time estimates, Beta distribution, expected time, standard deviation, probability of achieving desired time targets for projects.

RESOURCE ALLOCATION **9 Hours**

Resource aggregation diagrams as per early start and late start - smoothing by activity start time manipulation - Levelling of resources according to constraints - priorities of activities - sort rules - Minimum project duration subject to resource constraint

TIME COST OPTIMIZATION **9 Hours**



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Direct and Indirect costs and their relation to time – Activity crashing – Normal and Crash duration and corresponding cost of activities – Cost slope – Crashing of network to optimize cost and duration of a project – Operations Research Technique to optimize assignment of tasks to groups of workmen, transport of materials quarries to sites.

MACHINERY AND EQUIPMENT MANAGEMENT **9 Hours**

Classes of construction equipment according to functions and work cycle – Plant organization: ownership, leasing and hiring of equipment, their rationale and relative merits – performance factors of earth moving equipment: machine related, environmental related and material related– work cycle and time cycle – Earth work calculation by mass hand diagram.

TENDER AND CONTRACT **9 Hours**

Tenders: Types, tender notice, tender documents, submission, opening, scrutiny and award – Contract agreement : types of contracts, their relative merits and suitability – Principal clauses and conditions in contract agreement – Payment for works : measurements, bills, deductions. Introduction to construction management software packages – principles of dispute resolution.

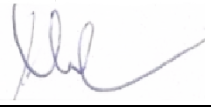
PRACTICALS	**30 Hours**

Introduction to project management softwares – Primavera P6 Professional - Navigation in PPM module – EPS & OBS – Calendar usage in projects – Project creation – WBS – Creation of activities in projects – Sequencing – Scheduling – Assigning resource units and costs – Codes – Baseline – Progress update – Earned value management - Reports

Theory: 45	**Tutorial: 0**	**Practical: 30**	**Project: 0**	**Total: 75 Hours**

REFERENCES

1. Kumar Neeraj Jha, "Construction Project Management,: Theory and Practices" Pearson Education India, 2nd Edition ,2015.
2. Srinath L S, "PERT/CPM Principles and Applications", Affiliated East West Press (P) ltd, 3rd Edition 2002.
3. Chitkara, K.K. "Construction Project Management Planning, Scheduling and Control", Tata McGraw-Hill Publishing Co., New Delhi, 3rd Edition 2014.
4. Punmia B C and Khandelwal K K, "Project Planning and Control with PERT and CPM", Laxmi Publications, 4th Edition 2016.
5. Chris Hendrickson and Tung Au, "Project Management for Construction – Fundamentals Concepts for Owners, Engineers, Architects and Builders", Prentice Hall, Pitsburgh, 3rd Reprint 2012.



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U17INI6600 ENGINEERING CLINIC - IV

L	T	P	J	C
0	0	4	2	3

Course objectives

- To help the students look into the functioning of simple to complex devices and systems
- To enable the students to design and build simple systems on their own
- To help experiment with innovative ideas in design and team work
- To create an engaging and challenging environment in the engineering lab

Course Outcomes

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

CO1: Identify a practical problems and find a solution
CO2: Understand the project management techniques
CO3: Demonstrate their technical report writing and presentation skills

Pre-requisite:U17INI5600

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO	PSO2
CO1	S	S	S	S	S	M	W		S			S		M
CO2											S			
CO3										S				M

Course Assessment methods:

1. Project reviews 50%
2. Workbook report 10%
3. Demonstration & Viva-voce 40%

Content:

The course will offer the students with an opportunity to gain a basic understanding of computer controlled electronic devices and apply the concepts to design and build simple to complex devices. As a practical project based embedded course, the students will be taught the concepts using a variety of reference material available in the public domain. While the course will start with formal instruction on hardware, programming and applications, the major portion of the course will provide the students with ample opportunity to be innovative in designing and building a range of products from toys to robots and flying machines.

In the sixth semester, students will focus primarily on Reverse engineering project to improve performance of a product.

GUIDELINES:

1. Practical based learning carrying credits.
2. Multi-disciplinary/ Multi-focus group of 5-6 students.
3. Groups can select to work on a specific tasks, or projects related to real world problems.
4. Each group has a faculty coordinator/Instructor who will guide/evaluate the overall group as well as individual students.
5. The students have to display their model in the 'Engineering Clinics Expo' at the end of semester.
6. The progress of the course is evaluated based on reviews and final demonstration of Prototype.

Total Hours: 90

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U17CER6703 # INPLANT TRAINING

L	T	P	J	C
0	0	0	0	1

Course Outcomes

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

CO1 handle and execute the civil engineering projects in the field.

CO2 calculate the spirit of team work

CO3 plan for material and manpower resources management.

CO4 prepare project report.

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1										S		M		S
CO 2									S		S	M		S
CO 3											S	M	S	
CO 4										S		M	S	

Course Assessment Methods

1. Project report
2. Oral presentation

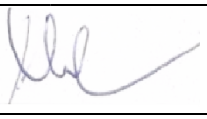
Course objectives:

Students have to undergo two-week practical training in Civil Engineering related organizations so that they become aware of the practical applications of theoretical concepts studied in the class rooms.

Students have to undergo two-week practical training in Civil Engineering related organizations of their choice but with the approval of the department. At the end of the training student will submit a report as per the prescribed format to the department.

Assessment Process:

This course is mandatory and a student has to pass the course to become eligible for the award of degree. The student shall make a presentation before a committee constituted by the department which will assess the student based on the report submitted and the presentation made. Marks will be awarded out of 100 and appropriate grades assigned as per the regulations.



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U18INT6000 **CONSTITUTION OF INDIA**

(Mandatory course)

L	T	P	J	C
2	0	0	0	0

Course Outcomes:

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

CO 1: Gain Knowledge about the Constitutional Law of India
CO 2: Understand the Fundamental Rights and Duties of a citizen
CO 3: Apply the concept of Federal structure of Indian Government
CO 4: Analyze the Amendments and Emergency provisions in the Constitution
CO 5: Develop a holistic approach in their life as a Citizen of India

Pre-requisites : NIL

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						M			W			S
CO2						S		S				M
CO3									M	S		W
CO4								W	M			M
CO5						M		M				S
CO6												

Course Assessment methods

1. Group Activity / Quiz/ Debate / Case studies
2. Class test / Assignment

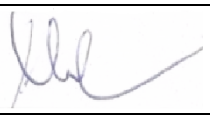
Module.1: Introduction to Indian Constitution **4 hours**

Meaning of the constitution law and constitutionalism - Historical perspective of the Constitution - Salient features and characteristics of the Constitution of India

Module.2: Fundamental Rights **8 hours**

Scheme of the fundamental rights - Right to Equality - Fundamental Right under Article 19 - Scope of the Right to Life and Liberty - Fundamental Duties and its legal status - Directive Principles of State Policy – Its importance and implementation

Module.3: Federal Structure **8 hours**



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Federal structure and distribution of legislative and financial powers between the Union and the States - Parliamentary Form of Government in India - The constitutional powers and status of the President of India

Module.4: Amendment to Constitution **6 hours**

Amendment of the Constitutional Powers and Procedure - The historical perspectives of the constitutional amendments in India

Module.5: Emergency Provisions **4 hours**

National Emergency, President Rule, Financial Emergency Local Self Government – Constitutional Scheme in India

Theory: 30	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 30 hours**

REFERENCES

1. Constitution of India - Ministry of Law & Justice – PDF format
   awmin.nic.in/coi/coiason29july08.pdf
2. Introduction to the Constitution of India by Durgadas Basu
3. The Constitution of India – Google free material -
   www.constitution.org/cons/india/const.html
4. Parliament of India – PDF format
   download.nos.org/srsec317newE/317EL11.pdf
5. The Role of the President of India – By Prof.Balkrishna
6. Local Government in India – E Book - Pradeep Sachdeva
   https://books.google.com/books/.../Local_Government_in_In...

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U17VEP6506 **NATIONAL VALUES_**

L	T	P	J	C
0	0	2	0	0

Course Outcomes

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

CO 1: Acquire knowledge on the Cultural Heritage of India

CO 2: Know the great Indian personalities and follow their trail

CO 3: Understand the specialty of democracy

CO 4: Disseminate our Nation and its values to propagate peace

CO 5: Contribute with their energy and effort for a prosperous India

CO 6: Propagate the youth and the contribution for development of our Nation

Pre-requisites :

1. U17VEP1501 / PERSONAL VALUES
2. U17VEP2502 / INTERPERSONAL VALUES
3. U17VEP3503 / FAMILY VALUES
4. U17VEP4504 / PROFESSIONAL VALUES
5. U17VEP5505 / SOCIAL VALUES

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						S						
CO2									M			
CO3							M					
CO4								S				
CO5											S	
CO6												M

Course Assessment methods

Direct
1.Group Activity / Individual performance and assignment 2.Assessment on Value work sheet / Test
Indirect
1. Mini project on values / Goodwill Recognition

Values through Practical activities: **30 hours**

1. Cultural Heritage of India : Indian Unity in Diversity – Universalism - Languages and Literatures - Religion and Philosophy - Art and Architectures.
2. Great Indian Leaders : Ancient rulers - Freedom fighters - Social reformers -Religious and Spiritual leaders - Noble laureates -Scientists – Statesman.
3. Largest Democracy : Socialist -Secular - Democratic and Republic – special features of Indian constitution – Three pillar of Indian democracy - Fundamental rights – Duties of a citizen – centre state relationship.
4. India's Contribution to World peace : Nonaligned Nation – Principle of Pancha Sheela – Mutual respect, non-aggression, non-interference, Equality and cooperation – Role of India in UNO -Yoga India's gift to the world.
5. Emerging India : World's largest young work force - Stable Economic development - Labor market & Achievement in space technology – Value based Social structure. Emerging economic superpower.

Theory: 0	**Tutorial: 0**	**Practical: 30**	**Project: 0**	**Total: 30 hours**

REFERENCES

1. CULTURAL HERITAGE OF INDIA - SCERT Kerala
   www.scert.kerala.gov.in/images/2014/HSC.../35_Gandhian_Studies_unit-01.pdf

2. LEARNING TO DO: VALUES FOR LEARNING AND WORKING TOGETHER - UNESCO
   www.unesdoc.unesco.org/images/0014/001480/148021e.pdf

3. INDIA AFTER GANDHI.pdf - Ramachandra Guha - University of Warwick
   www2.warwick.ac.uk/fac/arts/history/students/modules/hi297/.../week1.pdf

4. INDIA'S CONTRIBUTION TO THE REST OF THE WORLD - YouSigma
   www.yousigma.com/interesting facts/indiasgifttotheworld.pdf

5. INDIA AS AN EMERGING POWER - International Studies Association
   web.isanet.org/Web/Conferences/.../11353cac-9e9b-434f-a25b-a2b51dc4af78.pdf

SEMESTER VII

U17CET7001 **ESTIMATION,COSTING AND VALUATION**

L	T	P	J	C
3	0	0	0	3

Course Objectives

- To able to prepare detailed and abstract estimation for the building and other structure
- To prepare bill of quantity and schedule of rate for various item of work
- To able to value the existing building and property

Course Outcome

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

CO1: Prepare detailed estimation and find out the quantity of various works involved in the building

CO2: Estimate the quantity of works involved in road works, water supply and sanitary works and septic tank

CO3: Carry out analysis of rates and bill preparation using spreadsheets.

CO4: Able to value the building and calculate rent from building

CO5: Estimate the value of buildings.

Pre-requisites:Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						S				S	S		S	
CO2						S				S	S		S	
CO3						S				S	S		S	
CO4						S				S	S		S	
CO5						S				S	S		S	M

Course Assessment methods:

1. Continuous Assessment Test I,II
2. Assignment, Group Discussion
3. End semester Examination

ESTIMATION OF BUILDING **10 Hours**

Types of estimates – Units of measurements – Methods of estimates – Advantages. Quantity estimate for load bearing and framed structures - brick work and RCC works only, Steel requirement and Bar bending schedule - Calculation of quantities of earth work excavation, brickwork, PCC, RCC, Plastering, white washing, colour washing and painting/varnishing for shops and residential building with flat roof.

ESTIMATE OF OTHER STRUCTURES **9 Hours**

Estimating of septic tank, soak pit – sanitary and water supply installations – water supply pipe line – sewer line– estimate of bituminous and cement concrete roads

ANALYSIS OF RATES AND SPECIFICATIONS **8 Hours**

Data – Schedule of rates – Analysis of rates – Specifications – sources – General and Detailed

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specifications-Material Calculations for each work.- Material cost

VALUATION **10 Hours**

Necessity – Different methods of valuation of a building – capitalized value – Depreciation methods– Escalation – Value of building – Calculation of Standard rent - Mortgage - lease.

REPORT WRITING OF PROJECT **8 Hours**

Principles for report preparation – report on estimate of residential and industrial building – Roads – Water supply and sanitary installations.Introduction to Value Engineering:Cash flow and cost control. Systems of cost control based on accounting details of spends and periodicity of cost comparison

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45Hours**

REFERENCES

1. Dutta .B.N"Estimation and Costing in civil Engineering,27th Edition -2011
2. Chackraborti .M 'Estimation and Costing Specification and valuationin civil Engineering,24th edition 2010.
3. Rangalwala S C"Estimation costing and valuation,Charotar Publishing House"2008
4. Kohli D.D and Kohli.R.C"a TEXT BOOK OF Estimating and Costing,2013.
5. Estimating and Costing: Including Quantity Surveying, Tendering and Evaluation Kataria& Sons, 2010.

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U17CET7002

DESIGN OF STEEL STRUCTURES

L	T	P	J	C
3	0	0	0	3

Course Objectives

- the properties of steel sections and design basics and codal provisions and design of connections
- the design steel members subjected to axial tension and axial compression.
- to design simple beams, built-up beams and plate girders
- the load calculations and design of elements in roof trusses and design of gantry girder
- To design beam to beam and beam to column connections of steel members

Course Outcome

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

CO1: Summarize the codal provisions in IS 800-2007 code book for the design of steel members and design the bolted and welded steel connections.
CO2: design steel compression members and tension members as per the codal provisions.
CO3: design steel flexural members and plate girders.
CO4: design trusses and gantry girders
CO5: design beam to beam connections and beam to column connections for steel structures

Pre-requisites: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S		S	M									M	
CO2	S		S	M									M	
CO3	S		S	M									S	
CO4	S		S	M									M	
CO5	S		S	M										

Course Assessment methods:

1. Continuous Assessment Test I,II
2. Assignment, Group Discussion
3. End semester Examination

Bolted Connections of steel structures 9 Hours

Introduction: Type of steel structures-Properties of Indian standard rolled steel sections-limit state method of design- partial safety factor- general codal requirements.

Bolted Connection in Steel structures: Connection types-Introduction to bolted connections-Force transfer mechanism of bearing type and HSFG bolts-failure mechanism-Design of bolted connections in direct compression-tension-moment in plane of the bolt-moment perpendicular to the bolt.

Steel connections: Introduction – web angle connection-beam to beam connection-clip and seat connection- concept of rigid connection.

Welded Connection in steel structures 4 Hours

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Type of welds, joints-strength of welds-design-direct tension-compression-moment in plane of the weld-moment perpendicular to the weld.

Design of steel Tension members and compression members: 9 Hours

Steel tension members: Behaviour-Design-plates-single and double angle tension members.

Steel Compression members: Type of column sections-Design of columns with rolled steel section-built-up-section- laced and battened columns-Design of slab base and gusseted base for columns.

Design of Steel flexure members 5 Hours

Steel flexure members: Behaviour-design-simple and compound beams- laterally restrained- - built-up beams.

Design of laterally unrestrained beams and plate girders 9 Hours

Design of Laterally unrestrained beams.

Plate girder - Introduction to plate girder- difference between beam and plate girder-design of welded plate girder- proportioning of web and flange plates-Design of midsection- curtailment of flange plates- transverse stiffeners bearing stiffeners- flange plate to web connections- flange and web splices.

Design of Truss and gantry girder 9 Hours

Design of truss -Introduction-Evaluation of design dead load, live load and wind load. Design of truss using rolled steel sections-purlins-truss members.

Gantry girder -Introduction-load considerations- Determination of maximum bending moment and shear force due to vertical component of crane wheel load- horizontal component of crane wheel load- longitudinal effect of wheel load- design of gantry girder.

Theory: 45	**Tutorial:0**	**Practical:0**	**Project: 0**	**Total: 45Hours**

REFERENCES

1. Jayagopal L.S, Tensing D., "Design of steel structures" ,Vikas Publishing house 2015
2. Subramanian N., "Design of Steel Structures", Oxford University press USA, 2008.
3. Duggal S.K., "Limit State Design of Steel Structures ", Tata McGraw Hill Publishing company , New Delhi, 2010.
4. Ramachandra .S, Virendra Ghelot, " Design of steel structures", Volume 1, Scientific Publishers, New Delhi. 2009.
5. "Teaching Resource for Structural Steel Design , Vol. 1,2,3" INSDAG- Institute for steel Development and Growth , Kolkata, 2000.
6. Nehi L.S " Design of steel structures", McGraw Hill Co., New Delhi, 2014.

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U17CEP7703	PROJECT PHASE-I	L	T	P	J	C
		0	0	0	6	3

Course Outcomes

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

CO1: prepare plan for various types of structures.

CO2: analyze and design various components of structures using software.

CO3: prepare the working and approval drawings for Civil engineering structures.

CO4: apply suitable software for the projects.

CO5: prepare the project reports in the prescribed formats.

CO6: present project proposals efficiently.

Pre-requisites: Nil

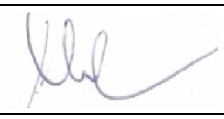
Course Assessment methods:

Direct			Indirect
1. Project report 2. Oral presentation			Course end survey

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						S			S		M		S	
CO2		S	S		S	M			S		M	M	S	
CO3						S			S		M	M	S	
CO4					S	M			S		M	M	M	
CO5						M			S	S	M	M	S	
CO6						M			S	S	M	M	S	



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The design project involves the following:

1. Preparation of plan of a Civil engineering structure.
2. Analysis and design of the structure
3. Preparation of detailed drawings
4. Consolidated report preparation

Every Project Work shall have a Guide who is a member of the faculty of Civil Engineering of the college where the student is registered. The hours allotted for this course shall be utilized by the students to receive directions from the Guide, on library reading, laboratory work, computer analysis or field work and also to present in periodical seminars the progress made in the project.

Total : 60Hrs

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SEMESTER VIII

U17CEP8701 **Project Phase -II**

L	T	P	J	C
0	0	0	24	12

Course Outcomes

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

CO1: carryout literature review of state-of-the-art works in civil engineering field.

CO2: identify the real-world problems

CO3: perform mix-design and conduct tests for the given grade of concrete.

CO4: utilize advanced software techniques / skills.

CO5: prepare the project reports in the prescribed formats.

CO6: present project proposals efficiently.

Pre-requisites: Nil

Course Assessment methods:

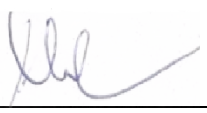
Direct	Indirect
1. Project report 2. Oral presentation	Course end survey

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1							M					S	M	
CO2							S							M
CO3	M	M		S									S	
CO4	M	M			S							M		S
CO5	M	M							M	S			S	
CO6	M	M							S	S	M		S	

The students in a group of 3 to 4 works on a topic approved by the Project Review committee of the department and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluatedbased on a minimum of three reviews. The Project Review committe may beconstituted by the Head of the Department. A project report is required at the end of the semester. The projectwork is evaluated based on oral presentation and the project report jointly by external and internal examiners appointed by the Controller of Exams.



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U17CEE0001 CONCRETE TECHNOLOGY

L	T	P	J	C
3	0	0	0	3

Course Objectives

- The objective of this course is to impart knowledge to the students on the properties of materials for concrete by suitable tests, mix design for concrete and special concretes.

Course Outcome

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

CO1: Apply the properties of various Ingredients of concrete.
CO2: Suggest suitable admixture for concrete with special properties.
CO3: Design the concrete mix for the required strength.
CO4: Conduct tests for fresh and hardened properties of concrete.
CO5: Suggest special type of concrete for the given requirement.

Pre-requisites: Nil

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S	S		M						W		M	M	
CO2	S	S		S						W				M
CO3	S	S		S	S							S	S	
CO4	S	S	S	M								M		M
CO5	S	S		S								M		M

Course Assessment methods:

1. Continuous Assessment Test I,II
2. Assignment, Group Discussion
3. End semester Examination

CONSTITUENT MATERIALS **9 Hours**

Cement-Different types-Chemical compositions and properties-Tests on cement-IS Specifications –Aggregates-Classifications-Mechanical properties and tests as per BIS Grading requirements-Water-Quality of water for use in concrete .

CHEMICAL AND MINERAL ADMIXTURES **9 Hours**

Accelerators-Catalysts-Retarders-Plasticisers-Super plasticizers-Water proofers-Mineral Admixtures like flyash, Slicafume, Ground Granulated Blast Furnace Slag, Copper slag and Metakaoline- Effects on concrete properties.

PROPORTIONING OF CONCRETE MIX **9 Hours**

Principles of Mix Proportioning-Properties of concrete related to Mix Design-Physical properties of materials required for Mix Design - Design Mix and Nominal Mix-BIS Method of Mix Design - Mix Design Examples

FRESH AND HARDENED PROPERTIES OF CONCRETE **9 Hours**

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Workability-Tests for workability of concrete-Slump Test and Compacting factor Test-Segregation and Bleeding-Determination of Compressive and Flexural strength as per BIS - Properties of Hardened concrete-Determination of Compressive and Flexural strength-Stress-strain curve for concrete-Determination of Young's Modulus.

SPECIAL CONCRETES **9 Hours**

Light weight concretes - High strength concrete - Fibre reinforced concrete – Ferrocement - Ready mix concrete - SIFCON- Shotcrete – Polymer concrete - High performance concrete- Geopolymer Concrete

Theory : 45 Tutorial :0 Practical :0 Project :0 Total :45 Hours

REFERENCES

1. Gupta.B.L., Amit Gupta, "Concrete Technology", Jain Book Agency, 2015.
2. Shetty,M.S, "Concrete Technology", S.Chand and Company Ltd, New Delhi, 2016.
3. Santhakumar,A.R; "Concrete Technology" , Oxford University Press, New Delhi, 2015.
4. Neville, A.M; "Properties of Concrete", Pitman Publishing Limited, London,1995 .
5. Gambir, M.L; "Concrete Technology", 3 rd Edition, Tata McGraw Hill Publishing Co Ltd, New Delhi, 2007.
6. IS10262-2000 Recommended Guidelines for Concrete Mix Design, Bureau of Indian Standards, New Delhi, 2004.

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U17CEE0002

PREFABRICATED STRUCTURES

L	T	P	J	C
3	0	0	0	3

Course Objectives

- The objective of this course is to know the basics of prefabricated structures.
- To understand the design principles and types of joints.
- To impart knowledge on progressive collapse and .code provisions

Course Outcome

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

CO1: Understand the principles and systems of prefabrication in the field.
CO2: Acquire knowledge on the behaviour of prefabricated components.
CO3: Understand the design principles of various prefabricated elements.
CO4: Understand various types of joints for prefabricated structures
CO5: Acquire knowledge on progressive collapse and their codes and standards adopted.

Pre-requisites: Nil

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	M												M	
CO2		M												
CO3			M										M	
CO4			M										M	
CO5	M													

Course Assessment methods:

1. Continuous Assessment Test I,II
2. Assignment, Group Discussion
3. End semester Examination

INTRODUCTION 9 Hours

Need for prefabrication – Principles – Types of prefabrication - Disuniting of structures - Materials – Modular coordination – Standardization – Systems – Production – Transportation – Erection – Elimination of erection stresses

PREFABRICATED COMPONENTS 9 Hours

Behaviour of structural components – Large panel constructions –roof and floor slabs – Wall panels – Columns – Shear walls.

DESIGN PRINCIPLES 9 Hours

Form factor - Design of cross section based on efficiency of material used – Problems in design because of joint flexibility – Allowance for joint deformation – Precision and dimensional Tolerance.

JOINTS IN STRUCTURAL MEMBERS 9 Hours

Types of joints - Joints for different structural connections – Dimensions and detailing – Design of expansion joints.

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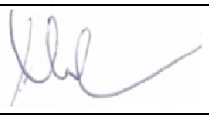
PROGRESSIVE COLLAPSE & CODE PROVISIONS **9 Hours**

Progressive collapse – Code provisions – IS 15916:2010 – ASCE 7-02, ACI 318-02, GSA PBS Facilities Standards 2000, GSA PBS Facilities Standards 2003, GSA PBS Progressive collapse Guidelines 2003 - Importance of avoidance of progressive collapse.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. Mokk, Prefabricated Concrete for Industrial and Public Structures, Publishing House of the Hungarian, Academy of Sciences, Budapest, Reprint 2007.
2. Dr. R. Ganesan and Mrs. A. Latha, Prefabricated Structures, Sri Kamalamani Publications, India, 2014, First edition.
3. Dr.K.Ramadevi and Dr.R.Anuradha, Prefabricated Structures, VSRD Academic Publishing, ISBN: 978-93-86258-71-7, 2017, First edition.
4. M. Pradeep Kumar, Shanlax Publications, India, Prefabricated Structures, 2016.
5. IS 15916:2010 – Building design and erection using prefabricated concrete – Code of Practice.



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U17CEE0003 **DESIGN OF REINFORCED CONCRETE STRUCTURES**

L	T	P	J	C
3	0	0	0	3

Course Outcomes

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

CO1: design counter fort and cantilever retaining walls.
CO2: design underground and overhead R.C water tanks for the given capacity.
CO3: analyze and design various types of slabs using yield line theory.
CO4: design bridges as per IRC standards.
CO5: design flat slab as per IS standards.
CO6: apply the concepts of pre-stressing for structural elements analysis

Pre-requisites : Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	M		S			S							M	
CO2	M		S			S							M	
CO3	M		S			S							M	
CO4	M		S			S							M	
CO5	M		S			S							M	
CO6	M	S				S							M	

Course Assessment methods:

1. Continuous Assessment Test I,II
2. Assignment, Group Discussion
3. End semester Examination

RETAINING WALL 9 Hours

Design of Cantilever and counterfort retaining wall

WATER TANK 9 Hours

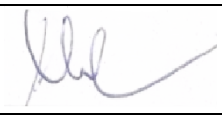
Design of rectangular and circular water tanks both below and above ground level- Design of overhead water tank (As per IS 3370(Part I-III))

YIELD LINE THEORY 9 Hours

Assumptions – Characteristics of yield line – Determination of collapse load/ plastic moment – Application of virtual work method – square, rectangular, circular and triangular slabs – Design problems

BRIDGES AND FLAT SLAB 9 Hours

Types of bridges – IRC loading – design of single span slab bridge, T-beam bridge. Flat slab – Types – design methods , IS code recommendations – Reinforcement details



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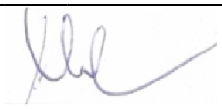
INTRODUCTION TO PRESTRESS **9 Hours**

Introduction – Materials – IS Codes – Methods and systems of prestressing – Analysis for Stresses and Losses - Application

Theory:45	Tutorial : 0	Practical :0	Total: 45Hours

REFERENCES

1. Varghese, P.., " Advanced Reinforced Concrete Design", Prentice Hall of India, Pvt. Ltd., New Delhi, 2012.
2. Gambhir.M.L.," Design of Reinforced Concrete structures", Prentice Hall of India Private limited, New Delhi, 2012.
3. Subramanian, N. Design of Reinforced Concrete Structures", Oxford University Press, New Delhi, 2013.
4. Punmia, B.C., Ashok Kumar jain, Arun Kumar jain, " RCC Designs Reinforced Concrete Structures " , Laxmi Publications Pvt. Ltd., New Delhi, 2006.
5. I.C.Syal and A.K.Goel, "Reinforced Concrete Structures", S.Chand and Company Ltd, New Delhi, 2012.



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U17CEE0004 **ENVIRONMENTAL IMPACT ASSESSMENT AND LIFE CYCLE ANALYSES**

L	T	P	J	C
3	0	0	0	3

Course Objectives

- To provide a basic understanding of the EIA process as its uses in research, planning, project or program evaluation, monitoring, and regulatory enforcement.
- To introduce legal, economic, social, administrative and technical process of preparing and/or evaluating environmental impact documents.
- To use the EIA tool for arriving practical situations in project planning and implementation and decision making

Course Outcome

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

CO1: Write EIA process for Civil engineering projects
CO2: Apply various method of EIA for assessing the impact on major environments
CO3: Conduct Socio-Economic Impact Assessment
CO4: Perform EIA for various civil engineering projects
CO5: Apply LCA as a tool for decision making

Pre-requisites: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1							S						M	
CO2												M	S	
CO3							M							
CO4				M									S	
CO5					M							M		M

Course Assessment methods:

1. Continuous Assessment Test I,II
2. Assignment, Group Discussion
3. End semester Examination

Introduction and Historical development of Environmental Impact Assessment (EIA). **9 Hours**

EIA in Project Cycle. Legal and Regulatory aspects in India. – Types and limitations of EIA – Cross sectoral issues and terms of reference in EIA – Public Participation in EIA. EIA process- screening – scoping - setting – analysis – mitigation

Components and Methods for EIA **9 Hours**

EIA Matrices – Networks – Checklists – Connections and combinations of processes - Cost benefit analysis – Analysis of alternatives – Software packages for EIA – Expert systems in EIA. Prediction tools for EIA – Mathematical modeling for impact prediction – Assessment of impacts – air – water – soil – noise – biological — Cumulative Impact Assessment

Socio-Economic Impact Assessment **9 Hours**

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Definition of social impact assessment-Social impact assessment planning process- measurement for SIA variables-Relationship between social impacts and change in community and institutional arrangements. Individual and family level impacts. Selecting, testing and understanding significant social impacts. Mitigation and enhancement in social assessment- Environmental costing of projects.

Environmental Management Plan and sectoral EIA **9 Hours**

Environmental Management Plan - preparation, implementation and review – Mitigation and Rehabilitation Plans – Policy and guidelines for planning and monitoring programmes – Post project audit – Ethical and Quality aspects of Environmental Impact Assessment. EIA case studies related to the following sectors - Infrastructure –construction and housing Mining – Industrial - Thermal Power - River valley and Hydroelectric – coastal projects-Nuclear Power. EIA for coastal projects

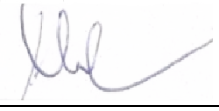
Introduction and application of LCA **9 Hours**

Introduction and history of LCA terminology, Goal & scope definition Economic input-output (EIO) LCA Attributional versus consequential LCA. Future developments in LCA, Life cycle impact assessment (LCIA) Characterization factors, LCA-Case studies

Theory:45	**Tutorial : 0**	**Practical :0**	**Total: 45Hours**

REFERENCES

1. Lawrence, D.P., Environmental Impact Assessment – Practical solutions to recurrent problems, Wiley-Interscience, New Jersey, 2003.
2. World Bank –Source book on EIA
3. Petts, J., Handbook of Environmental Impact Assessment, Vol., I and II, Blackwell Science, London, 1999.
4. Canter, L.W., Environmental Impact Assessment and McGraw Hill, New York. 1996
5. Jolliet et al. (2016) Environmental LCA, CRC Press, Boca Raton, FL
6. http://www.moef.nic.in/division/eia-manual
7. https://nptel.ac.in/noc/individual_course.php?id=noc18-ce08



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U17CEE0005

SURFACE WATER HYDROLOGY

L	T	P	J	C
3	0	0	0	3

Course Objectives

The focus is more towards intoduce the concept of hydrological cycle and to discuss various components / parameters of the system. This course also tries to introduce the impact that has been caused due to urbanization on the water cycle.

Course Outcome

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

CO1: quantity the precipitation intensity, duration, and frequency based on the historical database

CO2: estimate the effective precipitation based on interception, depression storage and infiltration

CO3: construct direct runoff hydrograph

CO4: route the flood through watershed

CO5: formulate the components of an urban water cycle

Pre-requisites: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S												M	
CO2		M												
CO3	M												M	
CO4		M												
CO5	S													M

Course Assessment methods:

1. Continuous Assessment Test I,II
2. Assignment, Group Discussion
3. End semester Examination

Precipitation 9 Hours

Hydrologic cycle – Types of precipitation – Forms of precipitation – Measurement – Adequacy of raingauges – Check for consistency – Mean precipitation – Intensity, duration, frequency relationship – Probably maximum precipitation

Abstractions from precipitation 9 Hours

Interception – Depression storage – Evaporation – Measurement – Infiltration – Measurement – Infiltration indices

Hydrographs 9 Hours

Components of hydrograph – Factors affecting hydrograph – Base flow separation – Unit hydrographs – Derivation of unit hydrographs – S-Curve – Synthetic unit hydrograph.

Floods and Flood routing 9 Hours

Flood peak estimation – Flood frequency studies – Gumbel's method – Reservoir routing – Channel routing – Flood control

Urban Hydrology 9 Hours

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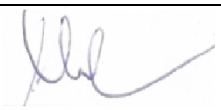
Introduction – water sustainability in cities – water supply, storm water, waste water -Urban water cycle – water budget analysis – urbanization impact on surface runoff

Theory:45 Tutorial : 0 Practical :0 Total: 45Hours

REFERENCES

1. Ven Te Chow, David R. Maidment "Applied Hydrology." MCGRAW-HILL Professional, 2nd edition, 2013
2. K. Subramanya – "Engineering hydrology," Tata McGraw-Hill, 4th Edition 2013.
3. H.M. Raghunath – "Hydrology," New Age International Publishers,2nd Edition 2006
4. K.N. Mutreja – "Applied hydrology," Tata McGraw-Hill,1986



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U17CEE0006 AIR AND NOISE POLLUTION CONTROL

L	T	P	J	C
3	0	0	0	3

Course Objectives

- To gain knowledge about air pollution and its preventive measure
- To Know about the standards for air quality and Noise quality
- To Understand about noise pollution and its preventive measure

Course Outcome

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

CO1: To learn about the air pollutants, sources and its effects.
CO2: To have a clear understanding on the air quality standards and its techniques.
CO3: To determine the fluid resistance for organic materials
CO4: To find the Properties of air pollution and its control measures
CO5: To learn about the effects and the sources of noise pollution

Pre-requisites: Nil

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S	S												
CO2	S	S											M	
CO3	S	S											M	
CO4	S	S											M	
CO5	S	S												

Course Assessment methods:

1. Continuous Assessment Test I,II
2. Assignment, Group Discussion
3. End semester Examination

INTRODUCTION **9 Hours**

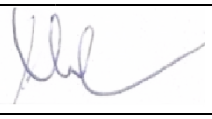
Definition of clean air, nature, air pollutants, sources of air pollutants, effects of air pollution on man, animal, vegetation and properties. Units Measurements Of Pollutants–Emission Standards – National Ambient Air Quality Standards – Air Pollution Indices. Air Quality Management In India.

AMBIENT AIR QUALITY STANDARDS AND AIR QUALITY MONITORING **9 Hours**

Harmful concentration – geographical factors in air pollution – air pollution control legislation. Classification sampling; sampling techniques; monitoring atmospheric pollution. Type Of Air Pollutants – Pollution Due To Automobiles – Analysis Of Air Pollutants

CATALYTIC COMBUSTION **9 Hours**

Principles of removal of a gaseous constituent; adsorption and combustion; catalytic combustion of organic materials; catalytic oxidation and decomposition



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AIR POLLUTION AND CONTROL MEASURES **10 Hours**

Setting chambers; momentum separators, fibrous filters; electro static precipitators; bag houses centrifugal spray scrubbers; venture scrubbers; elementary principles of air pollution e-control techniques.

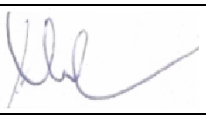
NOISE POLLUTION **8 Hours**

Sound and noise; sources of noise pollution, environmental and industrial noise; effects of noise pollution: measures for prevention and control of noise; environmental and industrial noise; noise control legislation.

Theory: 45 Tutorial: 0 Practical: 0 Project: 0 Total: 45 Hours

REFERENCES

1. Linsley R.K. and Franzini J.B, " Water Resources Engineering", McGraw-Hill Inc, 2000.
2. Punmia B.C., et.al; Irrigation and water power Engineering", Laxmi Publications, 16th Edition, New Delhi, 2009.
3. Garg S.K., Irrigation Engineering and Hydraulic structures", Khanna Publishers, 23rd Revised Edition, New Delhi, 2009.
4. Duggal, K.N. and Soni, J.P., "Elements of Water Resources Engineering", New Age International Publishers, 2005.
5. Chaturvedi M.C., "Water Resources Systems Planning and Management", Tata McGraw-Hill Inc., New Delhi, 1997.
6. Michael A.M., "Irrigation Theory and Practice", 2nd Edition, Vikas Publishing House Pvt. Ltd., Noida, 2008.



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U18CEE0007 **Glass Façade Engineering**

L	T	P	J	C
3	0	0	0	3

Course Objectives

At the end of this course the student should have learnt about the various glass types, both conventional and modern, that are commonly used in Civil Engineering construction. Further he should be able to appreciate design in façade Engineering

Course Outcomes

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

CO1: Appraise the use of glass as a building material
CO2: Illustrate the advantages of using energy efficient materials
CO3: Choose glass and a facade system
CO4: Design glass facade for safety and serviceability
CO5: Perform various tests on glass and facade system.

Pre-requisites : Nil

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

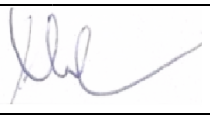
COs	Programme Outcomes(POs)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1							M						M	
CO2							S							
CO3			M										M	
CO4			S										M	
CO5				S		S								M

Course Assessment methods

1. Continuous Assessment Test I,II
2. Assignment, Group Discussion
3. End semester Examination

Introduction: Glass – The Building Material 9 Hours

Glass as a building material & its Applications-Float glass manufacturing technology-Key Functional Requirements-Building Physics: Theory of electromagnetic radiation-Factors defining performance & Selection of Glass: (VLT, SF, UV, SHGC)-Value Addition: Optical Properties- Coating Technology-Need for Green Buildings: Energy efficient buildings-Energy codes, Green ratings & its Approaches: ECBC, IGBC, GRIHA-Human safety Compliances-Fire Resistant Glazing: Types & Applications-Understanding Acoustic Glazing: Principle & Applications-Interior Glazing: Types & Applications-Glass for segments- Hospitals, Green Homes, Airports, Offices, Educational institutions-Types of Glass-Glass Processing: Tempering, Heat Strengthening, Insulation, Lamination & Ceramic Frit.



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Glass Applications on Facades **9 Hours**

Glass Façade-Understanding Glass façade-Types of Glazing & Applications: Forms of Construction-Windows- punch & strip-Doors /external partitions- hinged, sliding & rotating-Building perimeter glazing- Framed & Frameless systems.

Structural Designing of Glass & Glass Façade **9 Hours**

Key Design Basis-Strength-Deflection-Earthquake & Natural disasters-Thermal Breakage resistance- Design for safety-Design for serviceability-Design Approach & Method: Linear analysis: Wind load calculations, deflection and stress checking- Non-linear analysis-Introduction and methodology-Framing-structural framing -Framing of Steel & Aluminum Design of Glass and Glazing: Structural Design of Glass-Wind load analysis-Thickness analysis- Stress analysis- Size & Aspect ratio analysis-Innovative designs (skylights, balustrades & canopies)-Design of Glazing and Fixtures-Design of Glass Supporting systems Design of interfacing with Buildings (fixing and anchorages)-Component, framing sizing & Optimizing the frame

Glass Façade Testing & Certification **9 Hours**

Codes & Regulations-Allowable limits-Need for Façade Testing-Façade Testing & Certification-Weather performance-Structural load-Seismic floor displacement-Acoustic performance-Fire test-Thermal & U-Value test-

Practical Section: **9 Hours**

Size of frames-Size of glass- Onsite Tests

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. Structural Glass: Hugh Dutton, Peter Rice: 9780419199403
2. Structural Glass Facades and Enclosures, Mic Patterson; ISBN: 978-0-470-93185-1
3. Glass in Architecture ISBN 0714829226 by Michael Wigginton
4. Joseph S. Amstock's Glass in Construction (McGraw-Hill, 1997)
5. Envelope Design for Buildings ISBN 0750628545 by William Allen
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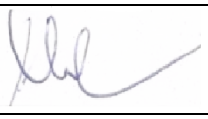

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U17CEE0008 Intelligent Transportation Systems

L	T	P	J	C
3	0	0	0	3

Course Objectives

Students who successfully complete the course will have gained a basic understanding and appreciation of the concepts related to ITS technologies and industry applications of the field

- To learn the fundamentals of ITS.
- To study the ITS functional areas
- To have an overview of ITS implementation in developing countries

Course Outcomes

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

CO1: Understand the concepts of Intelligent transport systems.
CO2: Acquire the basic knowledge on data collection using ITS.
CO3: understand the concept of telecommunication in ITS
CO4: know about the various functional areas of ITS
CO5: acquire the knowledge of management and automation of traffic systems

Pre-requisites : Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1			S											
CO2			S	M								M	M	
CO3			S											
CO4			S										M	
CO5			S	S								S	M	

Course Assessment methods

1. Continuous Assessment Test I,II
2. Assignment, Group Discussion
3. End semester Examination

INTRODUCTION TO ITS 9 Hours

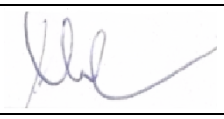
Introduction to Intelligent Transportation Systems (ITS) – Definition of ITS and Identification of ITS Objectives, Historical Background, Benefits of ITS

DATA COLLECTION TECHNIQUES 9 Hours

ITS Data collection techniques – Detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI), Geographic Information Systems (GIS), video data collection.

TELECOMMUNICATIONS IN ITS 9 Hours

Telecommunications in ITS – Importance of telecommunications in the ITS system,



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Information Management, Traffic Management Centres (TMC). Vehicle – Road side communication – Vehicle Positioning System;

ITS FUNCTIONAL AREAS **9 Hours**

ITS functional areas – Advanced Traffic Management Systems (ATMS), Advanced Traveler Information Systems (ATIS), Commercial Vehicle Operations (CVO), Advanced Vehicle Control Systems (AVCS), Advanced Public Transportation Systems (APTS), Advanced Rural Transportation Systems (ARTS)

TRAFFIC MANAGEMENT AND AUTOMATION **9 Hours**

ITS User Needs and Services – Travel and Traffic management, Public Transportation Management, Electronic Payment, Commercial Vehicle Operations, Emergency Management, Advanced Vehicle safety systems, Information Management, Mobile Applications;

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.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. Intelligent Transport Systems, Intelligent Transportation Primer, Washington, US, 2001
2. Henry F.Korth, and Abraham Siberschatz, Data Base System Concepts, McGraw Hill, 1992
3. E.Turban, ”Decision Support and Export Systems Management Support Systems", Maxwell Macmillan, 1998
4. Sitausu S.Mittra, "Decision Support Systems – Tools and Techniques", John Wiley, New York, 1986
5. ITS Hand Book 2000: Recommendations for World Road Association (PIARC) by Kan Paul Chen, John Miles.
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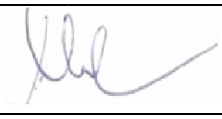

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U17CEE0009 SUSTAINABLE CONSTRUCTION METHODS

L	T	P	J	C
3	0	0	0	3

Course Objectives

To study and understand the latest construction techniques applied to engineering construction for sub structure, super structure, special structures, .

Course Outcomes

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

CO1: To understand the various processes involved in sub-structure construction
CO2: To understand the various processes involved in super-structure construction
CO3: To understand the construction process of special structures and offshore structures
CO4: Know about the rehabilitation techniques carried out for a structure
CO5: Know about the demolition techniques carried out for a structure.

Pre-requisites : Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	M		M		S									M
CO2	M		M		S									M
CO3	M		M		S									M
CO4	M		M		S									M
CO5	M		M		S									M

Course Assessment methods

Direct

1. Continuous Assessment Test I,II
2. Assignment, Group Discussion
3. End semester Examination

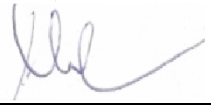
SUB STRUCTURE CONSTRUCTION 9 Hours

Box jacking - Pipe jacking - under pinning, trenchless technology, innovative road Construction techniques; immerse tube tunnelling. Smart tunnels: application and construction (Case study

SUPER STRUCTURE CONSTRUCTION FOR BUILDINGS 9 Hours

Vacuum dewatering of concrete flooring –concrete paving technology –techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections –launching techniques –suspended form work –erection techniques of tall structures, large span structures –launching techniques for heavy decks –insitu-prestressing in high rise structures, aerial transporting handling erecting lightweight components on tall structures

CONSTRUCTION OF SPECIAL STRUCTURES 9 Hours



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Erection of lattice towers-Rigging of transmission line structures –Construction sequence in cooling towers, Silos, chimney, sky scrapers -Bow string bridges, Cable stayed bridges –Launching and pushing of box decks –Construction of jetties and break water structures –Construction sequence and methods in domes –Support structure for heavy equipment and machinery in heavy industries –Erection of articulated structures and space decks..

REHABILITATION AND STRENGTHENING TECHNIQUES **9 Hours**

Seismic retrofitting-Strengthening of beams -Strengthening of columns -Strengthening of slab -Strengthening of masonry wall, Protection methods of structures, Mud jacking and grouting for foundation –Micro piling and underpinning for strengthening floor and shallow profile -Sub grade water proofing,Soil Stabilization techniques.

DEMOLITION **9 Hours**

Demolition Techniques, Demolition by Machines, Demolition by Explosives, Advanced techniques using Robotic Machines, Demolition Sequence, Dismantling Technique s, Safety precaution in Demolition and Dismantling.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. Jerry Irvine, Advanced Construction Techniques, CA Rocketr, 1984
2. Patrick Powers. J., Construction Dewatering: New Methods and Applications, John Wiley & Sons, 1992.
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4. Robertwade Brown,Practical foundation engineering hand book, McGraw Hill Publications, 1995.
5. Sankar, S.K. and Saraswati, S., Construction Technology, Oxford University., New Delhi, 2008.

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U17CEE0010 PRETRESSED CONCRETE STRUCTURES

L	T	P	J	C
3	0	0	0	3

Course Objectives

The Objectives of this course is to make the students to learn the following topics:

- Prestressing concepts in concrete
- Design of prestressed concrete members in flexure, shear and torsion
- Design of compression members, tension members and composite structures and various concepts involved in design of prestressed concrete elements

Course Outcome

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

CO1 : Understand different methods of prestressing techniques

CO2 : design prestressed concrete structures for flexure and shear

CO3 : Analyse and design the anchoring zone of Presetressed elements

CO4 : Design prestressed concrete pipes and tanks

CO5 : Analyse composite and indeterminate prestressed concrete structures

Pre-requisites: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S		S	M									M	
CO2	S		S	M									M	
CO3	S		S	M									S	
CO4	S		S	M									M	
CO5	S		S	M										

Course Assessment methods:

1. Continuous Assessment Test I, II
2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, Prototype or Product Demonstration etc. (as applicable)
3. End Semester Examination

PRINCIPLES AND ANALYSIS FOR FLEXURE 9 Hours

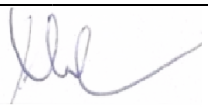
Principles of prestressing- Types of prestressing systems- Materials-Systems and devices – Analysis and design for flexure- General concepts of prestress- losses in prestress- Analysis for ultimate strength.

DESIGN FOR FLEXURE 9 Hours

Concept of Limit State design- Limit state of Collapse and serviceability – Analysis of ultimate strength.

DESIGN FOR SHEAR TORSION AND ANCHORAGE ZONE 9 Hours

Design for shear in rectangular beams- Modes of failure – design for Torsion, shear and bending. Anchorage zone – analysis and design of pre-tensioned and post tensioned end blocks



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STATICALLY INDETERMINATE STRUCTURES **9 Hours**

Analysis of continuous beams- linear transformations- concept of concordance- choice of cable profiles- deflection of prestressed members.

SPECIAL STRUCTURES **9 Hours**

Concept of circular prestressing- design of prestressed concrete pipes and cylindrical water tanks- composite constructions- types, behaviour, flexural stresses, compression members – design of poles, piles and sleepers. Design for Tension.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. N.Krishnaraju, "Prestressed Concrete", tata McGraw-Hill Publishing Company, 4th Ed, 2012
2. N.C.Sinha & S.K.Roy, "Fundamentals of Prestressed Concrete", s.Chand &Co, new delhi,2011
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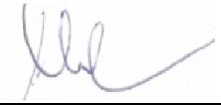

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U17CEE0011 **MAINTENANCE AND REHABILITATION OF STRUCTURES**

L	T	P	J	C
3	0	0	0	3

Course Outcome

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

CO1: suggest maintenance and repair strategies.
CO2: assess the durability of concrete under various climatic conditions.
CO3: suggest the suitable materials and techniques for repair.
CO4: suggest suitable special concretes for repair works.
CO5: implement various rehabilitation and retrofitting techniques.
CO6: select suitable demolition techniques for structures.

Pre-requisites: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	M		M									M	M	
CO2	M		M									M	M	
CO3	M		M									M	S	
CO4	M		M									M	M	
CO5	M		M									M		

Course Assessment methods:

1. Continuous Assessment Test I, II
2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, Prototype or Product Demonstration etc. (as applicable)
3. End Semester Examination

MAINTENANCE AND REPAIR STRATEGIES 9 Hours

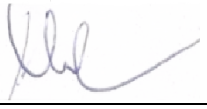
Maintenance, repair and rehabilitation, Facets of Maintenance, importance of Maintenance, types of maintenance various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration.

SERVICEABILITY AND DURABILITY OF CONCRETE 9 Hours

Quality assurance for concrete construction concrete properties – strength, permeability, thermal properties and cracking. – Effects due to climate, temperature, chemicals, corrosion – design and construction errors – Effects of cover thickness and cracking.

MATERIALS AND TECHNIQUES FOR REPAIR 9 Hours

Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, Fibre reinforced concrete. Rust eliminators and polymers coating for rebars during repair, foamed concrete, mortar and dry pack, vacuum concrete, Gunite and Shotcrete, Epoxy injection, Mortar repair for cracks,



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shoring and underpinning. Methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coating and cathodic protection..

REPAIRS, REHABILITATION AND RETROFITTING OF STRUCTURES **9 Hours**

Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering corrosion, wear, fire, leakage and marine exposure, Control on Termites in Buildings, Fungus Decay of wood works in Buildings, Estimation of Repair and retrofitting.

DEMOLITION AND DISMANTLING TECHNIQUES **9 Hours**

Demolition, Engineered demolition techniques for Dilapidated structures, Safety measures during demolition operation, Dismantling of buildings and reuse of materials, case studies

Theory: 45	Tutorial: 0	Practical: 0	Project: 0	Total: 45 Hours

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1. K. S. Vivek und P. Vyshnavi, (2017))Pre - Engineered Steel Building, Limit State Design of Structural Members, LAP LAMBERT Academic Publishing
2. Alexander Newman, (2014) Metal Building Systems, Design and Specifications, Third Edition, McGraw-Hill Education
3. Hass, A.M. (1983), Precast Concrete, Design and Applications, Taylor & Francis, UK.
4. Phillips, W.R. and Sheppard, D.A. (1980), Plant cast, Precast and Prestressed Concrete, McGraw Hill, New York.

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U17CEE0012 EARTHQUAKE ENGINEERING

L	T	P	J	C
3	0	0	0	3

Course Objectives

- To gain knowledge about the types of vibration and damping.
- To understand dynamic response of SDOF and MDOF systems.
- To design and introduce ductility into RC structural elements as per code provisions.
- To study active and passive vibration control devices.

Course Outcome

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

CO1: Understand the behaviour of earthquake and theory of vibration.
CO2: Understand the concepts of SDOF systems.
CO3: Understand the concepts of MDOF systems
CO4:.Study various IS code provisions for earthquake resistance and vibration control methods.
CO5: Design RC structural elements resisting earthquake forces as per IS code provisions.

Pre-requisites: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO2	S				M								M	
CO3	S	S			M								M	
CO4	S	S					M					S	M	M
CO5			S		S							S	M	M

Course Assessment methods:

1. Continuous Assessment Test I, II
2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, Prototype or Product Demonstration etc. (as applicable)
3. End Semester Examination

INTRODUCTION **5 Hours**

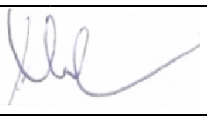
Engineering Seismology, Theory of vibration, Importance of Vibration Analysis Indian Seismicity, Earthquake history.

SINGLE DEGREE OF FREEDOM (SDOF) SYSTEMS **9 Hours**

Degrees of freedom – SDOF idealisation - Free vibration of SDOF system – Response to harmonic excitation – Impulse and response to unit impulse – Duhamel integral.

MULTIPLE DEGREE OF FREEDOM (MDOF) SYSTEMS **9 Hours**

Two degree of freedom system – Normal modes of vibration, Natural frequencies and Mode shapes, Introduction to MDOF system, Decoupling of equations of motion – Concept of mode superposition.



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BIS SPECIFICATIONS AND SPECIAL TOPICS **9 Hours**

Code Provisions of Design of Buildings as per IS1893 and IS4326, Ductile Detailing of Structures as per IS13920, Behaviour and Design of Masonry Structures as Per IS 13827 and IS13828. Active and passive control devices, Soil liquefaction.

DESIGN OF STRUCTURAL ELEMENTS **12 Hours**

Design of RC beams, columns and shear walls Concrete as per IS code provisions.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. S.K.Duggal, Earthquake Resistant Design of Structures, Prentice Hall of India, New Delhi, 2015.
2. Pankaj Agarwal and Manish Shrikhande, Earthquake Resistant Design of Structures, Prentice Hall of India, New Delhi, 2016.
3. Duggal S.K., Earthquake Resistant Design of Structures, Prentice Hall of India, New Delhi, 2013.
4. Neville, A.M, Properties of Concrete, Pitman Publishing Limited, London, 1995.
5. Damodarasamy and Kavitha, Basics of Dynamics and Aseismid Design, PHI Learning Pvt Ltd., 2009.

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U17CEE0013 **INDUSTRIAL WASTEWATER TREATMENT**

L	T	P	J	C
3	0	0	0	3

Course Objectives

- To understand the industrial process, water utilization and wastewater generation
- To impart knowledge on selection of treatment methods for industrial wastewater
- To acquire the knowledge on operational problems of common effluent treatment plants
- To gain knowledge on different techniques and approaches for minimizing the generation and reuse, recovery and disposal of industrial effluent
- To have awareness of the health, occupational and safety rules and regulations

Course Outcome

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

CO1: characterize industrial effluent and their effects on environmental components
CO2: implement environmental legislations to prevent and control industrial effluents and hazardous wastes
CO3: conduct waste audit in an industry and implement waste minimization techniques.
CO4: understand the manufacturing process and effluent discharge from various industries and their management concepts
CO5: select appropriate treatment technologies for treating industrial effluent
CO6: adopt preventive health and safety measures based on the toxicity effect of industrial pollutants

Pre-requisites:Nil

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1							M						M	
CO2						M	M						M	
CO3	S					M	M						M	
CO4	S					S	M						M	
CO5	M					M	S						M	
CO6						S	S						M	

Course Assessment methods:

1. Continuous Assessment Test I, II
2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, Prototype or Product Demonstration etc. (as applicable)
3. End Semester Examination

INTRODUCTION **7Hours**

Types of industries and industrial pollution – Characteristics of industrial wastes – Population equivalent – Bioassay studies – effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health – Environmental legislations related to prevention and control of industrial effluents and hazardous wastes

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CLEANERPRODUCTION **8 Hours**

Waste management Approach – Waste Audit – Volume and strength reduction – Material and process modifications – Recycle, reuse and byproduct recovery – Applications.

POLLUTION FROMMAJORINDUSTRIES **10 Hours**

Sources, Characteristics, waste treatment flow sheets for selected industries such as Textiles, Tanneries, Pharmaceuticals, Electroplating industries, Dairy, Sugar, Paper, distilleries, Steel plants, Refineries, fertilizer, thermal power plants – Wastewater reclamation concepts

TREATMENTTECHNOLOGIES **12 Hours**

Equalisation – Neutralisation – Physico chemical treatment: Removal of suspended and dissolved organic solids - Chemical oxidation – Adsorption - Removal of dissolved inorganics – Combined treatment of industrial and municipal wastes – Residue & sludge management – Dewatering – Disposal

INDUSTRIAL HEALTH AND SAFETY MANAGEMENT **8 Hours**

Importance of Industrial safety - Occupational Health Hazards, Classification of health hazards and their effects. Promoting safety and health training, biochemical action of toxic substance and toxicity, type and degrees of toxic effects, threshold limits of exposure (TLV), STEL, IDLH, Ld/LC etc – Occupational and Environmental safety measures in area specific industries

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. Nemerow, Nelson Leonard., 2007. “Industrial waste Treatment”, Elsevier Science & Technology.
2. Ahmad Ashfaq., 2014. Industrial waste treatment technology”, S.K. Kataria &Sons.
3. M.N.Rao & A.K.Dutta, 1995. “Wastewater Treatment”, Oxford - IBH Publication.
4. W.W. Eckenfelder Jr., 2000. “Industrial Water Pollution Control”, 2000. 3rd ed. McGraw-Hill Book Company, New Delhi.
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U17CEE0014 **CLIMATE CHANGE AND SUSTAINABLE MANAGEMENT**

L	T	P	J	C
3	0	0	0	3

Course Objectives

- Understand the earth climate system and drivers responsible for changes in the climate system
- Recognize the causes and effects of climate change at the atmospheric and earth levels
- Identify the potential impacts and vulnerability due to climate change onvarious sectors and regions
- Adopt sustainable management practices to protect the future earth climate system

Course Outcome

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

CO1: Elucidate the climate system and the drivers of climate change
CO2: Categorize the causes and effects of climate change
CO3: Understand the climate risk and various techniques for predicting the future climate
CO4: Exemplify sustainable management practices after learning the government policies and measures to mitigate climate change

Pre-requisites:Nil

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		M												M
CO2			S		W							S		M
CO3				M								M		M
CO4			S				S	W	W			S		S

Course Assessment methods:

1. Continuous Assessment Test I, II
2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, Prototype or Product Demonstration etc. (as applicable)
3. End Semester Examination

ATMOSPHERE AND EARTH'S CLIMATE SYSTEM 9 Hours

Atmospheric structure and composition,Radiative processes in the atmosphere- Earth Climate System – Drivers of Climate System - Components -– Role of components on Climate system - Hydrological cycle, Carbon Cycle–Earth's Carbon reservoirs - Global Wind Systems - Cloud Formation - Types - Monsoon Rains - Global Ocean Circulation – El Nino and Southern Oscillation

CAUSES OF CLIMATE CHANGE AND THE OBSERVED VARIABILITY 9 Hours

Brief History of past earth's climate - Koppen Climate Classification –Weather and Climate - Causes of Change in climate - The Green House Effect – Earth's Natural and Anthropogenic Climate change – Observed Effects of the climate change – Global Warming – Changes in patterns of precipitation - Floods and Drought – Storms and Hurricanes - Sea level rise – Climate

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Sensitivity and Feedbacks

IMPACTS, VULNERABILITY AND ADAPTATION 9 Hours

Evidences of Changes in Climate and Environment – on a Global Scale and in India - Impacts and vulnerability of Climate Change on various sectors – Agriculture, Forestry, Coastal Ecosystem – Water Resources – Human Health - Society - Incorporated Adaptation measures

PREDICTION OF CLIMATE CHANGE 9 Hours

Forecasts – short term, medium range and long range prediction–Tools for Climate prediction - Modelling –Current climate models- climate model evaluation using performance indicators

APPROACH TO A SUSTAINABLE MANAGEMENT 9 Hours

Sustainable Development - Scope and Emerging Trends- Concept of sustainability - Tools and ways to achieve sustainability - Measure and monitor the progress- Policies and programmes - Sustainable Development Goals (SDG) - Climate and Sustainable Development - An Interface - UNFCCC – IPCC –India's National Mission – A way forward to mitigate climate change -Case studies

Theory: 45	Tutorial: 0	Practical: 0	Project: 0	Total: 45 Hours

REFERENCES

1. Juha I. Uitto • Jyotsna PuriRob D. van den Berg, "Evaluating Climate Change Action for Sustainable Development", Springer, 2017.
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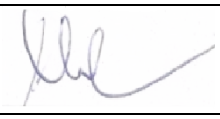

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U17CEE0015 **WASTE MANAGEMENT**

L	T	P	J	C
3	0	0	0	3

Course Objectives

At the end of this course the student should able to know how to manage solid and hazardous waste from its inception to disposal. They have learnt about various technologies that convert non-recyclable waste into usable form of energy. To know about E-Waste management and its ill-effects on health and society

Course Outcome

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

CO1: Familiarize with various waste management problems.
CO2: Implement various resource recovery and safe treatment options
CO3: Acquire rudiments in handling and disposal of Hazardous wastes.
CO4: Calculate the energy extraction potential from different types of wastes.
CO5: Device methods for safe dispose the E-Wastes

Pre-requisites: Nil

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(Pos)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S						S							
CO2	S						S						M	
CO3	S						S						M	
CO4	S						S						M	
CO5	S						S							

Course Assessment methods

1. Continuous Assessment Test I, II
2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, Prototype or Product Demonstration etc. (as applicable)
3. End Semester Examination

INTRODUCTION **9 Hours**

Principles of waste management. Waste minimization. Integrated waste management. Waste management and environmental protection. Waste management concept. Best management practices for sustainable development. Information systems in waste management. Legal Aspects of Environmental Management. Environmental Legislations in India. Swachh Bharat Mission and Smart Cities Program-MoEF Guideline.

SOLID WASTE MANGEMENT **9 Hours**

Introduction to Solid Waste Management Municipal Solid Waste Characteristics and Quantities MSW Rules 2016, Municipal Solid Waste Collection, Transportation, Segregation and Processing Disposal of Municipal Solid Waste Biochemical Processes and Composting. Current Issues in

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Solid Waste Management. Disposal of Solid Waste-Municipal solid waste in Indian conditions, legal aspects of solid waste disposal, Plastic waste ..Plastic waste disposal.

HAZERDEOUS WASTE AND BIOMEDICAL WASTE MANAGEMENT **9 Hours**

Hazardous waste definition – Physical and Health hazards wastes – Hazardous Waste Management and Handling Rules – Characterization of hazardous wastes Source reduction of hazardous wastes. Handling and storage of Hazardous wastes –Waste Compatability Chart – Hazardous Waste Transport- Manifest system – Transboundary movement of wastes – Basal Convention – Hazardous waste treatment technologies – Physical, chemical and thermal treatment of hazardous waste – Solidification – Chemical fixation – Encapsulation – Incineration. Secured landfills

ELECTRONIC WASTE **9 Hours**

Present scenario of E-Waste management in India- Composition of E-Waste and its generation rates .Effect of E-waste on human health, environment and society. Role of various stakeholders in E-waste management .Recover and recycling of Electronic Waste .Extraction of Rare-Earth Minerals. Rules and Legislation .Formal Metal extraction processes from E-Waste; Life-Cycle-Analysis (LCA) The challenges of E-Waste management for smart cities.

ENERGY FROM WASTE **9 Hours**

Characterization of wastes - Energy production form wastes through incineration, energy production through gasification of wastes - Energy production through pyrolysis and gasification of wastes, syngas utilization. - Densifications of solids, efficiency improvement of power plant and energy production from waste plastics. Week Energyproduction from waste plastics, gas cleanup- Energy production from organic wastes through anaerobic digestion and fermentation, introduction to microbial fuel cells - Cultivation of algal biomass from wastewater and energy production from algae.

Theory: 45	Tutorial: 0	Practical: 0	Project: 0	Total: 45 Hours

RFERENCES

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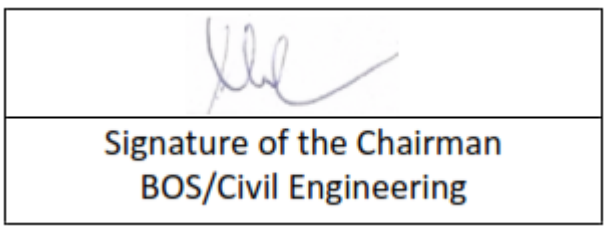


U17CEE0016 BUILDING INFORMATION MANAGEMENT

L	T	P	J	C
3	0	0	0	3

Course Objectives

- To understand strategies and aspects of building service requirements and the constraints involved in it.
- To plan buildings with proper interface integration

Course Outcome

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

CO1: Analyse the selection of various building materials, services and its structure
CO2: Understand the various environmental aspects involved in the building
CO3: Understand the integration of MEP systems in building construction
CO4: Identify the various components of infrastructure projects
CO5: Analyse the various aspects of safety and maintenance in construction

Pre-requisites: Nil

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(Pos)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1			M		M	M	M				M			M
CO2			M		M	M	M				M			M
CO3			M		M	M	M				M			M
CO4			M		M	M	M				M			S
CO5			M		M	M	M				M		S	

Course Assessment methods

1. Continuous Assessment Test I, II
2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, Prototype or Product Demonstration etc. (as applicable)
3. End Semester Examination

STRUCTURAL SYSTEM **9 Hours**

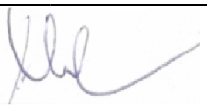
Systems for enclosing Buildings, Functional aesthetic system, materials selection and specification.

ENVIRONMENTAL ASPECTS AND SERVICES **9 Hours**

Qualities of enclosure necessary to maintain a specified level of interior environmental quality – Weather resistance – Thermal infiltration – Acoustic Control –Transmission reduction – Air quality – Illumination.

SYSTEM INTEGRATION **9 Hours**

Systems integration with structural systems, Mechanical, Plumbing – Electricity –Vertical



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circulation and their interaction-Technological demands on construction management in infrastructure development projects.

CONSTRUCTION AND INFRASTRUCTURE **9 Hours**

Construction component of various infrastructure projects, highway, railway, airports, harbour, power transmission lines -. Prospects of infrastructure sector, current scenario and future needs.

MAINTENANCE AND SAFETY **9 Hours**

Planning systems for least maintenance materials and construction – Access for maintenance – Feasibility for replacement of damaged components – Maintenance free exposed and finished surfaces, ability of systems to protect fire – preventive systems – fire escape system design – planning for pollution free construction- environmental constraints – Hazard free Construction execution.

Theory: 45	Tutorial: 0	Practical: 0	Project: 0	Total: 45 Hours

RFERENCES

1. E.C. Butcher and A.C. Parnell, Designing for Fire Safety, John Wiley and Sons, 1993.
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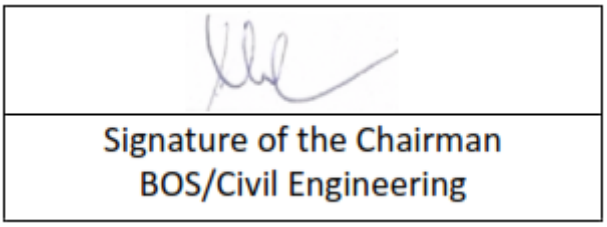


U17CEE0017 MASS TRANSIT MANAGEMENT

L	T	P	J	C
3	0	0	0	3

Course Objectives

This course discusses management methods of relevance to public transportation systems. Makes to understand strategic planning management, labor relations, maintenance planning and administration, and fare policy, and management information and decision support systems. The course explains the smart facilities and systems.

Course Outcomes

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

CO1: Understand the basic elements in mass transit modes.
CO2: Acquire the basic knowledge about strategic planning of networks
CO3: Understand the concepts of transit and crew scheduling.
CO4: Understand the organisational structure and performance measures.
CO5: Acquire the know-how of smart facilities and system in transit management.

Pre-requisites : Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S					M						M	S	
CO2				M		M						M	S	
CO3	S			M		S						M	S	
CO4				M		S						M	S	
CO5	S			M	M	S						S	S	

Course Assessment methods

1. Continuous Assessment Test I, II
2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, Prototype or Product Demonstration etc. (as applicable)
3. End Semester Examination

MASS TRANSIT MODES 9 Hours

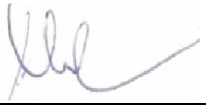
Introduction, modes of public transport and comparison, public transport travel characteristics, trip chaining, technology of bus, rail, rapid transit systems, basic operating elements

STRATEGIC MANAGEMENT AND PLANNING 9 Hours

Planning Objectives, principles, considerations, transit lines – types, geometry and characteristics, transit routes and their characteristics, timed transfer networks, prediction of transit usage, evaluation of network, accessibility considerations;

TRANSIT SCHEDULING 9 Hours

Components of scheduling process, determination of service requirements, scheduling procedure, marginal ridership, crew scheduling



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TRANSIT AGENCY AND ECONOMICS **9 Hours**

Organizational structure of transit agency, management and personnel, transit system statistics, performance and economic measures, operations, fare structure

SMART TRANSIT FACILITIES **9 Hours**

Bus stops and terminals – principles of good layout, types of layout, depot location, twin depot concept, crew facilities and amenities. Fleet maintenance – safety and security – Information system – Intelligent Transport system – Case studies.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45Hours**

REFERENCES

1. Ashish Verma and T.V. Ramanayya, Public Transport Planning and Management in Developing Countries, CRC Press Taylor and Francis group, 2014.
2. D. Johnson Victor and S. Ponnuswamy, Urban Transportation: Planning, Operation and Management, Tata McGraw hill, 2012.
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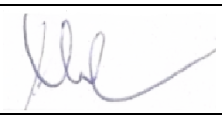

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U17CEE0018	RAILWAYS, AIRPORTS, DOCKS AND HARBOUR ENGINEERING	L	T	P	J	C
		3	0	0	0	3

Course Objectives

- To understand the basics and design of various components of railway engineering.
- To learn about the aircraft characteristics, planning and components of airport.
- To study about the types and components of docks and harbour.

Course Outcomes

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

CO1 : perform geometric design of permanent way
CO2 : plan for location of railway station, yards and other amenities
CO3 : prepare layout of airport and classify the airport
CO4 : perform the geometric design of airport components
CO5 : prepare the plan for various dock and harbour structures

Pre-requisites : Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	M		S									M	M	
CO2	M					S						M	M	
CO3			S			S						M	M	
CO4			S			S						M	M	
CO5	M		S			S						M	M	

Course Assessment methods

1. Continuous Assessment Test I, II
2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, Prototype or Product Demonstration etc. (as applicable)
3. End Semester Examination

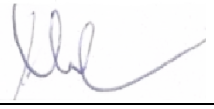
RAILWAY PLANNING AND CONSTRUCTION 9 Hours

Elements of permanent way – Rails, Sleepers, Ballast, rail fixtures and fastenings, Selection of gauges – Track Stress, coning of wheels, creep in rails, defects in rails – Route alignment surveys, conventional and modern methods–Geometric design of railway, gradient, super elevation, widening of gauge on curves-points and crossings.

RAILWAY CONSTRUCTION AND MAINTENANCE 9 Hours

Earthwork – Stabilization of track on poor soil – Track drainage – Calculation of Materials required for track laying – Construction and maintenance of tracks – Railway Station and yards and passenger amenities-Signalling- Urban rail- MRTS-Metro-mono rail.

AIRPORT PLANNING 9 Hours



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Air transport characteristics – airport classification – ICAO – airport planning: Site selection typical Airport Layouts, parking and Circulation Area

AIRPORT DESIGN **9 Hours**

Runway Design: Orientation, Wind Rose Diagram – Runway length – Problems on basic and Actual length, Geometric design of runways, Configuration and Pavement Design Principles – Elements of taxiway Design – Airport zones – Passenger Facilities and Services – Runway and Taxiway Markings and lighting

HARBOUR ENGINEERNG **9 Hours**

Definition of Basic terms : Harbour, Port, Satellite port, Docks, Waves and Tides – Planning and design of Harbours : Requirements, Classification, Location and design principles – harbour layout and terminal facilities- Coastal structures : Piers, Breakwaters, Wharves, jetties, Quays, Spring fenders, Dolphins and Floating Landing Stage- Environmental concern of Port operations – Coastal Regulation Zone, 2011.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45Hours**

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2. Satish Chandra and Agarwal M.M. "Railway Engineering", 2nd Edition, Oxford University Press, New Delhi, 2013.
3. Khanna S.K., Arora M.G and Jian S.S "Airport Planning and Design" Nemchand& Brothers, Roorkee, 2012.
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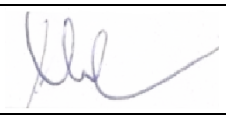

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