NANDHA ENGINEERING COLLEGE

(An Autonomous Institution affiliated to Anna University Chennai and approved by AICTE, New Delhi)
Erode-638 052, Tamilnadu, India, Phone: 04294 – 225585

Curriculum and Syllabi
for
B.E. - Civil Engineering [R15]
(1st to 8th Semesters)
[CHOICE BASED CREDIT SYSTEM]

(This Curriculum and Syllabi are applicable to Students admitted from the academic year 2015-2016 onwards)

JUNE 2018

Approved by Sixth Academic Council

B.E. - Civil Engineering PEOs and POs

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The following Programme Educational Objectives are designed based on the Department Mission to prepare the students to become graduates. The Civil Engineering education focuses on outcomes rather than simply on output. The courses offered are focused towards training the students to make them adaptable to any type of role in the different fields of Civil Engineering.

- **PEO1** To become a successful Civil Engineer and to meet the demand driven needs so as to prepare them industry ready in the field of Civil Engineering and related profession.
- **PEO2** To exhibit good depth of knowledge in core areas of Civil and allied Engineering.
- **PEO3** To communicate profound knowledge in fundamentals, techniques and design of Civil Engineering system that encourages them to develop innovative techniques in their professional practice.
- **PEO4** To develop an understanding of the multidisciplinary approach and an ability to relate Engineering issues to broader social and human context, in which their Engineering contributions will be utilized.
- **PEO5** To Engage in life-long continuous learning through independent study and participation in professional conferences, seminars and workshops.

PROGRAMME OUTCOMES (POs)

The Department comprising of Faculty and Experts from Academia and Industry together have defined the specific outcomes of the curriculum to be achieved by the Civil Engineering Students. These outcomes are as below.

PO1. An ability to apply knowledge of computing, fundamental mathematics, algorithmic principles and Civil Engineering theory in design to solve the real-world problems.

PO2. An ability to identify the basic principles, mathematical tools and apply the fundamentals in the field of engineering sciences.

PO3. An ability to make the graduates, who come with a background of social science and humanities, realize the impact of engineering solutions on the quality of life and physical environment in a global and societal context.

PO4. An ability to make graduates be aware of the continued research in the field of civil engineering and will actively engages themselves in research and development.

PO5. An ability to be aware of the emerging technologies, equip themselves with current techniques, tools and utilize the same to solve issues in the professional field.

PO6. An ability to understand the duties as professional engineers in the society, protect the public health, safety and welfare, act against plagiarism and respect the copyrights and patents of others.

PO7. An ability to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

PO8. An ability to apply the basic ethical principles with commitments in civil engineering field.

PO9. An ability to realize the importance of teamwork and work with in multi-disciplinary team.

PO10. An ability to communicate effectively on civil engineering activities with engineering society to produce reports through written, oral and graphical methods

PO11.An ability to recognize the role of a leader, leadership principles to manage projects in multi disciplinary environments

PO12. An ability to engage in continual professional development and life-long learning.

PROGRAMME SPECIFIC OBJECTIVES:

PSO1: To recognize the importance of Civil Engineering professional development by pursuing postgraduate studies.

PSO2: To face competitive examinations that offer challenging and rewarding careers.

PSO3: Ability to apply design, develop and execution of projects in the construction of various civil engineering disciplines.

PSO4: Ability to become a good entrepreneur and to improve the management skills.

NANDHA ENGINEERING COLLEGE (AUTONOMOUS), ERODE - 638 052

REGULATIONS – 2015 CHOICE BASED CREDIT SYSTEM

B.E. CIVIL ENGINEERING

CURRICULUM: I - VIII SEMESTERS SYLLABUS: V & VI SEMESTERS

SEMESTER: I								
SL.No.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15EY101	Communicative English	HS	3	1	0	2	2
2.	15MY101	Linear Algebra, Analytical Geometry and Calculus	BS	5	3	2	0	4
3.	15PY101	Engineering Physics	BS	3	3	0	0	3
4.	15CY101	Engineering Chemistry	BS	3	3	0	0	3
5.	15MEC01	Engineering Graphics	ES	4	2	0	2	3
6.	15CE101	Applied Mechanics	ES	5	3	2	0	4
PRACTICALS								
7.	15GY111	Physics and Chemistry Laboratory I	BS	4	0	0	4	2
8.	15GY112	Soft Skills I	HS	2	0	0	2	1
9.	15GYC11	Engineering Practices Laboratory	ES	4	0	0	4	2
			TOTAL	**33**	**15**	**4**	**14**	**24**

SEMESTER: II								
SL.No.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15EY201	Professional English	HS	3	1	0	2	2
2.	15MY201	Multivariable Calculus and Laplace Transform	BS	5	3	2	0	4
3.	15PY201	Materials Physics	ES	3	3	0	0	3
4.	15CY201	Environmental Science and Engineering	HS	3	3	0	0	3
5.	15EEC01	Basic Electrical and Electronics Engineering	ES	3	3	0	0	3
6.	15CSC01	Problem solving and C programming	ES	3	3	0	0	3
PRACTICALS								
7.	15GY211	Physics and Chemistry Laboratory - II	BS	4	0	0	4	2
8.	15GY212	Soft Skills – II	HS	2	0	0	2	1
9.	15CSC11	Computer Programming Laboratory	ES	2	0	0	2	1
10.	15CE211	Building Drawing I	PC	4	0	0	4	2
			TOTAL	**32**	**16**	**2**	**14**	**24**

SEMESTER: III								
SL.No.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15MY301	Fourier Series Partial Differential Equations and Probability	BS	5	3	2	0	4
2.	15CE301	Engineering Geology	PC	3	3	0	0	3
3.	15CE302	Mechanics of Solids – I	ES	5	3	2	0	4
4.	15CE303	Mechanics of Fluids	PC	3	3	0	0	3
5.	15CE304	Construction Materials and Technology	PC	3	3	0	0	3
6.	15CE305	Surveying	PC	3	3	0	0	3
PRACTICALS								
7.	15CE311	Survey Laboratory	PC	4	0	0	4	2
8.	15CE312	Material Testing Laboratory	PC	4	0	0	4	2
9.	15CE313	Building Drawing – II	PC	4	0	0	4	2
10.	15GYC12	Soft Skills – Listening and Speaking	MC	2	0	0	2	0
			TOTAL	**36**	**18**	**4**	**14**	**26**

SEMESTER: IV								
SL.No	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15MY402	Numerical Methods	BS	5	3	2	0	4
2.	15CE401	Mechanics of Solids – II	ES	5	3	2	0	4
3.	15CE402	Hydraulic Structures and Machinery	PC	3	3	0	0	3
4.	15CE403	Soil Mechanics	PC	3	3	0	0	3
5.	15CE404	Concrete Technology	PC	3	3	0	0	3
6.	15CE405	Highway Engineering	PC	3	3	0	0	3
PRACTICALS								
7.	15CE411	Hydraulics Engineering Laboratory	ES	4	0	0	4	2
8.	15CE412	Soil Mechanics Laboratory	PC	4	0	0	4	2
9.	15CE413	Survey Camp*	EEC	2	0	0	2	1
10.	15GYC13	Soft Skills – Reading and Writing	MC	2	0	0	2	0
			TOTAL	**34**	**18**	**4**	**12**	**25**

*Ten Days Survey Camp will be conducted during 3rd semester winter vacation

SEMESTER: V								
SL.No	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15CE501	Structural Analysis – I	PC	5	3	2	0	4
2.	15CE502	Design of Reinforced Concrete Elements	PC	5	3	2	0	4
3.	15CE503	Foundation Engineering	PC	3	3	0	0	3
4.	15CE504	Environmental Engineering	PC	3	3	0	0	3
5.	E-I	Elective - I (PE)	PE	3	3	0	0	3
PRACTICALS								
6.	15CE511	Concrete and Highway Engineering Laboratory	PC	4	0	0	4	2
7.	15CE512	Environmental Engineering Laboratory	PC	4	0	0	4	2
8.	15GY511	Soft Skills Aptitude and Reasoning - I	MC	2	0	0	2	0
			TOTAL	**29**	**15**	**4**	**10**	**21**

SEMESTER: VI								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15CE601	Structural Analysis – II	PC	5	3	2	0	4
2.	15CE602	Basics of Dynamics and Aseismic Design	PC	3	3	0	0	3
3.	15CE603	Design of Reinforced Concrete and Brick Masonry Structures	PC	3	3	0	0	3
4.	15CE604	Design of Steel Structures	PC	5	3	2	0	4
5.	E-2	Elective - II (PE)	PE	3	3	0	0	3
6.	E-3	Elective - III (PE)	PE	3	3	0	0	3
PRACTICALS								
7.	15CE611	Design and Drafting Laboratory	PC	4	0	0	4	2
8.	15CE612	Employability Skills – I	EEC	2	0	0	2	0
9.	15GE611	Comprehension	EEC	2	0	0	2	1
			TOTAL	**30**	**18**	**4**	**8**	**23**

SEMESTER: VII								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15CE701	Quantity Surveying and Estimation#	PC	5	3	0	2	4
2.	E-4	Elective - IV (PE)	PE	3	3	0	0	3
3.	E-5	Elective - V (PE)	PE	3	3	0	0	3
4.	E-6	Elective - VI (PE/OE)	PE/OE	3	3	0	0	3
5.	E-7	Elective - VII (OE)	OE	3	3	0	0	3
PRACTICALS								
6.	15CE711	Design Project	EEC	8	0	0	8	4
7.	15CE712	Practical Training**	EEC	0	0	0	1	0
8.	15CE713	Employability Skills –II	EEC	2	0	0	2	0
9.	15GE711	Personality and Character Development	EEC	1	0	0	1	0
			TOTAL	**28**	**15**	**0**	**14**	**20**

Theory cum Practical Component

** Practical training to be undergone during 3rd to 6th Semester Vacation - Minimum of 15 days duration

SEMESTER: VIII								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	E-8	Elective - VIII (PE/OE)	PE/OE	3	3	0	0	3
2.	E-9	Elective - IX (OE)	OE	3	3	0	0	3
PRACTICALS								
3.	15CE831	Project Work	EEC	20	0	0	16	8
			TOTAL	**26**	**6**	**0**	**16**	**14**

Total Credits: 24 + 24 + 26 + 25 + 21 + 23+ 20 + 14 = 177

PROFESSIONAL ELECTIVES (PE) I, II, III, IV, V, VI & VIII							
Course Code	**Course Title**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
15CEX01	Architecture and Town Planning	PE	3	3	0	0	3
15CEX02	Remote Sensing and GIS	PE	3	3	0	0	3
15CEX03	Construction Planning and Scheduling	PE	3	3	0	0	3
15CEX04	Transport Planning and Management	PE	3	3	0	0	3
15CEX05	Ground Improvement Techniques	PE	3	3	0	0	3
15CEX06	Hydrology	PE	3	3	0	0	3
15CEX07	Modern Construction Materials	PE	3	3	0	0	3
15CEX08	Railways, Airport and Harbour Engineering	PE	3	3	0	0	3
15CEX09	Irrigation Engineering	PE	3	3	0	0	3
15CEX10	Green Buildings	PE	3	3	0	0	3
15CEX11	Smart Materials and Structures	PE	3	3	0	0	3
15CEX12	Housing Planning and Management	PE	3	3	0	0	3
15CEX13	Traffic Engineering	PE	3	3	0	0	3
15CEX14	Ground Water Engineering	PE	3	3	0	0	3
15CEX15	Prefabricated Structures	PE	3	3	0	0	3
15CEX16	Municipal Solid Waste Management	PE	3	3	0	0	3
15CEX17	Repair and Rehabilitation of Structures	PE	3	3	0	0	3
15CEX18	Industrial Wastes Treatment and Disposal	PE	3	3	0	0	3
15CEX19	Construction Management	PE	3	3	0	0	3
15CEX20	Safety in Construction	PE	3	3	0	0	3
15CEX21	Environmental Impact Assessment	PE	3	3	0	0	3
15CEX22	Corrosion and its Control	PE	3	3	0	0	3
15CEX23	Interior Decoration	PE	3	3	0	0	3
15CEX24	Prestressed Concrete Structures	PE	3	3	0	0	3
15CEX25	Pavement Design	PE	3	3	0	0	3
15CEX26	Geosynthetics in Civil Engineering	PE	3	3	0	0	3
15GEC01	Principles of Management	PE	3	3	0	0	3
15GEC03	Professional Ethics and Human Values	PE	3	3	0	0	3
15GEC04	Total Quality Management	PE	3	3	0	0	3
15GEC07	Economics and Business Finance for Civil Engineers	PE	3	3	0	0	3

OPEN ELECTIVES (OE)								
SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	15CEZ01	Energy conservation in buildings	OE	3	3	0	0	3
2.	15CEZ02	Waste Management	OE	3	3	0	0	3
3.	15CEZ03	Air Pollution Management	OE	3	3	0	0	3
4.	15CEZ04	Building Services	OE	3	3	0	0	3
5.	15CSZ01	Software Engineering Methodologies	OE	3	3	0	0	3
6.	15CSZ02	Design Thinking	OE	3	3	0	0	3
7.	15CSZ03	Open Source Software	OE	3	3	0	0	3
8.	15CSZ04	Information Security	OE	3	3	0	0	3
9.	15ECZ01	Avionics	OE	3	3	0	0	3
10.	15ECZ02	Consumer Electronics	OE	3	3	0	0	3
11.	15ECZ03	Modern wireless communication system	OE	3	3	0	0	3
12.	15ECZ04	Electronic Testing	OE	3	3	0	0	3
13.	15EEZ01	Renewable Energy Technology	OE	3	3	0	0	3
14.	15EEZ02	Energy Conservation and Auditing	OE	3	3	0	0	3
15.	15EEZ03	Electrical Machines	OE	3	3	0	0	3
16.	15EEZ04	Wind and Solar Electrical Systems	OE	3	3	0	0	3
17.	15EIZ01	Autotronix	OE	3	3	0	0	3
18.	15EIZ02	Fiber Optic Sensors	OE	3	3	0	0	3
19.	15EIZ03	Industrial Automation	OE	3	3	0	0	3
20.	15EIZ04	Ultrasonic Instrumentation	OE	3	3	0	0	3
21.	15ITZ01	PC Hardware and Trouble Shooting	OE	3	3	0	0	3
22.	15ITZ02	Cyber Crime Investigations and Digital Forensics	OE	3	3	0	0	3
23.	15ITZ03	Developing Mobile Apps	OE	3	3	0	0	3
24.	15ITZ04	Software Project Management	OE	3	3	0	0	3
25.	15MEZ01	Six Sigma	OE	3	3	0	0	3
26.	15MEZ02	Project Management	OE	3	3	0	0	3
27.	15MEZ03	Electric Vehicle Technology	OE	3	3	0	0	3
28.	15MEZ04	Value Engineering	OE	3	3	0	0	3
29.	15MYZ01	Mathematical Structures	OE	3	3	0	0	3
30.	15MYZ02	Optimization Techniques	OE	3	3	0	0	3
31.	15MYZ03	Statics for Engineers	OE	3	3	0	0	3
32.	15MYZ04	Statistics for Engineers	OE	3	3	0	0	3
33.	15PYZ01	Nanomaterials	OE	3	3	0	0	3
34.	15PYZ02	Nuclear physics and reactors	OE	3	3	0	0	3
35.	15PYZ03	Space science and technology	OE	3	3	0	0	3
36.	15CYZ01	Chemistry for engineers	OE	3	3	0	0	3
37.	15CYZ02	Soil chemistry	OE	3	3	0	0	3
38.	15CYZ03	Organic chemistry	OE	3	3	0	0	3

15EY101 COMMUNICATIVE ENGLISH
(Common to All Branches)

L	T	P	C
1	0	2	2

OBJECTIVES:

- To improve their lexical, grammatical and communicative competence.
- To enhance their communicative skills in real life situations.
- To assist students understand the role of thinking in all forms of communication.
- To equip students with oral and appropriate written communication skills.
- To assist students with employability and job search skills.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1: Express their opinions clearly, speak convincingly, initiate a discussion, negotiate, and argue using appropriate communicative strategies.

CO2: Explain effectively and persuasively and produce different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.

CO3: Relate different genres of texts infer implied meanings and critically analyze and evaluate them for ideas as well as for method of presentation.

CO4: Infer unspoken and implied meanings and comprehend different spoken excerpts critically.

CO5: Develop their professional communication skills.

UNIT I: GRAMMAR **(9)**

Parts of Speech – Basic sentence structures- Types of sentences- Auxiliary verbs – Modal Auxiliaries- Articles - Prepositions –Tenses - Voices - Subject-Verb Agreement – Different Grammatical forms of the same word.

UNIT II: VOCABULARY **(9)**

Synonyms – Antonyms – One Word Substitution – Words often Confused - Compound nouns- Countable and Uncountable Nouns–Spelling rules - Homophones and Homonyms.

UNIT III: CONVERSATIONAL SKILLS **(9)**

Strategies for Good Conversation – Improving fluency and Self Expression – Articulation – Voice quality – Role-play – One minute talk.

UNIT IV: COMPREHENSIVE LISTENING AND READING **(9)**

Effective listening Strategies – Listening to Speeches and Lectures – Listening to Announcements – Listening and Gap Filling – Listening to Interviews – Reading Comprehension (Extensive Reading).

UNIT V: TECHNICAL WRITING **(9)**

Interpretation of Data – Highlighting problems & suggesting solution – Apology Letter – Inviting Dignitaries – Permission to undergo Industrial visit – Jumbled Sentences.

TOTAL (L:45) =45 PERIODS

TEXT/ REFERENCES BOOKS

1. Rizvi, Ashraf.M, "Effective Technical Communication", Tata McGraw Hill Publishing Company Limited, New Delhi, 2006.
2. Norman Whitby, Business Benchmark – Pre-Intermediate to Intermediate, Students Book, Cambridge University Press, 2006
3. Hewings. M, "Advanced English Grammar", Cambridge University Press, Chennai, 2000.
4. Raman M & Sangeetha Sharma, "Technical Communication", Oxford University Press, USA, 2005.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1						x			x	x	x	
2						x			x	x	x	
3						x			x	x	x	
4										x		
5						x			x	x	x	

15MY101 - LINEAR ALGEBRA, ANALYTICAL GEOMETRY AND CALCULUS

(Common to B.E .- MECH. &CIVIL Engineering Branches)

L	T	P	C
3	2	0	4

OBJECTIVES:

- To identify, formulate and solve Engineering problems.
- To use the techniques, Skills and Engineering tools necessary for Engineering practice.
- To learn further topics of Mathematics in higher semesters in a graded manner.
- To appreciate the important role of Mathematical concepts in Engineering applications.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1. Be capable of identifying algebraic Eigen value problems from practical areas and obtain the Eigen solutions in certain cases and to have acquired the technique of diagonalizing a matrix which would render the Eigen solution procedure very simple.

CO2. Have a sound knowledge of Three dimensional Cartesian co-ordinates, straight lines, plane and sphere, essential concepts for an engineer which would be encountered by them in their engineering subjects in the same or higher semesters.

CO3. To make the student knowledgeable in the area of infinite sequences and series and their convergence geometrical aspects of curvature, essential concepts for an engineer, as elegant applications of differential calculus.

CO4. Have grasped the basis of complex integration and the concept of contour integration which is an important tool for evaluation of certain integrals encountered in practice.

CO5. Have learnt the method of solving differential equations of certain types, including systems of differential equations that they might encounter in their studies of other subjects in the same or higher semesters.

UNIT I: MATRICES **(9)**

Characteristic equation-Eigen values and Eigen vectors of a real matrix-Properties of Eigen values and Eigen vectors (without proof)-Cayley Hamilton Theorem (statement only) and its applications- Orthogonal transformation of a symmetric matrix to diagonal form - Quadratic form -Nature of Quadratic form.

UNIT II: THREE DIMENSIONAL ANALYTICAL GEOMETRY **(9)**

Direction cosines and ratios– Angle between two lines – Equation of a plane – Equation of a straight line – Coplanar lines – Shortest distance between skew lines – Sphere – Tangent plane – Plane section of a sphere – Orthogonal spheres.

UNIT III: SERIES AND DIFFERENTIAL CALCULUS **(9)**

Sequences: Definition and Examples- Series: Types and convergence-Series of positive terms- Test of convergence: Comparison test, Cauchy's condensation test (without proof)-simple problem – Curvature in Cartesian coordinates– Centre and radius of curvature – Circle of curvature (Simple and Standard Questions be asked).

UNIT IV: COMPLEX INTEGRATION **(9)**

Cauchy's integral theorem and Integral formula – Taylor's and Laurent's series - Singularities - Residues – Residue theorem (Statement only) - Application of Residue theorem to evaluate real integrals – Evaluation of contour integrals of the type (i) Around unit circle $\int_0^{2\pi} f(\cos\vartheta, \sin\theta)d\theta$ (ii) $\int_{-\infty}^{\infty} \frac{P(x)}{Q(x)}dx$ with no pole on real axis.

UNIT V: ORDINARY DIFFERENTIAL EQUATIONS **(9)**

Higher order linear differential equations with constant coefficients - Method of variation of parameters - Homogeneous equation of Euler's type and Legendre's type.

TOTAL (L:45+T:30)=75 PERIODS

Approved by third Academic council

TEXT BOOKS

1. Dr.B.S.Grewal, "Higher Engineering Mathematics", 42nd Edition, Khanna publications, 2012.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", 9th Edition, John Wiley & sons, 2013.
3. Veerarajan.T, "Engineering Mathematics for first year", Third Edition, Tata McGraw Hill,2011.

REFERENCES

1. N.P.Bali, Manish Goyal, "A text book of Engineering Mathematics: Sem-II", 5th Edition, Laxmi Publications.2011.
2. P.Kandasamy, K.Thilagavathy,K.Gunavathy,"Engineering Mathematics for first Year", 9th Rv. Ed., S.Chand & Co Ltd, 2013.
3. Glyn James, "Advanced Engineering Mathematics", 7thEdition, Wiley India, (2007).
4. N.K.Venkatasubramanian,"Engineering Mathematics",Vikas Publishing House Private Ltd,(2000).
5. T.K.Manicavachagom Pillai, T.Natarajan, K.S.Ganapathy, "Algebra", Viswananthan Publishers.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

	Mapping of COs and POs											
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x		x		x		x				
2	x	x		x	x	x		x		x		
3	x	x		x	x							x
4	x			x	x							x
5	x				x							x

15PY101 - ENGINEERING PHYSICS
(Common to All Branches)

L	T	P	C
3	0	0	3

OBJECTIVES:

- To provide the basic ideas in large number of engineering subjects.
- To develop the skills of the students in physics under various applications.
- To provide knowledge in wave and particle physics.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1: Acquire knowledge regarding Acoustics and ultrasonic.

CO2: Applying knowledge in the areas of laser and fiber optic technique.

CO3:.Design the sensors using the knowledge of fiber optics

CO4 : Gaining knowledge about wave, particle nature and matter waves

CO5 : Analyze the different kind of crystal structures and gain knowledge about crystal growth

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UNIT I - ACOUSTICS & ULTRASONCIS **(9)**

Classification of sound – characteristics of musical sound – loudness – Weber – Fechner law – absorption coefficient – reverberation – reverberation time – Sabine's formula (growth & decay). Factors affecting acoustics of buildings and their remedies.

Ultrasonic: Introduction - properties of ultrasonics - magnetostriction - piezo electric methods. Medical application: Sonogram - Engineering Application: Ultrasonic A B C scan methods

UNIT II - OPTICS & LASER TECHNOLOGY **(9)**

Interference: Air wedge – theory – uses – testing of flat surfaces – determination of thickness of a thin wire.

Types of lasers – Nd – YAG laser – CO_2 laser – semiconductor laser (homojunction & hetrojuction). Applications: Determination of particle size using laser - Holography – construction – reconstruction – Lasers in industry (Material Processing) and Medical field (Surgery)

UNIT III - FIBER OPTICS AND SENSORS **(9)**

Principle of light transmission through fiber - epression for acceptance angle and numerical aperture – Fabrication of optical fibers- Double crucible method - types of optical fibers (material, refractive Inde profile and mode) fiber optic communication system. Splicing – Applications of optical fiber - Sensors- temperature- pressure sensor and displacement sensor Medical Endoscope.

UNIT IV - WAVE AND PARTICLE PHYSICS **(9)**

Development of quantum theory – de Broglie wavelength – properties of matter waves - G.P Thomson eperiment - Schrödinger's wave equation – time dependent – time independent wave equations – physical significance – applications – particle in a one dimensional potential bo - Compton Effect – theory and eperimental verification.

UNIT V - CRYSTALOGRAPHY **(9)**

Lattice – unit cell – Bravais lattices – lattice planes – Miller indices – 'd' spacing in cubic lattice – calculation of number of atoms per unit cell – atomic radius – coordination number – packing factor for SC, BCC, FCC and HCP structures – Crystal growth techniques- solution, melt (Czochralski) and vapour growth techniques(qualitative)

TOTAL (L:45) = 45 PERIODS

TET BOOKS:

1. V. Rajendran, Engineering Physics, Tata McGraw-Hill, New Delhi, 2011.
2. K. Tamilarasan, K. Prabu, Engineering Physics I, Second Edition, Tata McGraw-Hill. New Delhi. 2011
3. Senthilkumar. G Engineering Physics I VRB Publishers, 2011

REFERENCES:

1. P. K. Palanisami, Physics for Engineers, Vol. 1, Scitech Pub. (India) Pvt. Ltd., Chennai, 2002.
2. M. N. Avadhanulu and P. G. Kshirsagar, A Tetbook of Engineering Physics, S. Chand & Company Ltd., New Delhi, 2005
3. V. Rajendran and A. Marikani, Physics I, TMH, New Delhi, 2004.
4. R. K. Gaur and S. L. Gupta, Engineering Physics, Dhanpat Rai Publishers, New Delhi, 2006.

Approved by third Academic council

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1			x			x				x		x
2		x				x			x		x	
3			x			x					x	x
4												
5		x							x		x	

15CY101 - ENGINEERING CHEMISTRY
(Common for all Branches)

L	T	P	C
3	0	0	3

OBJECTIVES:

- The students should be conversant with the principles of water characterization and treatment of potable and industrial purposes.
- The students are able to study about the principles of electrochemistry, energy storage devices, principles of corrosion control and chemical kinetics.
- Principles of polymer chemistry and Engineering applications of polymers and adsorption.
- Have gained a well founded knowledge of chemistry of fuels and lubricants.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO 1 Apply knowledge of fundamental principles of chemistry.
CO 2. Define and solve engineering problems, including the utilization of creative and innovative skills.
CO 3. Gain practical experience with chemical process equipment as well as to analyze and interpret data.
CO 4. Understand the impact of engineering solutions in a global, economic, environmental and societal context.
CO 5. Gain the knowledge about fuels and lubricants..

UNIT I WATER TECHNOLOGY **(9)**

Hardness-types,- estimation by EDTA method - domestic water treatment - disinfection methods (chlorination, ozonation and UV treatment) - boiler troubles (scale, sludge, priming, foaming and caustic embrittlement) - eternal conditioning - demineralization process - desalination - reverse osmosis method. Determination of Fe in water by colorimetry - determination of sodium in water by flame photometry.

UNIT II ELECTROCHEMISTRY AND CORROSION **(9)**

Electrochemistry - electrode potential - - reference electrode - standard hydrogen electrode (SHE) and calomel electrode - Nernst equation and problems, potentiometric titration (redo). Conductance measurements - conductometric titration (acid-base). Batteries - types,- lead acid battery. Corrosion - Chemical corrosion - electrochemical corrosion - corrosion control - sacrificial anode method.

UNIT-III POLYMERS AND NANOMATERIALS **(9)**

Polymers – classification, addition, condensation and co polymerization - plastics - thermoplastics and thermosetting plastics - preparation , properties and uses of PVC, PET, teflon and nylon. Polymer processing – compression and injection moulding techniques. Nanomaterials - Carbon nanotubes - synthesis and their applications.

UNIT IV CHEMICAL KINETICS AND SURFACE CHEMISTRY **(9)**

Order of a reaction (definition) - kinetics of first order reaction – acid catalysed hydrolysis of ester, - kinetics of second order reaction – base catalysed hydrolysis of ester - Arrhenius equation - effect of temperature on reaction rate - Surface chemistry: Adsorption - types of adsorption - Langmuir adsorption isotherm – role of adsorption in catalytic reactions.

UNIT V FUELS AND LUBRICANTS **(9)**

Fuels: Coal - proimate analysis - metallurgical coke - manufacture by Otto-Hoffmann method. Liquid fuels - knocking - octane number and cetane number - synthetic petrol - Fischer Tropsch and Bergius processes. Lubricants - properties– viscosity inde, flash and fire points, cloud and pour points and oiliness – Flue gas analysis – Orsat apparatus.

TOTAL (L:45) = 45 PERIODS

TET BOOKS:

1. .C.Jain and Monica Jain, Engineering Chemistry vol I & II, Dhanpat Rai Pub.Co., New Delhi,15th Edition (2013).
2. S.S.Dara, A Tet book of Engineering Chemistry, S.Chand & Co.Ltd ., New Delhi(2014).
3. Dr.A.Ravikrishnan,Engineering chemistry I & Engineering chemistry II., Sri Krishna Hitech Publishing co. Pvt .Ltd., Chennai,13th Edition (2012).

REFERENCES:

1. N.Krishnamurthy, P.Vallinayagam and D. Madhavan, Engineering Chemistry, PHI learning private Ltd, New Delhi(2009).
2. B.Sivashankar , Engineering Chemistry, Tata Mcgraw-Hill Pub. Co. Ltd. New Delhi (2008)
3. R.Sivakumar and N.Sivakuamr, Engineering Chemistry, Tata McGraw-Hill publishing company limited, New Delh(2009).

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x				x		x	x	x	
2	x	x	x			x	x		x			x
3		x	x				x			x	x	
4	x	x				x	x		x			
5			x									x

15MEC01 - ENGINEERING GRAPHICS

(Common to All Branches except MECH.)

L	T	P	C
2	0	2	3

OBJECTIVES:

- To learn knowledge on the basics of Engineering Drawings and Procedures.
- To understand the principles involved in graphic skill for communication of concepts, ideas and design of Engineering products.
- To learn and expose the technical drawing existing to related national standards in various Engineering field.
- To understand and practice the drawings

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1. Understand the concepts of Conics.
CO2. Create the projection of point, straight line and plane
CO3. Draw the drawing of various solids.
CO4. Familiar with section of solids in different cutting planes
CO5. Create drawings and layouts of a product in 3D.

CONCEPTS AND CONVENTIONS:

Importance of graphics in engineering applications - Use of drafting instruments - BIS conventions and specifications - Size, layout and folding of drawing sheets - Lettering and dimensioning.

UNIT I GEOMETRICAL CONSTRUCTIONS AND PLANE CURVES **(12)**

Geometrical constructions: Dividing a given straight line into any number of equal parts, bisecting a given angle, drawing a regular polygon given one side, special methods of constructing a pentagon and a hexagon Curves used in engineering practices: Conics - Construction of ellipse, Parabola and hyperbola by eccentricity method - Construction of cycloid - construction of involutes of squad and circle - Drawing of tangents and normal to the above curves.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES **(12)**

Projection of points and straight lines located in the first quadrant - Determination of true lengths and true inclinations - Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT III PROJECTION OF SOLIDS **(12)**

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method

UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES **(12)**

Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other - Obtaining true shape of section - Development of lateral surfaces of simple and truncated solids - Prisms, pyramids, cylinders and cones- Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.

UNIT V ISOMETRIC, PERSPECTIVE PROJECTIONS **(12)**

Principles of isometric projection - isometric scale - isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones. Perspective projection of prisms, pyramids and cylinders by visual ray method.

TOTAL (L:30+P:30) = 60 PERIODS

TEXT BOOKS:

1. Venugopal.K, PrabhuRaja.V, "Engineering Drawing+AutoCAD", 5th ed., Reprint, New Age International, 2011.

REFERENCES:

1. BasantAgarwal and Agarwal C.M.,"Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
2. Natrajan.K.V, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2006.
3. Kumar.M.S, "Engineering Graphics", D.D. Publications, 2007.
4. Bhatt.N.D, "Engineering Drawing" Charotar Publishing House, 2011.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x		x					x	x	x	x
2	x	x				x		x		x		
3	x									x		x
4	x					x		x		x		
5	x				x				x	x	x	

15CE101 APPLIED MECHANICS

L	T	P	C
3	2	0	4

OBJECTIVES:

- To understand the scalar and vector representation of forces and moments.
- To apply static equilibrium of particles and rigid bodies in two dimensions.
- Understand the meaning of centre of gravity (mass) / Centroid and Moment of Inertia
- To communicate the solution to all problems in an organized and coherent manner and elucidate the meaning of the solution in the context of the problem.
- To understand the principle of work and energy, laws of motion & kinematics of motion.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1. Understand the Equilibrium of a particle and Forces in space
CO2. Analyze the problems in static equilibrium of particles and rigid bodies in two dimensions
CO3. Evaluate various sectional properties like Centroid, Moment of Inertia.
CO4. Identify with the laws of motion, the kinematics of motion and the interrelationship.
CO5. Realize the effect of friction on equilibrium.

UNIT I BASICS & STATICS OF PARTICLES **(9)**

Introduction - Units and Dimensions - Laws of Mechanics - Lame's theorem, Parallelogram and triangular Law of forces - Coplanar Forces - Resolution and Composition of forces - Equilibrium of a particle - Forces in space - Equilibrium of a particle in space - Equivalent systems of forces.

UNIT II EQUILIBRIUM OF RIGID BODIES **(9)**

Free body diagram - Types of supports and their reactions - requirements of stable equilibrium - Moments and Couples - Moment of a force about a point and about an axis - Varignon's theorem - Equilibrium of Rigid bodies in two dimensions

UNIT III PROPERTIES OF SURFACES AND SOLIDS **(9)**

Determination of Areas and Volumes - Centre of Gravity - First moment of area and the Centroid of sections - Rectangle, circle, triangle from integration - T section, I section, Angle section, Hollow section by using standard formula. Second and product moments of plane area - Rectangle, triangle, circle from integration - T section, I section, Angle section, Hollow section by using standard formula - Parallel axis theorem and perpendicular axis theorem - Polar moment of inertia - Principal moments of inertia of plane areas - Principal axes of inertia - Mass moment of inertia in simple solids.

UNIT IV DYNAMICS OF PARTICLES **(9)**

Displacements, Velocity and acceleration, their relationship – Relative motion – Curvilinear motion – Newton's laws of motion – Work Energy Equation– Impulse and Momentum – Impact of elastic bodies.

UNIT V FRICTION **(9)**

Frictional force - Laws of Coulomb friction - Angle of friction - cone of friction - Simple contact friction - Ladder friction - Wedge Friction - Rolling Resistance - Problems involving the equilibrium of rigid bodies with frictional forces

TOTAL (L:45+T:30) = 75 PERIODS

TEXT BOOKS:

1. Dr. N. Koteeswaran, "Engineering Mechanics", Sri Balaji Publications, Coimbatore, 2013.
2. Dr. R. K. Bansal "A Textbook of Engineering Mechanics", Laxmi Publications (P) Ltd, New Delhi, 6th Edition, 2015.

REFERENCES:

1. M.S. Palanichamy and S. Nagam, "Engineering Mechanics - Statics & Dynamics", 3rd Edition. Tata McGraw-Hill, 2004.
2. S. Rajasekaran, G. Sankarasubramanian, "Fundamentals of Engineering Mechanics", 3rd Edition. Vikas Publishing House Pvt. Ltd, 2009.
3. F. P. Beer and E. R. Johnson, Vector Mechanics for Engineers, Vol I - Statics, Vol II Dynamics, 9th Edition, Tata McGraw Hill, India, 2011
4. Irving H. Shames, "Engineering Mechanics - Statics and Dynamics", 4th Edition., Pearson Education Asia Pvt. Ltd., 2005.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x		x	x					x	x	x
2	x	x		x	x		x			x		x
3	x	x	x	x			x		x	x	x	x
4	x	x				x	x	x		x		
5	x	x		x	x	x		x				x

15GY111 - PHYSICS AND CHEMISTRYLABORATORY- I

(Common to All Branches)

L	T	P	C
0	0	4	2

OBJECTIVES:

- To provide the basic practical exposure to all the engineering and technological streams in the field of physics.
- The students are able to know about the water containing impurities and some physical parameters.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1 : Acquire the fundamental knowledge in optics such as interference, Diffraction and Understand about the spectral instruments etc.

CO2 : Gain the basic knowledge about handling the laser light and Identify the basic parameters of an optical fibre.

CO3 : Analyze the properties of matter with sound waves.

CO4 : Apply knowledge of measurement of hardness producing ions, chloride, alkalinity, DO, conductance, EMF and pH

CO5 : Understand the impact of water quality and solve engineering problems

LIST OF EXPERIMENTS:

PHYSICS LABORATORY-I

1. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
2. Determination of thickness of a thin wire – Air wedge method.
3. Determination of laser parameters - wavelength, particle size and angle of Divergence of a Laser.
4. Determination of acceptance angle and numerical aperture of an optical fiber.
5. Determination of wavelength of mercury spectrum – spectrometer grating.
6. Determination of Hysteresis loss in a ferromagnetic material.

CHEMISTRY LABORATORY- I

1. Estimation of hardness of Water by EDTA
2. Conductometric titration of strong acid Vs strong base
3. Determination of DO in water (Winkler's method)
4. Estimation of Chloride in a Water sample (Argentometric)
5. Conductometric precipitation titration using barium chloride and sodium sulphate
6. Determination of molecular weight and degree of polymerization using viscometry.

TOTAL (P:60) = 60 PERIODS

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x						x		x	x
2	x	x				x	x					x
3	x	x			x		x				x	x
4												
5												x

15GY112- SOFT SKILLS – I
(Common to All Branches)

L	T	P	C
0	0	2	1

OBJECTIVES:

- To develop inter personal skills and be an affective goal oriented team player.
- To develop professionals with idealistic, practical and moral values.
- To develop communication in writing techniques.
- To re-engineer attitude and understand its influence on behaviour.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1. Analyze their strength and weakness.
CO2. Understand the importance of non verbal communication.
CO3. Get exposure about the fundamentals of GDs and Interviews.
CO4. Communicate and present their ideas.
CO5. Know how to prepare Resume and write Report efficiently.

UNIT I **(6)**

Self-Analysis – Self Introduction – Ice breaking - Identify strength and weakness – Self- esteem and Confidence.

UNIT II **(6)**

Non-Verbal – Body Language of self and others
Presentation Skills – Stages involved in an effective presentation – Selection of topic, content, aids – Engaging the audience - Time management.

UNIT III **(6)**

Group Discussion – Understanding the objective and skills tested in GD – Types of GD – Roles in a GD – Do's & Don'ts – Video Modules, fundamentals of placement techniques.
Interview Skills – Self preparation checklist – Grooming tips (Do's& Don'ts) – Video Modules.

UNIT IV **(6)**

Out of box thinking and General behaviours.

UNIT V **(6)**

Preparing Resume and Report.

TOTAL (P:30) = 30 PERIODS

REFERENCE:

1. Andrews, Sudhir. 1988. *How to Succeed at Interviews*. 21st Reprint. Tata McGraw-Hill. New Delhi.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1									x	x	x	x
2									x	x	x	x
3									x	x	x	x
4									x	x	x	x
5									x	x	x	x

15GYC11 ENGINEERING PRACTICES LABORATORY

(Common to All Branches)

L	T	P	C
0	0	4	2

OBJECTIVES:

- To provide hands on training on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.
- To understand the basic working principle of electric components
- To understand and operate multimeter for current, voltage and resistance measurements
- Have and technical skills required to remain productive in the field of Electrical Engineering

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1 : Understand various civil engineering practices like plumbing, carpentry and relevant tools

CO2 : Understand various manufacturing processes

CO3 : Get familiarity with the instruments such as CRO, Function generator, single and dual power supply, multi-meter, bread board, IC's, and components such as diodes, transistors, resistors, capacitors, inductors, etc.

CO4 : Get familiarity with the testing of capacitors, diodes, transistors with Analog multimeter or Digital multimeter. Understand the principles of electrical circuits and electronics, and analysis, synthesis, and experimental techniques for both analog and digital electronic circuits

CO5: Do residential house wiring and Measure energy and resistance to earth of an electrical equipment

GROUP-A (MECHANICAL AND CIVIL ENGINEERING)

I - CIVIL ENGINEERING PRACTICE **(15)**

Buildings:

a. Study of plumbing and carpentry components of residential and industrial buildings, Safety aspects.

Plumbing Works:

a. Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
b. Study of pipe connections requirements for pumps and turbines.
c. Preparation of plumbing line sketches for water supply and sewage works.
d. Hands-on-exercise:

   Basic pipe connections –Mixed pipe material connection –Pipe connections with different joining components.
e. Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

a. Study of the joints in roofs, doors, windows and furniture.
b. Hands-on-exercise: Planning, Tee joints

II - MECHANICAL ENGINEERING PRACTICE **(15)**

Welding:

a. Preparation of edges for welding and study of welding symbols.
b. Arc welding- butt joints, lap joints and tee joints.
c. Gas welding
d. Study of standard size of bars, rods, sections, sheet metals.
e. Study of work piece types and parameters of welding such as welding current, air gap, filler metal.

Basic Machining:

a. Facing & Plain turning
b. Drilling Practice
c. Study of different types of screw drivers, screws, bolts and nuts.

Sheet Metal Work:

a. Model making using bending and forming - Trays, cone.
b. Study of thickness gauges, wire gauges.

GROUP - B (ELECTRICAL AND ELECTRONICS)

ELECTRICAL ENGINEERING PRACTICE **(15)**

a. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
b. Fluorescent lamp wiring.
c. Stair case wiring
d. Measurement of electrical quantities –voltage, current, power & power factor in RLC circuit.
e. Measurement of energy using single phase energy meter.
f. Measurement of resistance to earth of electrical equipment.

ELECTRONICS ENGINEERING PRACTICE **(15)**

a. Study of Electronic components and equipment –Resistor (Colour coding), Inductor, Capacitor.
b. Measurement of AC signal parameter (peak-peak, RMS period, frequency) using CRO.
c. Study of logic gates AND, OR, XOR and NOT.
d. Study of Clock Signal.
e. Soldering practice -Components Devices and Circuits –Using general purpose PCB.
f. Study of HWR and FWR.
g. Study of Telephone, FM Radio and Cell Phone.

TOTAL (P:60) : 60 PERIODS

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
	POs											
COs	1	2	3	4	5	6	7	8	9	10	11	12
1					x		x	x	x			
2			x	x	x		x	x			x	x
3	x		x		x		x		x			x
4	x	x	x	x	x			x	x			x
5	x	x		x					x			x

15EY201 PROFESSIONAL ENGLISH
(Common to All Branches)

L	T	P	C
1	0	2	2

OBJECTIVES:

- To articulate and enunciate words and sentences clearly and efficiently.
- To demonstrate ability to gather information and apply it to persuade or articulate one's own point of view.
- To understand different writing techniques and contents based on the communication medium being used.
- To apply appropriate skills for preparation and performance for effective oral communication.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1: Construct clear, grammatically correct sentences using a variety of sentence structures and appropriate academic vocabulary.
CO2: Utilize advanced vocabulary in different circumstances.
CO3: Acquire listening and speaking skills in both formal and informal contexts.
CO4: Distinguish main ideas and supporting details and employ active reading strategies to understand texts at the critical level.
CO5: Equip them with writing skills needed for academic as well as workplace contexts.

UNIT I: GRAMMAR (9)

Degrees of Comparison - Transformation of Sentences – Correction of errors – Reported Speech – Word Formation – Proximity of Concord - Connectives - Phrasal Verbs.

UNIT II: VOCABULARY (9)

Building Vocabulary using Thesaurus – Cloze Test –Idioms and Phrases - Analogy- Collocation – Modifiers - Redundancy.

UNIT III: LISTENING AND SPEAKING **(9)**

Introduction to articulation skills (Speech Pattern) - Activity based Listening and Speaking Practice (Listening to News, practicing Short Speeches and Debate).

UNIT IV: READING **(9)**

Reading Practice using General and Technical Articles from Newspapers and Science magazines – Reading short notices, Advertisements and passages –Levels of Reading Comprehension.

UNIT V: WRITING

(9)

Interpretation of pictures and cartoons – Slogan writing – Dialogue writing – Theme building exercises - Paragraph Completion – Instructions –Exercise on accuracy, brevity and correctness.

TOTAL (L:15+T:30) = 45 PERIODS

TEXT/ REFERENCES BOOKS

1. Rizvi, Ashraf M, "Effective Technical Communication", Tata McGRaw Hill Publishing Company Limited, New Delhi, 2006.
2. Norman Whitby, Business Benchmark – Pre-Intermediate to Intermediate, Students Book, Cambridge University Press, 2006.
3. Hewings. M, "Advanced English Grammar", Cambridge University Press, Chennai, 2000.
4. Raman M & Sangeetha Sharma, "Technical Communication", Oxford University Press, USA, 2005.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1									x	x	x	x
2									x	x	x	x
3									x	x	x	x
4									x	x	x	x
5									x	x	x	x

15MY201 - MULTIVARIABLE CALCULUS AND LAPLACE TRANSFORM

(Common to Civil and MECH. Branches)

L	T	P	C
3	2	0	4

OBJECTIVES:

- To apply knowledge of Mathematics in Engineering.
- To communicate problem solutions using correct Mathematical terminology.
- To apply rigorous and analytic approach to analyse and solve differential equations.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1. Understand and handle functions of more than one variable, from the points of view of their differentiation, expansions and extreme values, along with differentiation under integral sign which are encountered in engineering studies.

CO2. Have learnt the methods of double and triple integration, which are needed in their studies in other areas and gained confidence to handle integrals of higher orders.

CO3. Have a good grasp of analytic functions and their interesting properties which could be exploited in a few engineering areas and be introduced to the host of conformal mappings with a few standard examples that have direct application.

CO4. Have studied the basics of vector calculus comprising of gradient, divergence and curl and line, surface and volume integrals and the classical theorems involving them, which would be encountered by them in their engineering subjects in the same or higher semesters.

CO5. Have a sound knowledge of Laplace transform and its properties and sufficient exposure to solution of certain linear differential equations using the Laplace transform techniques which have applications in other subjects of the current and higher semesters.

UNIT I: FUNCTIONS OF SEVERAL VARIABLES **(9)**

Partial derivatives - Total differential-Differentiation of implicit functions-Taylor's expansion-Maxima and Minima-Constrained Maxima and Minima by Lagrange's Multiplier method-Jacobians.

UNIT II: MULTIPLE INTEGRALS **(9)**

Double integration in Cartesian Co-ordinates-Change of order of integration-Area as double integral- Triple integration in Cartesian Co-ordinates-Volume as triple integrals.

UNIT III: ANALYTIC FUNCTIONS **(9)**

Functions of a complex variable - Analytic functions – Necessary and sufficient conditions for analyticity (Statement only) – Properties – Harmonic conjugate – Construction of analytic function – Conformal mapping – Mapping by functions: w = z + c, cz, 1/z, and bilinear transformation.

UNIT IV: VECTOR CALCULUS **(9)**

Gradient and Directional derivative - Divergence and Curl – Irrotational and solenoidal vector fields – Line integral over a plane curve – Surface integral and volume integral - Green's ,Gauss divergence, Stokes Theorem(Statement only)-Verification and Evaluation.

UNIT V: LAPLACE TRANSFORM **(9)**

Definition- Laplace Transform of Standard functions: $e^{at}, \sin at, \sinh at, t^n, f'(t), f''(t)$ -First Shifting Theorem (Statement only) - Initial and Final value Theorems.

Inverse Laplace transforms -Convolution theorem (Statement only)– Applications of Laplace transform for differential equations of 2nd order with constant coefficients.

TOTAL=L:45+T:30=75 PERIODS

TEXT BOOKS

1. Dr.B.S.Grewal, "Higher Engineering Mathematics", 42nd Edition, Khanna publications, 2012.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", 9th Edition, John Wiley & sons, 2013.
3. Veerarajan.T, "Engineering Mathematics for first year", Third Edition,Tata McGraw Hill,2011.

REFERENCES

1. N.P.Bali, Manish Goyal, "A text book of Engineering Mathematics: Sem-II", 5th Edition, Laxmi Publications.2011.
2. P.Kandasamy, K.Thilagavathy,K.Gunavathy,"Engineering Mathematics for first Year", 9th Rv. Ed., S.Chand & Co Ltd, 2013.
3. Glyn James, "Advanced Engineering Mathematics", 7thEdition, Wiley India, (2007).

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x					x					x	x
2	x	x				x	x				x	
3	x					x		x			x	
4	x					x					x	
5		x					x					x

15PY201 – MATERIALS PHYSICS

(Common to Civil and Mechanical Branches)

L	T	P	C
3	0	0	3

OBJECTIVES:

- To provide the basic ideas in electrical conduction, conductors, semiconductors and nano technology.
- To understand the fundamental concepts on solid state physics.
- To gain fundamental knowledge about thermal physics and that will help students to study further subjects like thermodynamics, heat and mass transfer etc.
- To update the recent development about modern engineering materials.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1 : Analyze different conducting materials and their behavior.
CO2 : Know the basics about thermal conductivity of various materials
CO3 : Examine the materials using different methods during the manufacturing process
CO4 : Acquire information regarding new engineering materials and using them to create new Products
CO5 : Gain knowledge about nanotechnology and its various applications

UNIT I - CONDUCTING MATERIALS **(9)**

Electron theories of conductivity - postulates of classical free electron theory- derivation of electrical conductivity of metals (Drude- Lorentz theory) - merits and demerits. Derivation of thermal conductivity – Wiedeman-Franz law-verification. Fermi energy - Importance of fermi energy - Fermi-Dirac distribution function and its variation with temperature - density of energy states- calculation of density of electrons.

UNIT II - SEMI CONDUCTING MATERIALS & SUPER CONDUCTING MATERIALS **(9)**

SEMICONDUCTORS: Elemental and compound semiconductors - Intrinsic semiconductor – carrier concentration derivation – variation of Fermi level with temperature – electrical conductivity – band gap determination – extrinsic semiconductors (qualitative) – variation of Fermi level with temperature and impurity concentration – Hall effect – determination of Hall coefficient – Applications.

SUPERCONDUCTIVITY: Properties - Types of super conductors – BCS theory of superconductivity – Applications of superconductors – SQUID, cryotron, magnetic levitation.

UNIT III - THERMAL PHYSICS **(9)**

Mode of heat transfer-thermal conductivity-Newton's law of cooling -thermal conduction through compound media (bodies in series and parallel) - thermal conductivity of a good conductor – Forbe's method-thermal conductivity of bad conductor- Lee's disc - radial flow of heat-expression for thermal conductivity of rubber-experimental determination-practical applications of conduction.

UNIT IV - MATERIAL TESTING MECHANISMS **(9)**

Testing of materials – classification of tests – destructive tests – tensile test on a metal – hardness test – Non Destructive Testing-Various steps involved in NDT process- X-ray radiographic technique – displacement method – merits, demerits and applications of X-ray radiography – X-ray fluoroscopy – liquid penetrant method – advantages, disadvantages and applications.

UNIT V - MODERN ENGINEERING MATERIALS & NANOTECHNOLOGY **(9)**

Metallic glasses: preparation, properties and applications. Shape Memory Alloys (SMA): Characteristics, properties of NiTi alloy, applications, advantages and disadvantages of SMA. Nano materials: synthesis – plasma arcing – chemical vapour deposition – sol gel – electro deposition – ball milling - properties of nanoparticles and applications. Carbon nanotubes: fabrication – arc method – pulsed laser deposition –structure – properties and applications.

TOTAL (L:45) = 45 PERIODS

TEXT BOOKS:

1. V.Rajendran, "Engineering Physics", Tata McGraw-Hill.New Delhi.2011.
2. R.K.Gaur, S.L.Gupta, "Engineering Physics", Dhanpat Rai Publications, 2007.
3. M.N.Avadhanulu, P.G.Kshirsagar "A Text book of Engineering Physics", S.Chand, 2011.

REFERENCES:

1. G.Senthil Kumar, N.Iyandurai, "Physics-II", VRB Publishers, 2005-2006, Revised Edition.
2. S.O. Pillai, "Solid State Physics", New Age International Publications, New Delhi, 2010.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x						x			
2	x	x				x						
3	x	x	x			x			x			
4	x	x	x			x						
5	x	x	x	x								

15CY201 - ENVIRONMENTAL SCIENCE AND ENGINEERING

(Common to All Branches)

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the constitutes of the environment.
- The students should be conversant with valuable resources
- To know about the role of a human being in maintaining a clean environment.
- To maintain ecological balance and preserve bio-diversity.
- To get knowledge about the conservation of environment for the future generation.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO 1 Design a system, component or process to meet desired needs.
CO 2. Identify, formulate and solve environmental engineering problems.
CO 3. Understand the professional and ethical responsibility as related to the practice of environmental engineering and the impact of engineering solutions in global context.
CO 4. Use the techniques, skills and modern engineering tools necessary for environmental engineering practice.
CO 5. Acquire the knowledge of information technology in environmental science.

UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES (9)

Environment: Scope – importance - need for public awareness. Forest resources: Use-over exploitation-deforestation. Water resources: Use-over utilization of surface and ground water - conflicts over water. Mineral resources: Use-exploitation-environmental effects of extracting and using mineral resources. Food resources: World food problems changes caused by agriculture. Effects of modern agriculture - fertilizer- pesticide problems. Energy resources: Renewable energy sources - solar energy - wind energy. Land resources: land degradation - soil erosion. Role of an individual in conservation of natural resources.

UNIT II ECOSYSTEMS AND BIODIVERSITY (9)

Concepts of an ecosystem: Structure and function of an ecosystem - Producers, consumers and decomposers. Food chains- food webs. Types of ecosystem: Structure and functions of forest ecosystem and river ecosystem. Biodiversity: Value of biodiversity: consumptive use-productive use - social values - ethical values - aesthetic values. Hotspots of biodiversity -Threats to biodiversity: Habitat loss - poaching of wildlife and man wildlife conflicts- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT III ENVIRONMENTAL POLLUTION (9)

Pollution: Causes, effects and control measures of Air pollution, Water pollution, Soil pollution and Noise pollution. Solid waste management: Causes - effects -control measures of urban and industrial wastes. Role of an individual in prevention of pollution - Disaster managements: Floods - cyclone- landslides.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT (9)

Water conservation - rain water harvesting. Climate change - global warming - acid rain - ozone layer depletion. Environment protection act: Air (Prevention and control of pollution) Act - Water (prevention and control of pollution) Act - Wildlife protection Act - Forest conservation Act.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT (9)

Population growth - variation among nations - Population explosion - Family welfare programme - Human rights - HIV/AIDS - women and child welfare - Role of information technology in environment and human health.

TOTAL (L: 45) = 45 PERIODS

TEXTBOOKS:

1. Anubha Kaushik and C.P. Kaushik, Environmental Science and Engineering, New Age International Publishers, New Delhi (2006)"Elements of Environmental Science and Engineering", P.Meenakshmi, Prentice-Hall of India, New Delhi (2005).

2. Dr.A.Ravikrishnan,Environmental Science and Engineering.,Sri Krishna Hitech Publishing co. Pvt .Ltd., Chennai,13th Edition (2012).

REFERENCES:

1. Masters, Gilbert M, "Introduction to Environmental Engineering and Science", Second Edition, Pearson Education, New Delhi (2004).

2. Santosh Kumar Garg, Rajeshwari garg, smf Ranjni Garg "Ecological and Environmental Studies" Khanna Publishers, Nai Sarak, Delhi (2006).

3. Miller T.G. Jr., "Environmental Science", Tenth Edition, Wadsworth Publishing Co. (2004).

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x		x				x	x	x	x
2	x	x			x	x	x					x
3	x	x			x	x	x					x
4	x	x	x				x		x	x		
5					x		x			x		

15EEC01 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to Civil and MECH. Branches)

L	T	P	C
3	0	0	3

OBJECTIVES:

- To acquaint the students pursuing engineering disciplines other than electrical engineering and to give tl basic knowledge about AC,DC circuits and various types of measuring instruments and Electric Machines.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1 : Analyze and synthesis of electrical circuits

CO2 : Acquire knowledge about the working of measuring instruments

CO3 : Acquire knowledge about the working of electron devices

CO4: Know the fundamentals of electrical machines and digital electronics

CO5 : Know the fundamentals of communication engineering

UNIT I ELECTRICAL CIRCUITS & MEASURMENTS **(9)**

Ohms Law – Kirchoff's Laws – Steady State Solution of DC Circuits – Introduction to AC Circuits – Operating Principles of Moving Coil and Moving Iron Instruments, Dynamometer type Wattmeter and Induction type energy meter.

UNIT II ELECTRICAL MACHINES **(9)**

DC Generator-DC Motor-Single Phase Transformer- single phase induction Motor: Construction, Principle of Operation, EMF Equation and Applications.

UNIT III SEMICONDUCTOR DEVICES AND APPLICATIONS **(9)**

Characteristics of PN Junction Diode and Zener Diode– Half wave and Full wave Rectifier –Bipolar Junction Transistor: CB, CE, CC Configurations and Characteristics.

UNIT IV DIGITAL ELECTRONICS **(9)**

Binary Number System – Logic Gates – Half and Full Adders – Flip-Flops: RS,D,T and JK –Registers and Counters.

UNIT V FUNDAMENTALS OF COMMUNICATION ENGINEERING **(9)**

Types of Signals: Analog and Digital Signals – Modulation: Amplitude and Frequency Modulation-Demodulation-Communication Systems: Radio, TV, Microwave, Satellite (Block Diagram Approach only)

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. R. Muthusubramanian, S.Salivahanan and K A Muraleedharan, "Basic Electrical, Electronics and Computer Engineering", 2nd ed., Tata McGraw Hill, 2012.
2. R.S Sedha, "Applied Electronics", S. Chand & Co., 2008.

REFERENCES:

1. Mittle and V. N. Mittle, "Basic Electrical Engineering", Tata McGraw Hill Edition, New Delhi, 2005.
2. T K Nagsarkar and M S Sukhija, "Basics of Electrical Engineering", Oxford press 2005.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x										
2	x		x		x	x	x	x	x	x		
3	x		x		x	x	x	x	x	x		
4	x		x		x	x	x	x	x	x		
5			x	x	x	x	x	x	x	x	x	

15CSC01- PROBLEM SOLVING AND C PROGRAMMING
(Common to All Branches except CSE & IT Branches)

L	T	P	C
3	0	0	3

OBJECTIVES :

- To know the correct and efficient ways of solving problems.
- To learn the basics of C declarations, operators and expressions.
- To work on all the elementary statements (Loop, Branch) and arrays.
- To learn on the manipulation of strings, functions and pointers.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1 : Understand the basic terminology used in computer programming.
CO2 : Use different data types in a computer program.
CO3 : Design programs involving decision structures, loops and functions.
CO4 : Explain the difference between call by value and call by reference.
CO5 : Understand the dynamics of memory by the use of pointers.

UNIT I INTRODUCTION TO COMPUTERS **(9)**

Computer Basics - Applications and characteristics of Computer - Computer organization - Number systems - Computer Software- Types of software - Software Development steps.

UNIT II PROBLEM SOLVING & PROGRAMMING **(9)**

Algorithms - Flowchart - Pseudo code - Overview of C - Writing the first C Program - Constants, Variables, Data Types, Storage Classes - Operators and Expressions - Managing Input and Output operations.

UNIT III CONTROL STRUCTURES AND ARRAYS **(9)**

Selection structures, Iteration Structures - Control Transfer Statements- Array concepts - One dimensional array – Two dimensional arrays – Multidimensional arrays - Strings.

UNIT IV POINTERS & FUNCTIONS **(9)**

Pointer – Declaration –Initialization –Accessing the values - Dynamic Memory Allocation- Functions - Elements of User defined Functions, Function types, Parameter Passing Techniques, Passing Array to Functions, Recursive Function.

UNIT V STRUCTURES, UNIONS AND FILES **(9)**

Structure concepts - Defining, Declaring, Accessing Member Variables, Structure within Structure - Union **-** File Management in C - The Preprocessor.

TOTAL (P:45) : 45 HOURS

TEXT BOOKS:

1. Ashok.N.Kamthane, "Programming in C", Pearson Education (India), 2nd Ed., 2013.
2. E.Balagurusamy, "Fundamentals of computing and programming", Tata McGraw-Hill Publishing Company Limited, 2 nd Ed., 2012.

REFERENCE BOOKS:

1. Yashavant Kanetkar, "Let us C", BPB publications, New Delhi, 3 rd Ed., 2011.
2. Byron S Gottfried, "Programming with C", Schaum's Outlines, Tata McGraw-Hill, 2nd Ed., 2006.
3. Dromey R.G., "How to Solve it by Computer", Pearson Education, 4th Reprint, 2007.
4. Kernighan B.W and Ritchie D.M, "The C Programming language", 2nd Ed., Pearson Education, 2006.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x				x					
2	x	x					x		x		x	
3	x	x	x				x		x			
4	x	x	x				x					
5					x				x			

15GY211 - PHYSICS AND CHEMISTRY LABORATORY- II

(Common to All Branches)

L	T	P	C
0	0	4	2

OBJECTIVES:

- To provide the basic practical exposure to all the engineering and technological streams in the field of physics.
- The students are able to know about the water containing impurities and some physical parameters.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1 : Acquire the practical knowledge in various moduli.

CO2 : Gain the practical knowledge about band gap of a semiconductor and optoelectronic devices and uunderstand about the spectral instruments.

CO3 : Analyze the properties of matter and Determine the thermal conductivity of a material.

CO4 : Apply knowledge of measurement of conductance, hardness producing ions, alkalinity and conductance,EMF,pH

CO5 : Understand the impact of water quality and to solve engineering problems

LIST OF EXPERIMENTS:

PHYSICS LABORATORY- II

1. Determination of Young's modulus of the material – non uniform bending.
2. Determination of Band Gap of a semiconductor material.
3. Determination of viscosity of liquid – Poiseuille's method.
4. Spectrometer dispersive power of a prism.
5. Determination of Young's modulus of the material – uniform bending.
6. Torsional pendulum – Determination of rigidity modulus.
7. Solar cell – VI characteristics
8. V-I characteristics of PN junction diode.
9. Determination of thermal conductivity of a bad conductor – Lee's Disc method.

CHEMISTRY LABORATORY- II

1. Estimation of alkalinity of Water sample
2. Estimation of Copper in brass by EDTA
3. Conductometric titration of mixture of acids.
4. Estimation of iron by potentiometry.
5. Estimation of hydrochloric acid by pH metry.
6. Estimation of water of crystallization of copper sulphate.
7. Estimation of iron by spectrophotometer.

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TOTAL (P:60) = 60 PERIODS

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x						x		x	x	x
2	x	x									x	
3	x	x	x		x	x	x				x	x
4												
5												x

15GY212 - SOFT SKILLS – II
(Common to All Branches)

L	T	P	C
0	0	2	1

OBJECTIVES:

- To re-engineer attitude and understand its influence on behaviour.
- To recognize stress symptoms & develop stress deflecting strategies.
- To improve time management, organizational skills and goal setting.
- To develop leadership skills to improve teamwork, creativity, efficiency & productivity.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1: Narrate stories by their own.

CO2: Develop their leadership qualities for the betterment of the team.

CO3: Demonstrate the ability to evaluate an event or situation, identify the problem and alternate solutions, and make a recommendation

CO4: Acquire strategic knowledge about how to manage time.

CO5: Overcome stress making factors in society

UNIT I **(6)**

Effective presentation strategies – Story telling – Visual communication.

UNIT II **(6)**

Team work – Importance of team work – Leadership skills - attributes of a successful team – barriers involved- dealing with people- Group decision making.

UNIT III **(6)**

Life and Managerial skills – Effective ways of dealing with people – Emotional intelligence- Types of conflicts (Inter and Intra group conflicts).

UNIT IV **(6)**

Time Management – Tips and strategies- Time wasters – Procrastination – Advantages of time management.

UNIT V **(6)**

Stress management – Management of various forms of fear (examination fear, stage fear and public speaking fear).

TOTAL (P:30) = 30 PERIODS

TEXT BOOK :

1. Swaminathan. V.D &Kaliappan.K.V(2001), "Psychology for Effective Living", Chennai, The Madras Psychology Society.

REFERENCE:

1. Robbins, S.B.(2005). Organizational Behavior. New Delhi: Prentice Hall of India.
2. Smith, B (2004). Body Language. Delhi: Rohan Book Company.
3. Hurlock, E.B (2006). Personality Development, 28th Reprint. New Delhi: Tata Mc-Graw Hill.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1									x	x	x	x
2									x	x	x	x
3									x	x	x	x
4									x	x	x	x
5									x	x	x	x

15CSC11 COMPUTER PROGRAMMING LABORATORY

(Common to All Branches except CSE & IT)

L	T	P	C
0	0	2	1

OBJECTIVES:

- Learn about Office tools like MS Word and MS Excel.
- Gain knowledge about open source tool to draw flowchart.
- Acquire the basics of C declarations, operators and expressions.
- Work on all the elementary statements (Loop, Branch), functions and arrays.
- Learn on the manipulation of structures, pointers and files.

COURSE OUTCOMES:

At the end of this course the students will be able to

CO1 : Use MS Word and MS Excel for document preparation.
CO2 : Draw flowchart using open source tool.
CO3 : Develop program using basic C constructs.
CO4 : Write program using arrays and functions.
CO5 : Create program using pointer, structure and files.

Word Processing

1. Document creation, Text manipulation with Scientific notations.
2. Table creation, Table formatting and Conversion.
3. Mail merge and Letter preparation

Spread Sheet

4. Chart - Line, XY, Bar and Pie.
5. Formula - formula editor

RAPTOR –Tool

6. Drawing - flow Chart

C-Programming

7. Program Using Operators, Expressions and IO formatting
8. Program Using Decision Making and Looping
9. Program Using Arrays and Strings
10. Program Using Functions and Recursion
11. Program Using Pointers.
12. Program Using Structure, Union.
13. Program Using Files.

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS

Hardware

- LAN System with 33 nodes (OR) Standalone PCs – 33 Nos.
- Printers – 3 Nos.

Software

- OS – Windows / UNIX Clone
- Application Package – Office suite
- RAPTOR –Tool
- Compiler – C

TOTAL (P:30) = 30 PERIODS

Mapping of Course Outcomes and Programme Outcomes

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1		x		x	x		x					x
2		x	x	x			x					x
3				x	x		x		x			x
4	x	x		x	x		x					x
5					x				x			x

15CE211- BUILDING DRAWING - I

L	T	P	C
0	0	4	2

OBJECTIVES:

- To Study about the Software capabilities for drafting and modeling
- To draw the polygons and multiline figures
- To study the different types of buildings & their views
- To draw the Isometric, 2D and 3D views of the simple objects

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1. Capability to draw the simple figures and its types
CO2. Knowledge to create the simple solids like prism pyramids etc.
CO3. Ability to draw the plan of the different buildings
CO4. Expert in isometric, 2D and 3D views of simple objects like cone, prism.
CO5. To identify the symbols and sign conventions in construction.

1. **INTRODUCTION:** Introduction to computer aided drawing, co-ordinate systems, reference planes and commands.
2. **SYMBOLS AND SIGN CONVENTIONS:** Materials, Architectural, Electrical and Plumbing symbols.
3. **BUILDINGS WITH LOAD BEARING WALLS** (Plan only) - Flat roof & Sloped roof.
4. **JOINERY DETAILS: DOORS** - Flush and Partially Glazed Door.
5. **WINDOWS** - Windows with & without mullion
6. **INDUSTRIAL BUILDINGS** - Types of Simple Steel Trusses.
7. **PLANNING OF BUILDINGS** - Plan, elevation and section of single storied residential building with flat RCC roof and brick masonry walls having not more than 2 rooms.

TOTAL (P:60) = 60 PERIODS

TEXT BOOKS:

1. Subhash C Sharma & Gurucharan Singh, "Civil Engineering Drawing", Standard Publishers, 7th Edition, 2014.
2. B.P. Verma, "Civil Engineering Drawing", Khanna Publishers, New Delhi, 2006.

REFERENCES:

1. Dr. N. Kumara Swamy, A. Kameswara Rao. "Building Planning and Drawing", Charotar Publishing House Pvt. Ltd., 7th Edition, 2014
2. V.B Sikka, "A Course in Civil Engineering Drawing", S.K. Kataria & Sons, Delhi, 2012.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1		x			x		x		x		x	x
2	x	x	x	x	x					x		
3		x	x			x		x	x		x	
4	x			x		x		x	x	x	x	x
5					x		x					

15MY301 FOURIER SERIES PARTIAL DIFFERENTIAL EQUATIONS AND PROBABILITY

(Use of Normal Distribution table is permitted)

(*Common to BE - MECH & CIVIL Branches)*

L	T	P	C
3	2	0	4

OBJECTIVES:

- To acquire knowledge on formation of Fourier series for the functions with different types of periods.
- To introduce the solution methods of given partial differential equations and their applications.
- To understand the theory of probability and types of statistical distributions.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1: Develop the Fourier series for the functions of given period.
CO2: Determine the solution for numerical problems in first order partial differential equations.
CO3: Solve the given types of problems on the partial differential equations.
CO4: Construct the Fourier series for solving engineering problems.
CO5: Demonstrate the theory of probability and the parameters of statistical distributions

UNIT I FOURIER SERIES **(9)**

Dirichlet's conditions - Fourier series - Odd and even functions - Half range sine series - Half range cosine series - Parseval's identity - Root -Mean square value of a function - Harmonic Analysis.

UNIT II FIRST ORDER NON LINEAR PARTIAL DIFFERENTIAL EQUATIONS **(9)**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions - Solution of standard types of first order partial differential equations: (i) f(p,q)=0, (ii) Clairaut's type, (iii) f(z,p,q) = 0, (iv) f(x,p) = g(y,q).

UNIT III LINEAR PARTIAL DIFFERENTIAL EQUATIONS **(9)**

General solution of Lagrange's linear equation Pp+Qq = R - Solutions of simultaneous equations dx/P=dy/Q =dz/R by the method of grouping & method of multipliers-.Linear partial differential equations of second and higher order with constant coefficients (R.H.S = 0, e^{ax+by}, cos(ax+by), sin(ax+by), $x^r y^s$)(only homogeneous types.)

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS **(9)**

Classification of second order quasi linear partial differential equations - Solutions of one dimensional wave equation(zero and Non-zero Boundary conditions) - One dimensional heat equation(Reduced to zero & non zero temperature) - Steady state solution of two dimensional heat equation (Finite and infinite plate).

UNIT V PROBABILITY THEORY AND DISTRIBUTIONS **(9)**

Random Experiment - Definition of Probability - Axioms of probability - conditional probability - independent of events, Discrete distributions: Binomial and Poisson - Continuous distributions: Exponential and Normal distributions

TOTAL: L: 45 + T:30 = 75 PERIODS

TEXT BOOKS:

1. Veerarajan,T. " (Transforms and Partial Differential Equations)", 2nd ed., Tata Mc Graw Hill, New Delhi, Second reprint, 2015.
2. Veerarajan. T., "Probability, Statistics and Random Processes with Queueing theory and Queueing Networks) Tata McGraw-Hill, 4th ed., second reprint 2016, New Delhi.

REFERENCES:

1. Goyal. Manish and Bali, N.P, "A Textbook of Engineering mathematics", 6th ed., Laxmi Publication (P) Ltd. New Delhi, 2012.
2. Grewal, B.S. "Higher Engineering Mathematics", 43rd ed., Khanna Publishers, New Delhi, 2014.
3. Kreyszig, Erwin. "Advanced Engineering Mathematics", 9th ed., Wiley Publications, New Delhi, 2006.
4. Kandasamy.P, Thilagavathy.K and Gunavathy.K, "Engineering Mathematics: Volume III", S. Chand & Co Ltd., 2006.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x		x							
2	x	x		x						x		x
3	x	x		x		x		x				
4	x	x			x					x		x
5	x	x	x		x							x

15CE301 ENGINEERING GEOLOGY

L	T	P	C
3	0	0	3

OBJECTIVES:

- The overall objective of the lecture portion of Engineering Geology is to demonstrate the importance Geology in making engineering decisions.
- Introduce the fundamentals of the engineering properties of earth materials for the use of Civil Engineeri constructions.
- Develop quantitative skills and a frame work for solving basic engineering geology problems.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO 1: Characterize of the engineering properties of rocks and soils.
CO 2: Assess the geological hazards.
CO 3: Use seismic and electrical methods to investigate the subsurface.
CO 4: Develop a native construction plan incorporating all relevant aspects of geology.
CO 5: To know the various types of natural hazards.

UNIT I MINERALS AND ROCKS **(9)**

Relevance and importance of Engineering Geology of Civil Engineers, Minerals, their physical properties - rock forming minerals, physical and engineering properties of igneous, metaphoric and sedimentary rocks.

UNIT II INTERIOR AND STRUCTURES OF EARTH **(9)**

Earth's interior based on seismic models, plate tectonics and continental drift, study of earth's structures - fold, faults and joints, geological factors affecting Civil Engineering constructions, geological maps, and their uses.

UNIT III WEATHERING AND SOILS **(9)**

The atmosphere, rock decay and weathering, soil origin and formation – classification and its engineering importance, slope stability – rock and soil slopes stability analysis –landslides - cause and remedial measures.

UNIT IV GROUND WATER **(9)**

Characteristic of ground water, hydro-geological cycle, types of aquifers, water level fluctuations, surface and subsurface geophysical methods, groundwater contamination, artificial recharge of groundwater and harvesting of rainwater

UNIT V EARTH PROCESSES AND REMOTE SENSING **(9)**

Brief description on - geological hazards -cause and formation of flood, cyclone, Volcano- Earthquake, tsunami - Introduction to remote sensing and Geographical Information System

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. ChennaKesavulu.N "Textbook of Engineering Geology", 2nd edition, Macmillan Publishers India Ltd.,2009.
2. Parbin Singh, "Engineering & General Geology", 7th edition, S.K.Kataria and Sons, New Delhi, 2010.

REFERENCES:

1. Blyth - F.G.H. Edward Arnold, "A Geology for Engineers", 7th edition, Great Britain by Biddies Ltd., King's Lynn, Norfolk, 2008.
2. David.K, Todd John Wily & Sons Inc, "Ground Water Hydrology" 3rd edition, New York, 2005.
3. Garg.S.K, "Physical and Engineering Geology", Khanna Publishers, Delhi, 2004

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1			x	x	x		x	x		x		x
2			x	x	x		x	x				x
3			x	x	x		x	x				x
4	x	x	x	x	x		x	x				x
5	x	x	x	x	x		x	x	x			x

15CE302 MECHANICS OF SOLIDS - I

L	T	P	C
3	2	0	4

OBJECTIVES:

- Understand the concepts of Simple Stress and Strain.
- Study the analysis of plane truss.
- Study the behaviour of statically determinacy of beams subjected to various types of forces.
- Study the Slope and deflection of Beams by various methods.
- Understand the concepts of theory of torsion and springs

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO 1: Understand the different types of stress and strains
CO 2: Analyze the members subjected to various types of forces.
CO 3: Understand the concepts of shear force and bending moment in beams
CO 4: Analyze the slope and deflection of beams by various methods.
CO 5: Analyze the theory of torsion and deformation of spring.

UNIT I SIMPLE STRESSES AND STRAINS (9)

Stress and Strain due to axial load – Elastic limit – Hooke's law – stress – strain diagram – Stresses in Composite Sections - Poisson's ratio – Shear Stress and Shear Strain – Rigidity Modulus – Volumetric Strain – Bulk Modulus – Relation between elastic constants – Principal Stresses and Strains – Principal Planes.

UNIT II ANALYSIS OF PLANE TRUSS (9)

Stability and equilibrium of plane frames - types of trusses – analysis of forces in truss members method of joints, method of tension coefficients and method of sections.

UNIT III STATICALLY DETERMINATE BEAMS (9)

Types of beams and supports –shear force and bending moment diagrams for cantilever, simply supported and over hanging beams – Theory of simple bending – bending stress and shear stress in rectangular, I sections beams.

UNIT IV DEFLECTION OF BEAMS (9)

Slope and Deflection of beams using Double Integration Method, Macaulay's Method, Moment Area Method and Conjugate Beam Method

UNIT V TORSION OF CIRCULAR SHAFTS – SPRINGS (9)

Torsion Equation – Assumptions – Theory of Torsion – Stresses in Solid and Hollow Circular Shafts – Power transmitted by the shaft –Types of Springs – Deformations and Stresses in closed and open coiled Helical Springs.

TOTAL: L: 45 + T:30 = 75 PERIODS

TEXT BOOKS

1. Bansal.R.K, "Strength of Materials", Laxmi Publications, New Delhi, 2015.
2. Rajput.R.K "Strength of Materials", S. Chand Publications, New Delhi, 2014.

REFERENCES:

1. Bhavikatti S.S, "Mechanics of Solids", New Age International, New Delhi, 2010.
2. Egor P Popov, "Engineering Mechanics of Solids", Prentice Hall of India, New Delhi, 2010
3. Srinath L.S, "Advanced Mechanics of Solids", Tata McGraw-Hill Publishing Co., New Delhi, 2009.
4. Subramanian.R "Strength of Materials", Oxford University Press, New Delhi, 2010.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x										
2	x	x			x			x	x			x
3	x	x			x			x	x			x
4	x	x			x			x	x			x
5	x	x			x							

15CE303 MECHANICS OF FLUIDS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce and explain basic fundamentals of Fluid Mechanics, which is used in the applications of Aerodynamics, Hydraulics, Marine Engineering, Gas dynamics etc.
- To learn fluid properties and hydrostatic law.
- To understand the concept of advanced fluid mechanics.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO 1: Find properties of fluids and hydrostatic law..
CO 2: Understand the importance of flow measurement
CO 3: Find the losses in a pipe when there is a flow between two places.
CO 4: Analyze the model and the prototype.
CO 5: Study the various methods available for the boundary layer separation.

UNIT IFLUID PROPERTIES AND HYDROSTATICS (9)

Density – Viscosity – Surface tension – compressibility – capillarity –Measurement of pressure- Hydrostatic forces on plane – inclined and curved surfaces – buoyancy – centre of buoyancy – metacentre.

UNIT II FLUID DYNAMICS (9)

Control volume – Fluid Kinematics - Types of flows; Steady flow, Unsteady flow,Uniform and Non Uniform flow, Rotational flow, Irrotational flow, 1-D, 2-D, 3-D flows– Streamline and Velocity potential lines - Euler and Bernoulli's equations and their applications – moment of momentum – Momentum and Energy correction factors – Impulse – Momentum equation-Navier-Stokes Equations-Applications.

UNIT III OPEN CHANNEL FLOW (9)

Flow through pipes – Open Channels and Measurement pipe flow: Darcy's law – Minor losses – Multi reservoir problems – pipe network design – Moody's diagram – Hagen Poiseuille equation – Turbulent flow.Specific Energy – Critical flow concept – specific force – Hydraulic jump – uniform flow and gradually varying flow concepts.

UNIT IV DIMENSIONAL ANALYSIS (9)

Dimensional homogeneity – Raleigh and Buckingham π theorems – Non-dimensional numbers – Model laws and distorted models-Unit quantities-Specific quantities

UNIT V BOUNDARY LAYERS (9)

Boundary layers – Laminar flow and Turbulent flow – Boundary layer thickness – momentum – Integral equation – Drag and lift-Separation of boundary layer-Methods of separation of boundary layer.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Bansal.R.K. "Fluid Mechanics and Hydraulic Machines", 9thedition.,Laxmi Publications, New Delhi, 2015.
2. Vijay Gupta and Santosh Kumar Gupta,"Fluid Mechanics and Applications", 2ndedition., New Age International, Reprint 2012.

REFERENCES:

1. Kumar.D.S, "Fluid Mechanics and Fluid Power Engineering", S K Kataria& Sons, New Delhi, 2013.
2. Modi.P.N, "Hydraulics and Fluid Mechanics including Hydraulic Machines", 19th Revised and Enlarged edition, Standard Publishers Distributors, 2013.
3. Victor Streeter, E. Benjamin Wylie and K.W. Bedford, "Fluid Mechanics", 9th edition., Tata McGraw - Hill Education, New Delhi2010.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x	x	x	x	x				
2	x	x	x	x	x	x	x	x				x
3	x	x	x	x								x
4	x	x	x	x	x	x	x	x				x
5			x	x								x

15CE304 CONSTRUCTION MATERIALS AND TECHNOLOGY

L	T	P	C
3	0	0	3

OBJECTIVES:

- To teach students about the Physical and Mechanical properties of construction materials and their respective testing procedure.
- To teach students about the building materials available in market to be used for many components of building industry.
- To teach students about the principles and methods to be followed in constructing various components of a building.
- To teach students about the deterioration and repair of buildings.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO 1: Learn and identify the relevant physical and mechanical properties and BIS testing procedure pertaining to the construction industry.
CO 2: Study of modern construction materials
CO 3: Ability to supervise the techniques to be followed in building construction.
CO 4: Learn about the prefabricated structures.
CO 5: Learn about the construction damages and its repair techniques.

UNIT I SOURCES OF AGGREGATES & PROPERTIES (9)

Physical and Mechanical properties of construction materials - commonly used types of stones - Tests for stones, road aggregates and concrete aggregates, properties of sand, BIS specification for testing of aggregates –Bricks – Properties and testing methods for Bricks.

UNIT II MODERN CONSTRUCTION MATERIALS (9)

Structural Steel and Aluminium – Roofing Material – Physical descriptions of asbestos sheets, GI sheets, tubes and light weight roofing materials - Timber - Types, Seasoning and various products – Modern materials – Neoprene, thermocole, decorative panels and laminates, architectural glass and ceramics, ferrocement, PVC, polymer base materials, fibre reinforced plastics.

UNIT III FLOORING & ROOFING MATERIALS (9)

Principles of construction – Bonding – Reinforced brick work –– Stone masonry – Hollow block masonry - Pointing - Plastering – DPC Floor and Roof Construction: Floors, General Principles – Types of floors – Floor coverings – Types of roofs

UNIT IV PREFABRICATED BUILDINGS (9)

Sound insulations – Ventilations – Fire resisting construction – Prefabricated panels and structures – production, transportation and erection of structures

UNIT V CONSTRUCTION DAMAGES & REPAIR TECHNIQUES (9)

Causes of deterioration – crack pattern – Assessment of damages – methods of repairs and rehabilitation.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. S.C. Rangwala, “Engineering Materials”, Charotar Publishing House, 2008

REFERENCES:

1. S P Arora and S P Bindra, “Building Construction”, Dhanpat Rai Publishers, 2013.
2. Sharma & Kaul, “Building Construction”, S.Chand & Company Pvt, New Delhi, 1998
3. M.S Shetty , “Concrete Technology”, S. Chand & Company Ltd, 2010

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x		x	x	x				x
2	x		x	x	x	x	x	x				
3	x	x		x	x	x	x	x				x
4			x	x	x	x	x					x
5			x	x	x	x		x				x

Approved by Fourth Academic Council

15CE305 SURVEYING

L	T	P	C
3	0	0	3

OBJECTIVES:

- Understand the concepts of different types of surveying and the procedures for carrying out the survey works.
- Learn the advanced surveying equipments and its techniques.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO 1: Get knowledge about traditional methods of surveying.
CO 2: Understand the leveling by leveling instruments.
CO 3: Analyze the survey parameter using theodolite.
CO 4: Get exposure to astronomical and route surveying.
CO 5: Synthesize and evaluate the advancements in the engineering survey.

UNIT I HISTORY AND TRADITIONAL METHODS OF SURVEYING (9)

Definition - Principles - Classification - Conventional signs - Survey instruments - well conditioned triangles - Traversing - Plane table instruments and accessories - Compass - Types - Bearing - weighted observations - Principle of least squares.

UNIT II CONTOUR AND LEVELLING (9)

Level line - Horizontal line - Levels and Staves - Bench marks -Temporary and permanent adjustments - Fly and check Levelling - Reciprocal leveling - Longitudinal and cross sections - Contouring solve problems by using height of collimation and rise and fall method - Calculation of areas and volumes.

UNIT III THEODOLITE SURVEYING (9)

Theodolite - Horizontal angles - Vertical angles - Heights and distances -Traversing - Closing error and distribution - Omitted measurements. Tachometric surveying - Tachometric systems - Tangential, stadia - Stadia systems – Horizontal and inclined sights - Vertical and normal staffing - Fixed and movable hairs - Stadia constants.

UNIT IV ASTRONOMICAL SURVEYING AND ROUTE SURVEYING (9)

Astronomical terms and definitions - Celestial sphere - Motion of sun and stars - use of nautical almanac - Star constellations - calculations for azimuth of a line.Reconnaissance, preliminary and location surveys for engineering projects - Lay out – Setting out works - Route Surveys for waterways - Types of Curves

UNIT V ADVANCES IN ENGINEERING SURVEY (9)

Hydrographic Surveying - Tides - MSL - Sounding methods - Location of soundings and methods - Mine Surveying - instruments - Tunnels - Electromagnetic distance measurement –Basics of Total Station and GPS.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Bannisterand.A & Raymond.S “Surveying”, 7th ed., Dorling Kindersley India Pvt Ltd,Delhi, 2009.
2. Punmia.B.C. Ashok K. Jain and Arun K. Jain, “Surveying, Vols.I, II and III”, Laxmi Publications, New Delhi, 2015.

REFERENCES:

1. James M.Anderson and Edward M.Mikhail, “Introduction to Surveying”, McGraw-Hill Book Company, New Delhi, 2005.
2. Kanetkar.T.P “Surveying and Levelling”, Vols. I and II, United Book Corporation, Pune, 1994.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x							x			x
2	x	x	x	x	x				x			x
3	x	x	x	x	x		x		x			x
4	x	x	x	x	x		x		x			x
5	x	x	x	x	x		x		x	x		x

15CE311 SURVEY LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

- To enable the student possess knowledge about Survey field techniques.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO 1: Acquire knowledge about chain and its accessories.
CO 2: Understand the traversing, leveling & Plane table concepts.
CO 3: Synthesize the boundary of an area by contouring and tacheometry.
CO 4: Analyze the elevation and distance by single plane and double plane method.
CO 5: Create a topographical map using total station and GPS.

List of Experiments:

1. Study of chains and its accessories
2. Compass Traversing
3. Study of Plane Table and its accessories
4. Fly leveling using Dumpy level – LS and CS
5. Contouring
6. Stadia Tachometry
7. Tangential Tachometry
8. Measurement of horizontal angles and vertical angles
9. Heights and distances by Single plane method.
10. Heights and distances by Double plane method
11. Setting out works – Foundation marking
12. Distance and angular measurement using Total Station
13. Co-ordinates and distance measurement with GPS

TOTAL: P: 60 = 60 PERIODS

Mapping of Course Outcomes (COs) and Programme Outcomes (Pos)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x		x				x	x		x
2	x	x		x	x		x		x	x		x
3	x	x	x		x		x		x	x		x
4	x	x		x	x		x		x	x	x	x
5		x		x	x		x		x	x	x	x

15CE312 MATERIAL TESTING LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

- The experimental work involved in this laboratory should make the student understand the fundamental modes of loading of the structures and also make measurements of loads, Displacements and Strains.
- To obtain the strength and stiffness of different materials.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO 1: To know the stress- strain characteristics for steel.

CO 2: To test the basic properties of materials.

CO 3: Assure the quality of materials used in construction works.

CO 4: Assess the impact value of steel.

CO 5: Predict the hardness number for different materials.

List of Experiments:

1. Tension Test on mild steel rod.
2. Torsion Test on steel specimen.
3. Deflection Test on beam
4. Tests on springs
5. Hardness tests
   (a)Rockwell Hardness
   (b) Brinell Hardness
6. Shear test on steel specimen
7. Impact Test
8. Test on Bricks
   (a) Water absorption
   (b) Compressive Strength
9. Compression test on wooden specimen
10. Tests on Cement
    (a)Specific Gravity
    (b) Fineness
    (c) Consistency
    (d) Initial Setting Time and Final Setting Time
    (e) Compressive Strength on Mortar
    (f) Soundness Test

TOTAL: P: 60 = 60 PERIODS

Mapping of Course Outcomes (COs) and Programme Outcomes (Pos)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x		x	x		x			x		x
2			x	x	x		x	x		x		x
3			x	x	x		x	x		x		x
4	x			x								x
5	x	x	x									x

15CE313 BUILDING DRAWING - II

L	T	P	C
0	0	4	2

OBJECTIVES:

- To enable students to possess knowledge about the building components.
- To enable students to understand different types of roofs in a building.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO 1: Draft drawings by using software.

CO 2: Understand different type of structures in a building

CO 3: Draw plan, section & elevation of different types of buildings & structures.

CO 4: Learn the drawing as per National Building code.

CO 5: Describe knowledge about building components.

List of Experiments:

1. Planning of building based on as per building bye laws.
2. Plan, Section and Elevation of load bearing walls (Flat roof)
3. Plan, Section and Elevation of load bearing walls (Sloped roof)
4. Plan, Section and Elevation of RCC framed structures
5. Plan, Section and Elevation of Industrial buildings
6. Perspective view of Residential buildings
7. Requirements of Drawings as per National Building Code

TOTAL: P: 60 = 60 PERIODS

REFERENCES / MANUALS / SOFTWARES:

1. Computer Aided Design and Drafting software
2. Varma B.P, "Civil Engineering Drawing & House Planning", Khanna Publishers, New Delhi, 2014.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1							x			x		
2				x	x		x	x	x	x		x
3	x		x	x	x		x	x				x
4		x	x	x			x	x	x	x		
5			x	x	x		x			x		x

15GYC12- SOFT SKILLS – LISTENING AND SPEAKING

L	T	P	C
0	0	2	0

OBJECTIVES:

- To recollect the functional understanding of basic grammar and its structure.
- To acquire the listening skills through note completion, matching and multiple choice modes
- To develop speaking skills through self introduction, short talk and topic discussion

COURSE OUTCOMES:

At the end of this course, student shall be able to

CO1. Apply the knowledge of basic grammar to classify the types of verbs and questions and to construct the sentences

CO2. Develop the listening skills through note completion, matching and multiple choice modes

CO3. Organize a presentation on the given topic.

UNIT I: Grammar **(10)**

Tenses – Verb (Auxiliary and Modal) – 'Yes/No' Type Questions – Reported Speech – Gerund – Phrasal Verbs

UNIT II: Listening **(10)**

Part I: Note completion

Part II: Matching

Part III: Multiple Choice

UNIT III: Speaking **(10)**

Part I: Self-Introduction

Part II: Short Talk on Business Topics

Part III: Topic Discussion in Pairs

TOTAL: P: 30 = 30 PERIODS

REFERENCES:

1. Murphy, Raymond, "Essential Grammar in Use", Cambridge University Press, UK, 2007.
2. Whitby, Norman ,"Business Benchmark Pre- Intermediate to Intermediate Preliminary, Cambridge University Press,Second Edition , 2013

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1										x	x	
2									x	x	x	x
3									x	x	x	x

15MY402 NUMERICAL METHODS

(Common to BE- EEE, EIE & CIVIL Branches)

L	T	P	C
3	2	0	4

OBJECTIVES:

- Find numerical approximations to the roots of an equation by Newton method, numerical solution to a system of linear equations by Gaussian Elimination and Gauss-Seidel.
- Apply several methods of numerical integration, including Romberg integration.
- Find the Lagrange Interpolation Polynomial for any given set of points.
- Find numerical solution of a differential equation by Euler's, Modified Euler's, Predictor Corrector and Runge- Kutta Methods.
- Use finite differences for interpolation & differentiation.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1: The students would be acquainted with the basic concepts in numerical methods and their uses.

CO2: When huge amounts of experimental data are involved, the methods discussed on interpolation will be useful in constructing approximate polynomial to represent the data and to find the intermediate values.

CO3: Explain the consequences of finite precision and the inherent limits of the numerical methods considered and by using differentiation and integration.

CO4:Many physical laws are couched in terms of rate of change of quantity. Therefore most of the engineering problems are characterized in the form of nonlinear ordinary differential equations. The methods introduced in the solution of ordinary differential equations will be useful in attempting any engineering problem.

CO 5: Apply numerical methods to obtain approximate solutions of the boundary value problems.

UNIT I SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS (9)

Solution of equation – Method of criteria for convergence - Iteration method : x = g(x)method – Newton Raphson method – Solution of linear system by Gaussian elimination and Gauss – Jordon method – Iterative methods: Gauss-Seidel method – Inverse of a matrix by Gauss Jordon method – Eigen value of a matrix by power method for symmetric matrix.

UNIT II INTERPOLATION AND APPROXIMATION (9)

Divided differences in unequal intervals - Interpolating with a cubic spline – Lagrangian Polynomials — Newton's forward and backward difference formulas for equal intervals.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION (9)

Numerical Differentiation using interpolation formulae – Numerical integration by Trapezoidal and Simpson's 1/3 rule and 3/8 rule – Romberg's method – Two and Three point Gaussian quadrature formulae – Double integrals using trapezoidal and Simpson's rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS (9)

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

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS (9)

Finite difference solution of second order ordinary differential equation – Finite difference solution of one dimensional heat equations using Crank-Nicolson, Bender Schmidt methods – One dimensional wave equation and two dimensional Laplace and Poisson equations using Liebmann's iteration process.

TOTAL: L: 45 + T:30 = 75 PERIODS

TEXT BOOKS:

1. T. Veerarajan. and T. Ramachandran., "Numerical Methods with programming in C", 2nd ed., Tata McGraw-Hill, 2006, First reprint 2007.
2. P. Kandasamy, K.Thilagavathy and K. Gunavathy, "Numerical Methods – Vol: IV", S.Chand & Co. Ltd. New Delhi, 2003, reprint 2007.

REFERENCES:

1. C.F Gerald and P.O Wheatley, "Applied Numerical Analysis", 7th ed., Pearson Education Asia, New Delhi 2007.
2. K. Sankar Rao, "Numerical Methods for Scientists and Engineers", 3rd ed., Prentice Hall of India, New Delhi, 2007,10th reprint 2012.
3. E. Balagurusamy, "Numerical Methods", Tata McGraw-Hill, New Delhi, 1999, 25threprint 2008.
4. M.K Venkatraman, "Numerical Methods" National Publication, New Delhi, 2000, reprint 2005.
5. B.S.Grewal,Numerical Methods in Engineering & Science ,Khanna publishers ,New Delhi,2012.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x		x	x			x		
2	x	x	x		x		x	x			x	
3	x	x	x		x	x			x			x
4	x	x		x	x	x			x	x		
5	x	x	x	x		x				x		x

15CE401 MECHANICS OF SOLIDS- II

L	T	P	C
3	2	0	4

OBJECTIVES:

- Understand the concepts of energy principles
- Study the behavior of statically indeterminate beams
- Understand the concepts of columns and cylinders
- Study the stress in 3D and theories of failure
- Study of advanced topics in bending of beams

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO 1: Find out the strain energy and deflection of beam and trusses by using various theorems.
CO 2: Analyze the indeterminate beams.
CO 3: Calculate the critical loads for columns and stresses for cylinders.
CO 4: Determine the principal stresses and principal planes in 3D
CO 5: Understand the concept of unsymmetrical bending of beams.

UNIT I ENERGY PRINCIPLES (9)

Strain energy - Castiglione's theorems – principle of virtual work – application of energy theorems for computing deflections in beams and trusses – Maxwell's reciprocal theorems

UNIT II INDETERMINATE BEAMS (9)

Propped cantilever and fixed beams-fixed end moments and reactions for concentrated load (central, non-central), uniformly distributed load – theorem of three moments – analysis of continuous beams – shear force and bending moment diagrams for continuous beams.

UNIT III COLUMNS AND CYLINDERS (9)

Eccentrically loaded columns – middle third rule – core section – Euler's theory of elastic columns with different end conditions - Rankine-Gordon formula thin cylinders and shells - thick cylinders – compound cylinders.

UNIT IV STATE OF STRESS IN THREE DIMENSIONS (9)

Determination of principal stresses and principal planes – volumetric strain –theories of failure –Mohr's circle of stresses and strains - application in analysis of stress, load carrying capacity and design of members – residual stresses

UNIT V ADVANCED TOPICS IN BENDING OF BEAMS (9)

Unsymmetrical bending of beams of symmetrical and unsymmetrical sections – curved beams (rectangular, circular and trapezoidal) – Winkler Bach formula.

TOTAL: L: 45 + T:30 = 75 PERIODS

TEXT BOOKS :

1. Bansal.R.K, "Strength of Materials", Laxmi Publications, New Delhi, 2015.
2. Rajput.R.K "Strength of Materials", S. Chand Publications, New Delhi, 2014.

REFERENCES:

1. S.M.A Kazimi, "Solid Mechanics", 26th reprint, Tata McGraw-Hill Publishing Co., New Delhi, 2006.
2. Egor P Popov, "Engineering Mechanics of Solids", Prentice Hall of India, New Delhi, 2010
3. Punmia B.C."Theory of Structures (SMTS) Vol I &II", LaxmiPublications Pvt Ltd,New Delhi, 2004.
4. William A .Nash, "Theory and Problems of Strength of Materials", Schaum's Outline Series, Tata McGraw Hill Publishing Company Ltd,New Delhi, 2007.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x		x	x			x				x
2	x	x		x	x			x	x			x
3	x	x		x	x			x	x			x
4	x	x			x			x				x
5	x	x		x	x			x	x			x

15CE402 HYDRAULIC STRUCTURES AND MACHINERY

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the working principles of hydraulic machinery
- To know the design which is used for supplying water and generating power and also various structures designed for storage and for the development of irrigation system.
- To know the irrigation systems and its applications

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO 1:Identify the pump required for different purposes

CO 2:Classify the turbines and design based on water availability

CO 3:Design the head work for irrigation system

CO 4:Design the drops and outlet for the channel system

CO 5:Understand the operation of hydropower structures

UNIT I IMPACT OF JET ON VANES AND PUMPS (9)

Impact of Jet on flat and curved vanes – Pumps-Types, Centrifugal Pump-Velocity triangle, characteristic curves, specific speed, applications, Reciprocating pump – Types – Indicator diagram-Acceleration and friction, air vessels.

UNIT II TURBINES (9)

Classification - Pelton Turbine, Francis Turbine, Kaplan Turbine-Velocity Triangle, Characteristic Curves-Specific Speed -Governing of Turbines

UNIT III IRRIGATION APPURTENANCE STRUCTURES (9)

Diversion headwork – components – weir– Design of vertical drop weirs – Bligh's theory – Khosla's theory, Divide wall, fish ladder – Design criteria, U/s & D/s protection works. Types of canals, Head regulators – cross regulator - canal falls – canal transitions – cross drainage works, Evacuation & flood proofing,– sediment control and silt exclusion devices.

UNIT IV DAMS AND RESERVOIRS (9)

Reservoir yield- storage capacity, Strategies & operation, Sedimentation- causes, effect & control measures. Dams, factors governing their selection-Classification, Elementary design of gravity dam - Earthen dam, arch dams- spill ways, energy dissipators, spill way gates – Important Dams in India.

UNIT V HYDROPOWER STRUCTURES (9)

Components -Penstock - Pumping storage -Pipe line engineering -Cavitation - Water hammer - Remedies.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS :

1.Bansal.R.K "Fluid Mechanics and Hydraulic Machines", 9thRevised edition, Laxmi Publications, New Delhi, 2011.

2.Garg.S.K, "Irrigation Engineering & Hydraulic Structures", 23rdedition, Khanna Publishers, New Delhi, 2009.

REFERENCES:

1. V.T.Chow, "Open Channel Hydraulics", Blackburn Press, Caldwell United States, 2009.

2. Modi & Seth, "Hydraulics & Fluid Mechanics including Hydraulic Machines", Standard Publications, New Delhi, 2002.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1					x							
2	x				x							x
3	x	x			x						x	x
4	x	x			x	x	x	x		x	x	x
5	x	x			x		x			.	x	x

15CE403 SOIL MECHANICS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To impart the fundamental concepts of soil mechanics
- To understand the bearing capacity
- To know the importance of index properties like grain size, consistency limits, soil classification
- To understand the concept of compaction and consolidation of soils

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO 1: Identify the Index properties and Classify the soil
CO 2: To find soil water and permeability of soil.
CO 3: Draw the stress distribution diagram for various load
CO 4: Study the important engineering properties such as consolidation and compaction.
CO 5: To assess the shear strength parameter of soil

UNIT I WEIGHT VOLUME RELATIONS AND INDEX PROPERTIES (9)

Importance of geotechnical engineering – Three phase diagram – Weight-volume relations – Index properties of soils – Atterberg's limits – Classification of soils – Theory of compaction

UNIT II SOIL WATER AND PERMEABILITY (9)

Soil water - Effective and neutral stresses – Flow of water through soils – Permeability-Laboratory methods – Darcy's law – Seepage and flow-nets - Quick sand.

UNIT III STRESS DISTRIBUTION IN SOILS (9)

Vertical pressure distribution -Boussinesq's equation for point load and uniformly distributed loads of different shapes– New mark's influence chart – Westergaard's equation – Isobar diagram – Pressure bulb - Contact pressure

UNIT IV CONSOLIDATION AND COMPACTION (9)

Compressibility – e-log p curve – Preconsolidation pressure - Primary consolidation – Terzaghi's consolidation theory - Compaction - factors affecting soil compaction - Laboratory compaction tests - dry density and moisture content relationship - field compaction.

UNIT V SHEAR STRENGTH OF SOILS (9)

Stress analysis by Mohr's circle - Mohr's strength theory – Shear strength of soils – Mohr-Coloumb strength envelope – Laboratory shear tests – Direct shear test – Triaxial compression – Unconfined compression test – Vane shear test – Shear strength of saturated cohesive soils – Shear strength of cohesionless soils

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Arora K.R"Soil Mechanics and Foundation Engineering ", Standard Publishers and Distributors, NewDelhi, 2005.
2. Gopal Ranjan and Rao A.S.R." Basic and Applied Soil Mechanics "Wiley Eastern Ltd, New Delhi, 2007.
3. Punmia P.C. "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd., New Delhi, 2005.

REFERENCES:

1. Purushothama Raj. P., "Soil Mechanics and Foundation Engineering", 2nd Edition, Pearson Education, 2013
2. Khan I.H., "A text book of Geotechnical Engineering ", Prentice Hall of India, New Delhi, 2012.
3. Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 2007 (Reprint).

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x			x		x			x		x
2	x	x	x	x	x	x		x				x
3		x					x					x
4	x	x		x	x		x			x		x
5	x	x								x.		x

Approved by Fourth Academic Council

15CE404 CONCRETE TECHNOLOGY

[IS: 10262: 2009, IS 456:2000 code books are permitted]

L	T	P	C
3	0	0	3

OBJECTIVES:

- To know the types of cement, mineral and chemical admixtures, aggregates
- To understand the properties of concrete.
- To know the methodology of mix design.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO 1: To know the various field and laboratory test on cement.
CO 2: Understand the mineral and chemical admixtures.
CO 3: Understand the IS mix design and quality control of concrete
CO 4: Identify the strength of concrete using various testing methods.
CO 5: Implement the special concreting methods required for cold weather and hot weather regions.

UNIT I PROPERTIES OF CEMENT (9)

Manufacturing of Cement by wet and dry Process, Types of cement – Properties of Cement - Heat of Hydration - Test on Cement – Field Test – Laboratory Testing Methods – Fineness of cement, Consistency of cement, Specific Gravity of cement, Setting properties of cement, Soundness of cement and compressive strength of cement mortar

UNIT II AGGREGATES & ADMIXTURES (9)

Fine aggregate and coarse aggregate– Properties and testing methods of fine aggregates– fineness modulus - Bulking of Sand - sieve analysis - Properties and testing methods of coarse aggregates - Crushing test, Abrasion test, Impact test, Specific gravity and water absorption test - mineral and chemical admixtures

UNIT III MIX DESIGN & CONCRETE PRODUCTION (9)

Selection of materials for concrete - water cement ratio - Concrete mix design – concepts variables in proportioning – methods of mix design - Indian Standard method, Factor affecting the test results, process of manufacture of concrete Properties of fresh concrete - workability – measurement of workability –Statistical and quality control of concrete

UNIT IV STRENGTH OF CONCRETE (9)

Strength of concrete – gain of strength with age – testing of hardened concrete - Compressive strength - Tensile strength – Flexural strength – modulus of elasticity of concrete- Stress and Strain characteristics. Introduction to NDT Techniques- Rebound hammer and Ultrasonic pulse velocity test

UNIT V DIFFERENT TYPES OF CONCRETE (9)

Introduction to Polymer concrete, High performance concrete, High strength concrete, Fibre reinforced concrete, Light weight concrete, Ready mix concrete and pumping of concrete

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS :

1. Santhakumar.A.R “Concrete Technology, ”Oxford University Press, New Delhi, 2006.
2. Shetty M.S. “Concrete Technology”, S. Chand & Company Ltd, New Delhi, 2010.

REFERENCES:

1. Metha P.K,” Concrete: Microstructure, properties and Materials”, McGraw-Hill, New Delhi 2005.
2. Neville.N.M, “Properties of Concrete”, 5th edition, Prentice-Hall of India, New Delhi, 2012.
3. IS : 12269-1987,“Specification for 53 grade ordinary Portland Cement”, BIS, New Delhi
4. IS : 383 - 1970, Specification for Coarse and fine natural sources for Concrete, BIS, New Delhi
5. IS: 10262: 2009 “Concrete mix proportioning – Guidelines, BIS, New Delhi.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x		x	x	x				x	x	x
2		x		x	x	x				x		x
3	x	x	x	x	x	x				x		x
4	x	x			x	x				x		x
5			x	x	x	x				x		x

15CE405 HIGHWAY ENGINEERING
[IRC 37:2001 & IRC58:2002 code books are permitted]

L	T	P	C
3	0	0	3

OBJECTIVES:

- This course is taught to impart the knowledge in Traffic Engineering, Highway geometrics, materials, construction and design.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO 1: Study the highway planning.
CO 2: Understand the procedure to collect the traffic data for design and traffic management.
CO 3: Test the highway materials as per recommendation.
CO 4: Do structural design flexible and rigid pavements.
CO 5: Understand the strengthening of pavements.

UNIT I HIGHWAY AND TRAFFIC PLANNING **(8)**

Introduction to Transportation modes – Highway alignment and field surveys – PCU– Master Plan – Transport Economics – Traffic Studies – Volume, speed, origin and destination studies.

UNIT II GEOMETRIC DESIGN OF HIGHWAY **(11)**

Highway classification, Road Geometrics – Highway cross section elements - Camber – Sight Distance, Horizontal Alignment Design, Super Elevation, Extra widening, Transition curves, Set back distance, Design of Vertical curves.

UNIT III HIGHWAY MATERIALS AND CONSTRUCTION **(9)**

Material requirement for pavements – Soil classification for Highway – Soil tests – CBR and Plate Load Test, Aggregate – materials testing and specification, Bitumen – material testing and specification, construction of bituminous and rigid pavements

UNIT IV HIGHWAY DESIGN **(8)**

Pavement Analysis – Factors affecting pavement thickness – Soil – Wheel load – Temperature – Environmental factors; Flexible Pavement Design – Axle Load surveys – CBR method of Design, Rigid Pavement Design – IRC method.

UNIT V HIGHWAY MAINTENANCE AND DRAINAGE **(9)**

Causes of Pavement failures - Pavement Management Systems – Pavement Failures - Pavement evaluation – Strengthening of pavements –Types of maintenance – Highway Drainage – Importance of highway drainage - special considerations for hill roads.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. S.K.Khanna, C.E.G.Justo, "Highway Engineering", New Chand & Bros, Roorkee, 2015.
2. L.R.Kadiyali& N.B Lal, "Principles and Practice of Highway Engineering (Including expressways &Airport Engineering)", Khanna Publishers, New Delhi, 2013.

REFERENCES:

1. G.V Rao, "Principles of Transportation and Highway Engineering", Tata McGraw Hill Co, New Delhi, 2005.
2. ParthaChakroborthy, Animesh Das, "Principles of Transportation Engineering", Prentice-Hall of India, New Delhi, 2011.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x		x	x		x	x				x
2	x	x	x	x	x		x					
3	x	x	x		x		x	x				
4	x	x	x					x				x
5	x	x	x					x				x

Approved by Fourth Academic Council

15CE411 HYDRAULICS ENGINEERING LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

- Student should be able to verify the principles studied in theory by conducting the experiments.
- To impart the knowledge about practical applications concept of Hydraulic Engineering Lab.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO 1: Estimate the Co-efficient of discharge for orifice and notches
CO 2: Experiment the venturi meter and orifice meter for their discharges
CO 3: Understand the flow measurement in a pipe flow
CO 4: Determine the energy loss in pipe flow.
CO 5: Study the characteristics of turbines and pumps.

List of Experiments:

1. Determination of co-efficient of discharge for orifice.
2. Determination of co-efficient of discharge for notches.
3. Determination of co-efficient of discharge for Venturimeter.
4. Determination of co-efficient of discharge for orifice meter.
5. Study of friction losses in pipes.
6. Determination of minor losses in pipes.
7. Performance study on Pelton wheel turbine.
8. Determination of Efficiency of Francis turbine.
9. Study on Performance characteristics of Kaplan turbine.
10. Determination of Efficiency of Centrifugal pumps (Constant speed / variable Speed).
11. Performance study of reciprocating pump.
12. Determination of Meta-Centric Height.

TOTAL: P: 60 = 60 PERIODS

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x			x			x	x	x		x
2	x	x			x			x	x	x		x
3			x	x	x			x	x	x		x
4	x	x	x	x	x			x	x			x
5			x	x	x			x		x		x

15CE412 SOIL MECHANICS LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

- To gain experience regarding the determination of properties of different types of soils
- To provide an opportunity to learn how to measure the shear strength of the soil and its importance.
- To impart knowledge about the foundation engineering.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO 1: Determine the index properties of the soil

CO 2: Apply the knowledge of science and techniques in engineering properties of soil.

CO 3: To identify shear strength parameters of soil

CO 4: Identify the suitability of the soil for different foundations

CO 5: Evaluate the impact of field density of soil.

List of Experiments:

1. Determination of Moisture Content
2. Determination of Specific Gravity of soil
3. Relative Density for sand
4. Sieve Analysis for Coarse Grained soil
5. Atterberg's Limits
6. Sand replacement Test
7. Field Density Test (Core Cutter Method & Standard Proctor's Compaction)
8. Permeability Test
9. Unconfined Compression Test for Cohesive Soil
10. Direct Shear Test on Sand
11. Demonstration on Triaxial Compression Test
12. Demonstration on One dimensional Consolidation Test

TOTAL: P: 60 = 60 PERIODS

REFERENCES:

1. "Soil Engineering Laboratory Instruction Manual", Published by the Engineering College Co- operative Society, Chennai, 1996.
2. Lambe T.W., "Soil Testing for Engineers", John Wiley and Sons, New York, 1990.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x									x
2	x	x	x	x	x		x		x	x		x
3	x	x		x	x					x		x
4			x		x		x		x	x		x
5	x	x		x	x					x		x

15CE413 SURVEY CAMP

L	T	P	C
0	0	2	1

OBJECTIVES:

- To measure the horizontal angles and vertical angles for triangulation work
- To find the area of the field using Total Station
- To measure and draw the longitudinal and cross sectioning

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO 1: Conduct various types of surveys in the field as per the requirements
CO 2: Conduct survey using Advanced Instruments
CO 3: Prepare contour map for the given area.
CO 4: To learn about the trilateration method.
CO 5: To get a basic knowledge about the triangulation method

Ten days survey camp using theodolite, leveling and total station. At the end of the camp, each student shall have plot the contour map and calculate the area. The camp record shall include all original field observations, calculations and plots.

1. Triangulation
2. Trilateration
3. Rectangulation
4. Contouring
5. Co-ordinates and distance measurement with GPS
6. Distance and angular measurement using Total Station
7. Fly leveling using Dumpy level - LS and CS

(Ten Days Survey Camp will be conducted during 3rd Semester winter vacation)

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x	x		x		x			x
2	x	x	x	x	x		x		x			x
3	x	x	x	x			x	x	x	x		x
4	x	x	x	x	x		x	x	x	x		x
5	x	x	x	x			x	x	x	x		x

Approved by Fourth Academic Council

15GYC13 - SOFT SKILLS – READING AND WRITING

L	T	P	C
0	0	2	0

OBJECTIVES:

- To recollect the functional understanding of parts of speech and basic grammar
- To acquire the reading skills through cloze texts, matching and multiple choice modes
- To enhance the writing skills for a variety of purposes

COURSE OUTCOMES:

At the end of this course, student shall be able to

CO1. Apply the knowledge to identify the parts of speech and construct the sentences

CO2. Develop the reading skills through cloze texts, matching and multiple choice modes

CO3. Interpret effectively through writing for a variety of purposes

UNIT I: Grammar **(10)**

Articles – Adjectives – Conjunctions – Prepositions – Idioms & Phrases

UNIT II: Reading **(10)**

Part I: Matching 7 sentences to four short texts

Part II: Text with sentences missing

Part III: Text with multiple choice questions

Part IV: Text with multiple choice gaps

Part V: Identification of additional unnecessary words in text

UNIT III: Writing **(10)**

Part I: E-mail writing, Writing short notes, Memo, Agenda & Minutes

Part II: Report Writing, Complaint Letter, Writing Proposals

TOTAL: P: 30 = 30 PERIODS

REFERENCES:

1. Murphy, Raymond, “Essential Grammar in Use”, Cambridge University Press, UK, 2007.
2. Whitby, Norman ,”Business Benchmark” Pre- Intermediate to Intermediate Preliminary, Cambridge University Press,Second Edition , 2013

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1										x	x	
2									x	x	x	x
3									x	x	x	x

15CE501 STRUCTURAL ANALYSIS - I

L	T	P	C
3	2	0	4

OBJECTIVE:

- To introduce the students to basic theory and concepts of structural analysis and the classical methods for the analysis of buildings.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Analysis the trusses and frames.
CO2: Analyse and solve arched and cable profiled structures.
CO3: Determine the slopes and deflections of beams and frames.
CO4: Analyse the indeterminate structures by iterative procedure.
CO5: Draw the influence lines for statically determinate and indeterminate structures.

UNIT I DETERMINATE AND INDETERMINATE FRAMES (9+6)

Degree of static and kinematic indeterminacies for plane frames - analysis of indeterminate pin-jointed frames - rigid frames (Degree of statical indeterminacy up to two). Principles of virtual work for deflections – Deflections of pin-jointed plane frames and rigid frames

UNIT II ARCHES (9+6)

Arches as structural forms – Types of arches – Analysis of three hinged, two hinged and fixed arches, parabolic and circular arches – Settlement and temperature effects.

UNIT III SLOPE DEFLECTION METHOD (9+6)

Slope deflection method - analysis of continuous beams and portal frames (with and without sway) - bending moment and shear force diagram.

UNIT IV MOMENT DISTRIBUTION METHOD (9+6)

Moment distribution method - analysis of continuous beams and portal frames (with and without sway) - bending moment and shear force diagram.

UNIT V INFLUENCE LINE (9+6)

Influence line - influence lines for bending moment and shear force, Muller Breslau's - principle, determinate and indeterminate beams.

TOTAL: L: 45 + T:30 = 75 PERIODS

TEXT BOOKS:

1. Vaidyanathan, R and Perumal, P., "Comprehensive Structural Analysis," Volume I and II, Laxmi Publications Pvt. Ltd., Chennai, Fourth edition 2008.
2. Subrata Chakarabarty,Sujit Kumar Roy., "Fundamentals of Structural Analysis", S.Chand & Company Ltd, New Delhi, 2012.
3. S.S.Bhavikatti, "Structural Analysis" – Vol.I& II, Vikas Publishing Pvt Ltd., New Delhi, Fourth Edition 2013.

REFERENCES:

1. Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain., "Theory of Structures", Laxmi Publications, New Delhi, 2015.
2. Wang, C.K., "Analysis of Indeterminate Structures", Tata McGraw-Hill, New Delhi, 2000.
3. Negi, L.S. and Jangid, R.S., "Structural Analysis", Tata McGraw-Hill Publications, New Delhi, 2004.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x		x	x		x	x		x		
2	x	x		x	x			x		x		x
3	x	x			x							x
4	x	x		x				x				x
5	x	x		x	x					x		

Approved by Sixth Academic Council

15CE502 DESIGN OF REINFORCED CONCRETE ELEMENTS

[IS 456-2000 & SP 16 code books are to be permitted]

L	T	P	C
3	2	0	4

OBJECTIVE:

- To introduce the different types of philosophies related to design of basic structural elements such as slab, beam, column and footing which form part of any structural system with reference to Indian standard code of practice.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Identify the basic concepts and methods in the design of reinforced concrete structures.
CO2: Design flexural members using limit state method under different loading and end conditions
CO3: Design flexural members of any cross sectional shape for shear, bond, and torsion.
CO4: Design RC columns of any cross section with different end conditions.
CO5**:** Select and design RC footing of different cross section under various site conditions.

UNIT I METHODS OF DESIGN OF CONCRETE STRUCTURES (6+6)

Concept of Elastic method, ultimate load method and limit state method – Advantages of Limit State Method over other methods – Design codes and specification – Limit State philosophy as detailed in IS code.

UNIT II DESIGN FOR FLEXURE (12+6)

Analysis and design of singly and doubly reinforced rectangular and flanged beams(T – Beams only) - Analysis and design of one way, two way and continuous slabs subjected to uniformly distributed load for various boundary conditions

UNIT III DESIGN FOR BOND, ANCHORAGE SHEAR & TORSION (9+6)

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

UNIT IV DESIGN OF COLUMNS (9+6)

Types of columns – Braced and unbraced columns – Design of short Rectangular and circular columns for axial, uniaxial and biaxial bending.

UNIT V DESIGN OF FOOTING (9+6)

Design of wall footing – Design of axially and eccentrically loaded rectangular pad and sloped footings – Design of combined rectangular footing for two columns only.

TOTAL: L: 45 + T:30 = 75 PERIODS

TEXT BOOKS:

1. Gambhir.M.L. "Design of Reinforced Concrete Structures", Prentice Hall of India Private Limited, 2012.
2. Punmia B.C, Ashok Kumar Jain, Arun K.Jain, "R.C.C. Designs Reinforced Concrete Structures", Laxmi Publications Pvt. Ltd., New Delhi, 2007.
3. Varghese.P.C., "Advanced Reinforced Concrete Design", Prentice Hall of India Pvt. Ltd., New Delhi, 2012.
4. N. Krishna Raju, “Design of Reinforced Concrete Structures (IS: 456-2000)”, 3rd Edition, 2014.

REFERENCES:

1. Sinha, S.N., “Reinforced Concrete Design”, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2014
2. Unnikrishna Pillai, S., Devdas Menon, “Reinforced Concrete Design”,Tata McGraw Hill Publishing Company Ltd., 3rd ed.,2009
3. Subramanian. N., "Design of Reinforced Concrete Structures", Oxford University, New Delhi, 2013.
4. IS456:2000, Code of practice for Plain and Reinforced Concrete, Bureau of Indian Standards, New Delhi, 2007
5. SP:16, “Design Aids for Reinforced Concrete to Bureau of Indian Standards, New Delhi, 2007

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x			x	x		x		x		x
2	x	x	x		x			x		x		
3	x	x				x		x		x		
4	x	x	x			x						
5	x	x			x			x				

Approved by Sixth Academic Council

15CE503 FOUNDATION ENGINEERING
[IS 6403 code book is to be permitted]

L	T	P	C
3	0	0	3

OBJECTIVE:

- To impart knowledge on common method of sub soil investigation and design of foundation.
- Acquires the capacity to investigate the soil condition and to select and design a suitable foundation

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1**:** Conduct sub surface investigation and select foundation based on soil condition.
CO2**:** Estimate pressure distribution below the footing and calculate bearing capacity of soil.
. CO3**:** Estimate pressure distribution below the footing and settlement of foundation.
CO4**:** Calculate the load carrying capacity of piles.
CO5**:** Analyse and design the suitable foundation and earth retaining structures.

UNIT I SITE INVESTIGATION AND SELECTION OF FOUNDATION (9)

Introduction–Planning and stages in sub-surface exploration–depth and spacing of exploration–Methods of exploration–Test pit–Trenches–Geophysical methods: Seismic refraction and Electrical resistivity method–Boring methods–Types of soil sample–Features of sampler affecting soil disturbance–standard penetration test–static and dynamic cone penetration test–bore log report.

UNIT II SHALLOW FOUNDATION (9)

Introduction–Bearing capacity – definition – types of shear failure – Bearing capacity of shallow foundation on homogeneous deposits -Methods: Terzaghi's and BIS methods–Effect of water table on bearing capacity–Plate load test–Bearing capacity from in-situ tests-SPT, SCPT and plate load test–methods of improving bearing capacity of soil.

UNIT III FOOTING, RAFT AND SETTLEMENT OF FOUNDATION (9)

Types of foundation–contact pressure distribution below isolated footing–types and proportioning of combined footing–types and application of mat foundation–floating foundation–Settlement–causes and methods of minimizing settlement.

UNIT IV DEEP FOUNDATION (9)

Types and functions of pile–factors influencing the selection of pile-carrying capacity of single pile in cohesion less and cohesive soil–static formula–dynamic formulae (Engineering News and Hileys)–Capacity from in-situ tests (SPT and SCPT)–Negative skin friction–Carrying capacity of Pile group–Pile load test–Under-reamed piles–Introduction to well foundation and Diaphragm wall.

UNIT V STABILITY OF SLOPES AND EARTH PRESSURE (9)

Slopes–Infinite and finite slopes–types of failure–causes of failure–Procedure for slip circle method - method of slices - Earth pressure in soils: active and passive states–Lateral earth pressure - Rankine's theory–stratified soil–Cullman's Graphical method.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Punmia, B.C. "Soil Mechanics and Foundations", Laxmi Publications Pvt.Ltd, New Delhi, 16th ed., 2005.
2. Arora K.R. "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 2005.

REFERENCES:

1. Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 2007 (Reprint).
2. Gopal Ranjan and Rao A.S.R. "Basic and Applied soil mechanics", New Age International Pvt. Ltd, New Delhi, 3rd ed., 2016.
3. Purushothama Raj. P., "Soil Mechanics and Foundation Engineering", 2nd ed., Pearson Education, 2013
4. IS 6403 - 2002 "Breaking capacity of shallow foundation", Bureau of Indian Standards, New Delhi, 2002

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x		x			x		x		x
2	x	x	x	x			x			x		
3		x		x	x			x		x		
4	x		x			x			x			
5		x		x	x					x		

15CE504 ENVIRONMENTAL ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand the sources and characteristics of water and wastewater
- To realize the different water treatment techniques
- To recognize the different primary and secondary treatment techniques of wastewater.
- To learn the principles of sludge management and disposal of wastewater

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Identify the source of water and estimate water demand.
CO2: Apply the water treatment concept and methods.
CO3: Design the various primary treatment units for wastewater.
CO4: Design and choose the various secondary treatment units for wastewater.
CO5: Plan for disposal of sewage and sludge.

UNIT I SOURCES AND QUALITY OF WATER (8)

Public Water supply system – Planning, Objectives, Design period, Population forecasting - water demand – Sources of water – Surface and Ground water – Characteristics of water – Water quality Standards

UNIT II WATER TREATMENT (11)

Water treatment Objectives – Unit operations and processes in surface water treatment – Principles, functions and design of flash mixers, flocculators, sedimentation tanks and sand filters – Aeration – iron and manganese removal, defluoridation and demineralization.

UNIT III PRIMARY WASTE WATER TREATMENT (8)

Characteristics of sewage, Primary treatment: Principles, functions and design of screen, grit chambers and primary sedimentation tanks-operation and maintenance aspects.

UNIT IV SECONDARY WASTE WATER TREATMENT (10)

Activated Sludge Process and Trickling filter (no design); Other treatment methods - oxidation ditches, UASB - Waste Stabilization Ponds - Anaerobic Stabilization units - Septic tanks, Advances in sewage treatment .

UNIT V DISPOSAL OF SEWAGE AND SLUDGE (8)

Dilution – Self purification of surface water bodies – Oxygen sag curve – disposal to lakes and sea, Land disposal – Sewage farming - characteristics of Sludge -Thickening – Sludge digestion – Sludge disposal - Drying beds – Conditioning and Dewatering.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Garg, S.K., "Environmental Engineering", Vol.I and II, Khanna Publishers, New Delhi, 2005.
2. Modi, P.N. “Water Supply Engineering”, Vol. I Standard Book House, New Delhi, 2010.
3. Punmia, B.C., Ashok K Jain and Arun K Jain, "Water Supply Engineering", Laxmi Publications Pvt. Ltd., New Delhi, 2013

REFERENCES:

1. Government of India, “Manual on Water Supply and Treatment”, CPHEEO, Ministry of Urban Development, New Delhi, 2013.
2. Syed R. Qasim and Edward M. Motley Guang Zhu, “Water Works Engineering Planning”, Design and Operation, Prentice Hall of India Private Limited, New Delhi, 2006.
3. George Tchobanoglous, Franklin Louis Burton, H. David Stensel, Metcalf & Eddy, “Wastewater Engineering, Treatment and Reuse”, Tata McGraw-Hill Edition, 4th ed., New Delhi, 2009.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x		x	x						x
2	x		x		x	x						
3	x		x		x	x	x					x
4					x							
5					x	x						x

15CE511 CONCRETE AND HIGHWAY ENGINEERING LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVE:

- To understand and perform various tests on cement, aggregates, bitumen and concrete.
- To provide an opportunity to learn how to measure the parameters which governs the quality of the materials.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Analyze the various tests and properties of cement and concrete.
CO2: Diagnose the properties of aggregates with different testing methods
CO3: Ensure the strength characteristics of the given concrete.
CO4: Prepare different concrete mixes and check the workability properties
CO5: Gain sufficient idea on practice and procedure of using bitumen in road works

List of Experiments:

TESTS ON FRESH AND HARDENED CONCRETE

1. a. Slump Test
   b. Vee-Bee Test
2. a. Compaction Factor Test
   b. Flow table
3. a. Tests on Cubes (Compressive Strength Test)
   b. Tests on Cylinders (Split Tensile Strength)
   c. Tests on Prisms (Flexural Strength of Concrete)
4. Young's Modulus of concrete

PRACTICES

1. Comparison of compressive strength between Conventional and Special Concretes

NON -DESTRUCTIVE TESTS

1. Rebound Hammer Test
2. Ultrasonic Pulse Velocity Test

TESTS ON BITUMEN

1. Penetration test
2. Softening point test
3. Ductility test
4. Marshal Stability and Flow Values (Study Experiment)

TOTAL: P: 60 = 60 PERIODS

REFERNCES

1. Shetty. M. S (2005), Concrete Technology, Published by S. Chand & Co., Ltd, New Delhi.
2. IS: 10262 - 2009, Indian Standard specification for Methods of Mix design.
3. IS: 383 - 1987, Indian Standard specification for Test for Fine and Coarse aggregates.
4. IS: 1203 to 1208 - 1978, Indian Standard specification for Bitumen test

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1		x						x	x	x		
2			x			x						
3		x		x			x			x		
4			x		x	x			x	x		x
5			x			x			x	x		

15CE512 ENVIRONMENTAL ENGINEERING LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVE:

- To convey the principles of testing of water and wastewater.
- To impart the principles of sampling and preservation of water and wastewater.
- To get the idea in testing bleaching powder and chlorinated water.
- To perform the various test on water and waste water sample

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Estimate the parameters of the water quality
CO2: Test the water and wastewater and their different characteristics as per standards
CO3: Test bleaching powder and find the disinfectant percentage in chlorinated water.
CO4: Acquire the sampling and preservation methods of water and waste water.
CO5: Detect and quantify the gases by using gas analyzers

List of Experiments:

1. Determination of Turbidity, Conductivity and pH
2. Determination of Hardness
3. Determination of Alkalinity
4. Determination of Acidity in water
5. Determination of Chlorides
6. Determination of Residual chlorine
7. Determination of Optimum Coagulant
8. Determination of Total, Dissolved and Suspended solids
9. Determination of Available chlorine in bleaching powder
10. Determination of Dissolved Oxygen and BOD for the given sample
11. Determination of COD for given sample
12. Sampling and preservation methods and significance of characterization of water and wastewater

TOTAL: P: 60 = 60 PERIODS

REFERENCES:

1. "Standards Methods for the Examination of Water and Wastewater", WPCF, APHA and AWWA, USA, 17th ed., 2012.
2. KVSG Muralikrishna, "Chemical analysis of water and soil - a laboratory manual", Environmental Protection Society, 2011.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1			x		x	x						
2			x		x	x	x					x
3			x			x						
4					x	x						
5			x		x							

15GY511 SOFT SKILLS APTITUDE AND REASONING - I
(Common to All branches)

L	T	P	C
0	0	2	0

OBJECTIVE:

- To enhance the students to write and speak fluently with the help of grammatical structures
- To develop students to workout solution for problems that involves mathematical aptitude
- To develop students to workout solutions for problems that involves general reasoning

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Write and speak fluently without any grammatical errors
CO2: Solve aptitude problems with ease
CO3: Solve reasoning problems with ease

UNIT I SOFT SKILLS **(10)**

Grammar –Parts of Speech, Tenses, Subject - Verb agreement , Articles, Preposition, Conjunctions, Modal Auxiliaries, Degrees of Comparison – Self Introduction - Role Play - Object Description – Passage writing

UNIT II APTITUDE **(10)**

Average - Percentage - Age Ratio & Proportion - Partnership - Profit & loss - Mixture & Allegation

UNIT III REASONING **(10)**

Odd man out - Number series - Syllogism - Coding & decoding - Seating arrangement

TOTAL: 30 PERIODS

TEXT BOOKS:

1. Thorpe, Edgar and Shawick Thorpe. *Objective English.* 3rd ed. New Delhi: Pearson, 2011.
2. Khattar, Dinesh. *Quantitative Aptitude*. 3rd ed. New Delhi: Pearson, 2014.

REFERENCES:

1. Prasad, Hari Mohan & Uma Rani Sinha. "Objective English for Competitive Examinations", 4th ed., New Delhi: Tata McGraw Hill Education Pvt. Ltd., 2010.
2. Aggarwal, R.S. "A Modern Approach to Verbal & Non Verbal Reasoning", Revised Edition. New Delhi, S.Chand Publishers, 2017.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1									x	x	x	x
2										x		
3									x		x	x

15CE601 STRUCTURAL ANALYSIS - II

L	T	P	C
3	2	0	4

OBJECTIVE:

- To analyse statically indeterminate structures by imposing boundary conditions on flexibility matrix.
- To understand the basics of finite element method and its application to structural analysis.
- To formulate the element stiffness matrix and assemble the structure stiffness matrix for solving indeterminate problems.
- To introduce the importance of plastic analysis to calculate the collapse loads for beams and frames.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Employ plastic analysis to calculate the collapse loads for beams and frames.
CO2: Analysis simple determinate and indeterminate beams, frames and trusses using matrix flexibility method.
CO3: Analysis simple determinate and indeterminate beams, frames and trusses using matrix stiffness method.
CO4: Determine the member forces in suspension bridges and space truss.
CO5: Explain the basic concepts in finite element method.

UNIT I PLASTIC ANALYSIS (9+6)

Plastic moment of resistance - shape factor, collapse load - analysis of continuous beams and portal frames – limiting conditions for applications

UNIT II FLEXIBILITY MATRIX METHOD (9+6)

Concept of flexibility matrix – determinate Vs indeterminate - Analysis of indeterminate pin-jointed plane frames, analysis of continuous beams, rigid jointed plane frames

UNIT III STIFFNESS MATRIX METHOD (9+6)

Stiffness matrix for beam element - analysis of continuous beams - plane frames & pin jointed plane frames.

UNIT IV SPACE AND CABLE STRUCTURES (9+6)

Analysis of Space trusses using method of tension coefficients – Beams curved in plan -Suspension cables – suspension bridges with two and three hinged stiffening girders

UNIT V FINITE ELEMENT METHOD (9+6)

Introduction – Discretization of a structure – Displacement functions – Truss element – Beam element – Plane stress and plane strain - Triangular elements

TOTAL: L: 45 + T:30 = 75 PERIODS

TEXT BOOKS:

1. Vaidyanathan, R and Perumal, P. “Comprehensive Structural Analysis,” Volume I and II, Laxmi Publications Pvt. Ltd., Chennai, 4th ed., 2008.
2. V.N.Vazirani & M.M.Ratwani, “Analysis of Structures” Volume I and II, Khanna Publishers, New Delhi, 2015.
3. S.S.Bhavikatti, “Structural Analysis” - Vol. I & II, Vikas Publishing Pvt Ltd., New Delhi, 4th ed., 2013.

REFERENCES:

1. R.L.Jindal, “Indeterminate Structures”, Tata McGraw Hill Publishing House, 1996.
2. Negi.L.S, “Theory & Problems in Structural Analysis”, Tata McGraw Hill Publishing House, 2002
3. G.S.Pandit & Gupta S.P, Structural Analysis (A Matrix Approach), Tata McGraw Hill, Publishing Ltd, 2008.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x			x		x				
2	x	x		x							x	x
3	x	x	x			x	x				x	x
4	x	x		x								x
5	x	x		x			x					x

15CE602 BASICS OF DYNAMICS AND ASEISMIC DESIGN
[IS 1893, IS 13920 & IS 4326 Code Books are to be Permitted]

L	T	P	C
3	0	0	3

OBJECTIVE:

- To introduce dynamic loading and the dynamic performance of the structures.
- To discuss different types of dynamic loading.
- To study on the performance of structures under earthquake loading.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Assess the influence of vibrations and selection of remediation methods based on the nature of vibration
CO2: Understand the dynamic concepts
CO3: Realize the origin, various terminologies and behavior of earthquakes
CO4: Analysis and design of structures for earthquake forces as per IS 1893 and IS 13920.
CO5: Know the codal provisions as well as the aseismic design methodology

UNIT I THEORY OF VIBRATIONS (9)

Theory of vibrations and harmonic motion -Dynamic Loads-D'Alembert's Principle and inertia forces- Degree of freedom- Equation of motion for SDOF - Damped and Undamped free vibrations - Undamped forced vibration - Natural frequencies

UNIT II MULTIPLE DEGREE OF FREEDOM SYSTEM (9)

Two degree of freedom system - Normal modes of vibration - Natural frequencies - Mode shapes - Introduction to MDOF systems -Decoupling of equations of motion - Concept of mode superposition (No derivations).

UNIT III ELEMENTS OF EARTHQUAKE ORIGIN (9)

Elements of Seismology - Causes of Earthquakes -Seismic waves - Magnitude - Intensity of earthquake- Seismogram-Information on some disastrous earthquakes - Seismic zone map of India - Strong motion characteristics.

UNIT IV EARTHQUAKE RESISTANT DESIGN (9)

Principles of Earthquake Resistant Design - Response spectrum theory and Design spectra-Time Acceleration method, Effect of soil properties and damping -liquefaction, Types, effects and controlling factors

UNIT V DESIGN METHODOLOGY (9)

IS 1893-Codal provisions - Design horizontal seismic coefficient - Design base shear distribution, IS 13920 and IS 4326 - Codal provisions - Base isolation techniques - Vibration control measures - Important points in mitigating effects of earthquake on structures

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. A K. Chopra, "Dynamics of Structures – Theory and Applications to Earthquake Engineering", Printice-Hall India Pvt Ltd, 4th ed., 2011.
2. Pankaj Agarwal and Manish Shrikhande, "Earthquake Resistant Design of Structures", Prentice Hall of India, 2007.

REFERENCES:

1. Mario Paz, "Structural Dynamics – Theory and Computation", CBS Publications, 2nd ed., 2006.
2. IS 1893 – 2002, Criteria for Earthquake Resistant Design of Structures.
3. IS 4326 – 1993, Earthquake Resistant Design and Construction of Buildings – Code of Practice.
4. IS 13920 – 2016, Ductile Detailing of Reinforced Concrete Structures to Seismic Forces – Code of Practice.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x		x		x		x		x		
2		x		x	x		x		x			x
3	x		x		x		x		x			x
4		x		x		x		x		x		x
5	x		x		x	x						x

15CE603 DESIGN OF REINFORCED CONCRETE AND BRICK MASONRY STRUCTURES
[IS 456, IS 1905, SP 16 and IS 3370 Code Books are to be permitted]

L	T	P	C
3	0	0	3

OBJECTIVE:

- To give an exposure to the design of continuous beams, slabs, staircases, walls and brick masonry structures
- To learn about yield line theory.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Design various types of retaining walls under various loading conditions.
.CO2: Design and detailing of different types of water tanks
CO3: Acquire sufficient knowledge of design for special elemets
CO4: Apply the yield line theory for design of square, rectangular, circular and triangular slabs
CO5: Design axially and eccentrically loaded brick walls based on the knowledge gained for various loading conditions.

UNIT I EARTH RETAINING STRUCTURES (9)

Functions of a Retaining Wall – Design Principles - Design of Cantilever and Counterfort Retaining walls

UNIT II WATER TANKS (9)

Design principles of elevated overhead water tank - Design of rectangular underground water tank – Design of circular overhead water tank

UNIT III SPECIAL ELEMENTS (9)

Design of staircases (ordinary and doglegged) – Design of flat slabs – Principles of design of mat foundation, box culvert and road bridges

UNIT IV YIELD LINE THEORY (9)

Assumptions - Characteristics of yield line - Determination of collapse load / plastic moment - Application of virtual work method - square, rectangular, circular and triangular slabs - Design problems

UNIT V BRICK MASONRY (9)

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

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Krishnaraju. N.,"Design of reinforced Concrete Structures", CBS Publishers & Distributors Pvt Ltd, 4th ed., 2016.
2. Dayaratnam, P., "Brick and Reinforced Brick Structures", Oxford & IBH Publishing House, 1997
3. Punmia B.C, Ashok Kumar Jain, Arun K.Jain, "R.C.C. Designs Reinforced Concrete Structures", Laxmi Publications Pvt. Ltd., New Delhi, 2006.
4. Varghese.P.C., "Advanced Reinforced Concrete Design", Prentice Hall of India Pvt. Ltd., New Delhi, 2012.

REFERENCES:

1. Ram Chandra.N and VirendraGehlot, "Limit State Design", Standard Book House, 2004.
2. Gambhir.M.L., "Design of Reinforced Concrete Structures", Prentice Hall of India Private Limited, 2012
3. Subramanian. N., "Design of Reinforced Concrete Structures", Oxford University, New Delhi, 2013.
4. IS 456:2000, Code of Practice for Plain and Reinforced Concrete, Bureau of Indian Standards, New Delhi, 2007
5. IS1905:1987, Code of Practice for Structural use of Unreinforced Masonry Bureau of Indian Standards, New Delhi, 2002

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x		x		x	x	x	x	
2	x	x		x		x		x		x	x	
3	x	x		x	x	x		x	x	x	x	
4	x	x	x		x			x	x	x		
5	x	x	x		x			x		x	x	

15CE604 DESIGN OF STEEL STRUCTURES

[IS 800-2007 is to be permitted]

L	T	P	C
3	2	0	4

OBJECTIVE:

- Have knowledge on the design of structural steel members subjected to compressive, tensile and bending forces, as per current code.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Be proficient in limit state design concepts and connection design.
CO2: Know the concept of design of tension members
CO3: Execute compression member design
CO4: Know the design of beams and plate girders.
CO5: Carry out Steel design real projects and live examples

UNIT I INTRODUCTION (9+6)

Properties of steel – Structural steel sections – Limit State Design Concepts – Loads on Structures – Connections using welding and bolting – Design of bolted and welded joints – Eccentric connections - Efficiency of joints

UNIT II TENSION MEMBERS (9+6)

Types of sections – Net area – Net effective sections for angles and Tee in tension – Design of connections in tension members – Use of lug angles – Design of tension splice – Concept of shear lag.

UNIT III COMPRESSION MEMBERS (9+6)

Types of compression members – Theory of columns – Basics of current codal provision for compression member design – Slenderness ratio – Design of simple and built up members – Design of laced and battened type columns – Design of column bases – Gusseted base.

UNIT IV BEAMS (9+6)

Design of laterally supported and unsupported beams – Built up beams – Beams subjected to uniaxial and biaxial bending – Design of plate girders - Intermediate and bearing stiffeners – Flange and web splices

UNIT V ROOF TRUSSES AND INDUSTRIAL STRUCTURES (9+6)

Roof trusses – Roof and side coverings – Design of purlins and elements of truss; end bearing – Design of gantry girder.

TOTAL: L: 45 + T:30 = 75 PERIODS

TEXT BOOKS:

1. Subramanian.N, "Design of Steel Structures", Oxford University Press, New Delhi, 2013.
2. Gambhir. M.L., "Fundamentals of Structural Steel Design", McGraw Hill Education India Pvt. Ltd., 2013
3. Shiyekar. M.R., "Limit State Design in Structural Steel", Prentice Hall of India Pvt. Ltd, Learning Pvt. Ltd., 2nd ed., 2013.
4. Bhavikatti.S.S, "Design of Steel Structures", By Limit State Method as per IS:800–2007, IK International Publishing House Pvt. Ltd., 2010

REFERENCES:

1. Dr. L. S. Jayagopal, Dr. D. Tensing, "Design of Steel Structures", Vikas Publishing House Pvt. Ltd., 2015
2. Narayanan.R "Teaching Resource on Structural Steel Design", INSDAG, Ministry of Steel Publications, 2002.
3. Duggal. S.K, "Limit State Design of Steel Structures", Tata McGraw Hill Publishing Company, 2009
4. Shah.V.L and Veena Gore, "Limit State Design of Steel Structures", IS 800–2007 Structures Publications, 2012.
5. IS 800:2007, General Construction in Steel - Code of Practice, (Third Revision), Bureau of Indian Standards, New Delhi, 2007

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x	x	x			x		x		x
2	x	x		x		x			x			x
3	x		x		x		x		x			x
4		x		x		x		x		x		x
5	x		x		x		x		x			x

15CE611 DESIGN AND DRAFTING LABORATORY

[IS 10262, SP 16, IS 3370 codes books are to be permitted]

L	T	P	C
0	0	4	2

OBJECTIVE:

- To acquire hands on experience in design and preparation of structural drawings for concrete / steel structures normally encountered in Civil Engineering practice.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Identify and calculate the different types of loadings for various Structures
CO2: Identify the method of analysis
CO3: Acquires hands on experience in design structural drawings for concrete structures
CO4: Gain sufficient idea on practice of construction of water tanks.
CO5: Design the structures and draw the reinforcement detailing

List of Experiments:

1. Design and analysis of multistorey framed structure (Beam, Column and Slab)
2. Design and drawing of RCC cantilever type retaining walls with reinforcement details
3. Design of solid slab bridges for IRC loading and reinforcement details
4. Design and drafting of circular RCC water tanks
5. Design and drafting of Elevated Water Tank
6. Design and detailing of Roof Truss

Note: Manual Design & Auto CAD Drawing

TOTAL: P: 60 = 60 PERIODS

TEXT BOOKS:

1. Krishnaraju,N. "Structural Design & Drawing, Universities Press, 2009.
2. Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, "Comprehensive Design of Steel Structures, Laxmi Publications Pvt. Ltd., 2015

REFERENCES:

1. Krishnamurthy, D., "Structural Design & Drawing - Vol. II and III, CBS Publishers, 2010.
2. Shah V L and Veena Gore, "Limit State Design of Steel Structures" IS800-2007,Structures Publications, 2009.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x		x	x	x		x	x	x		x
2	x	x		x	x							
3	x	x		x	x							
4	x	x		x	x						x	
5	x	x		x	x						x	

15CE612 EMPLOYABILITY SKILLS - I

L	T	P	C
0	0	2	0

OBJECTIVE:

- To instruct and improve the design capability of the student.
- This course conceives purely a plan preparation of RCC Structure complete set of drawings

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Gain sufficient idea on practice of preparing plan in civil Engineering.

CO2: Develop the plan into 3D view of Buildings

List of Experiments:

To measure the data from site (Building more than (G +1) and Industrial building with roof truss), from that data is to Prepare (Plan, Section and Elevation) the following

1. Drafting by manual
2. Drafting by using software
3. 3D VIEW with walk through

The method of evaluation will be as follows:

1. Evaluation of Report : 80 marks
2. Viva voce examination : 20 marks

TOTAL: 100 MARKS

TOTAL: P: 30 = 30 PERIODS

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x			x		x					x
2	x	x										x

Approved by Sixth Academic Council

15GE611 COMPREHENSION

L	T	P	C
0	0	2	1

OBJECTIVE:

- To encourage the students to comprehend the knowledge acquired from the first Semester to Sixth Semester of B.E Degree Course through periodic exercise.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Understand and comprehend any given problem related to Civil Engineering field.
CO2: Recall the fundamentals of Civil Engineering.
CO3: Summarize the concepts of Codal design

METHOD OF EVALUATION:

- The students will be assessed 100% internally through weekly test with objective type questions on all the subject related topics.

TOTAL: P: 30 = 30 PERIODS

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x			x		x					x
2	x	x										x
3	x	x			x		x					x

Approved by Sixth Academic Council

15CE701 QUANTITY SURVEYING AND ESTIMATION

L	T	P	C
3	0	2	4

OBJECTIVE:

- To impart the knowledge on basic concepts related to estimate preparation.
- To analyse the rate of a work item according to the specification
- To identify various items of work in a building & calculate their quantities using appropriate methods.
- To understand the concepts behind the preparation of estimate of the various civil engineering works

COURSE OUTCOMES:

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

CO1: Prepare the estimate corresponding to the required specification
CO2: Arrive rates of various work items
CO3: Performance quantity take-offs for various work items using various methods of processing dimensions.
CO4: Predict the value of properties considering various influencing factors.
CO5: Understand the principles for report preparation, tender notices and types.

UNIT I INTRODUCTION TO ESTIMATES AND SPECIFICATIONS (8)

General introduction to Quantity surveying - purpose of estimates - Types of estimates, various items to be included in estimates - Principles in selecting units of measurement for items, various units and modes of measurement for different trades - I.S. 1200, Specifications - purpose and basic principles of general and detailed specifications - detailed specifications for various items of work.

UNIT II RATE ANALYSIS (9)

Analysis of rates, factors affecting the cost of materials, labour. Taskwork, schedule as basis of labour costs. Plants and equipment –hour costs based on total costs and outputs. Overhead charges, rates for various items of construction of civil engineering works. Standard schedule of rate, price escalation.

UNIT III ESTIMATION OF CIVIL ENGINEERING WORKS (9)

Reading and interpretation of architectural and structural drawings – Detailed estimate of masonry buildings, R.C.C works, Preparation of schedule for steel as reinforcement - Preparation of bills of quantities - Approximate estimates, purpose, various methods used for buildings and other civil engineering works such as culvert and road projects

UNIT IV VALUATION (12)

Principles of valuation, definition of value, price and cost - Attributes of value, Different types of values- Valuer and his duties, purpose of valuation and its function. Factors affecting the valuation of properties - free hold and leasehold properties, different types of lease - Methods of valuation - Forms of rent, different types of rent - carpet area basis, unit basis, cubic content basis - Sinking fund, Depreciation

UNIT V TENDERS AND REPORT PREPARATION (7)

Tenders – e-tender – Preparation of Tender Notice and documents – Contracts – types of contracts – Drafting of contract document – Arbitration and legal requirements – Principles for report preparation – report on estimate of Residential building – culvert

LISTOF EXPERIMENTS:

1. Rate analysis for earth work, PCC, RCC, Brick work, plastering and steel fabrication
2. Calculation of quantities and prepare the estimate for load bearing structure (Residential)
3. Calculation of quantities and prepare the estimate for framed structure (Commercial)
4. Prepare the bar-bending schedule for footing, column, plinth / roof beam and slab

TOTAL: L: 45 + P:30 = 75 PERIODS

TEXT BOOKS:

1. Birdie .G.S, "*A Text Book on Estimating and Costing"*, Dhanpat Rai and Sons, New Delhi, 2000.
2. Dutta B.N., "Estimating and Costing in Civil Engineering", UBS Publishers & Distributors Pvt. Ltd., New Delhi, 2013
3. Chakraborti .M," *Estimating Costing"*, Specification and Valuation in Civil Engineering, 2006.

REFERENCES:

1. Kohli, D.D and Kohli, R.C., "A Text Book of Estimating and Costing (Civil)", S.Chand & Company Ltd., 2014
2. B.S.Patil, 'Civil Engineering Contracts and Estimates', University Press, 2006.
3. Rangwala .S.C.," *Elements of Estimating and Costing"*, Charotar Publishing House, Anand, 1987.
4. Rangwala .S.C,"*Valuation of Real Properties*", Charotar Publishing House, Anand, 1984.
5. Course notes on "Estimation and costing", State Institute of Vocational Education Andhra Pradesh, Hyderabad. First Edition: 2006.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

COs	POs											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	x					x		x				x
2		x	x		x		x		x		x	x
3	x			x		x				x		x
4		x			x	x						x
5	x									x		x

Approved by Sixth Academic Council

15CE711 DESIGN PROJECT

L	T	P	C
0	0	8	4

OBJECTIVE:

- To impart and improve the design capability of the student.
- This course conceives purely a design problem in any one of the disciplines of Civil Engineering, e.g., Design of an RCC Structure, Design of a waste water treatment plant, Design of a foundation system, Design of traffic intersection, Design of a Steel Structures, etc.
- The design problem can be allotted to either an individual student or a group of students comprising of not more than four.
- At the end of the course the group should submit a complete report on the design problem consisting of the data given, the design calculations and specifications with complete set of drawings.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Formulate a problem definition in the field of Civil Engineering through literature survey.
CO2: Develop methodology using appropriate tools for the problem.
CO3: Identify the objectives of the project by thorough understanding of the problem
CO4: Gain sufficient idea on practice of various fields in civil Engineering.
CO5: Design the structures, draw the reinforcement detailing and find the Estimate of Buildings

EVALUATION PROCEDURE

The method of evaluation will be as follows:

1. Internal Marks : 50 marks
   (Decided by conducting 3 reviews by the guide appointed by the Institution)
2. Evaluation of Project Report : 30 marks
   (Evaluated by the external examiner appointed the University)
   Every student belonging to the same group gets the same mark
3. Viva voce examination : 20 marks
   (Evaluated by the internal examiner appointed by the HOD with the approval of HoI, external examiner appointed by the COE and Guide of the course - with equal Weightage)

TOTAL: 100 MARKS

TOTAL: P: 120 = 120 PERIODS

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

COs	Pos											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x		x			x	x	x		x	x
2	x		x	x		x	x				x	x
3	x	x		x				x			x	
4		x		x		x	x	x		x		x
5	x	x	x	x	x	x			x		x	x

Approved by Sixth Academic Council

15CE712 PRACTICAL TRAINING

L	T	P	C
0	0	1	0

OBJECTIVES:

- It conceives purely a practical training in any one of the Construction Industry.
- It can be allotted to either an individual student or a group of students.
- At the end of the course the group should submit a complete report on the practical training.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Better experience in practical knowledge and construction needs.

EVALUATION PROCEDURE

The Practical Training shall carry 100 marks and shall be evaluated through internal assessment.

The method of evaluation will be as follows:

1. Evaluation of Practical Training Report : 50 marks
   (Evaluated by the Internal examiner)
2. Power Point Presentation : 50 marks
   (Evaluated by the internal examiner appointed by the HoD with the approval of HoI and the COE)

TOTAL: 100 MARKS

TOTAL: P: 15 = 15 PERIODS

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1				X				X		X	X	X

15CE713 EMPLOYABILITY SKILLS II

L	T	P	C
0	0	2	0

OBJECTIVE:

- To instruct and improve the estimating and planning capability of the student. This course conceives purely a quantity calculation of RCC / Steel Structures using software

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1: Gain sufficient idea on estimation of RCC / Steel Structure

CO2: Acquire basic knowledge in planning

LIST OF EXPERIMENTS:

To calculate the quantity and prepare the estimate of a RCC Building more than (G +1) or Industrial building with roof truss using software, from that data is to submit the following

1. Working Plan
2. Detailed measurement sheet
3. Abstract
4. Scheduling

The method of evaluation will be as follows:

1. Evaluation of Report : 80 marks

2. Viva voce examination : 20 marks

TOTAL: 100 MARKS

TOTAL: P: 30 = 30 PERIODS

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x		x	x			x		x	x
2	x			x		x		x		x		X

Approved by Sixth Academic Council

15GE711 PERSONALITY AND CHARACTER DEVELOPMENT

L	T	P	C
0	0	1	0

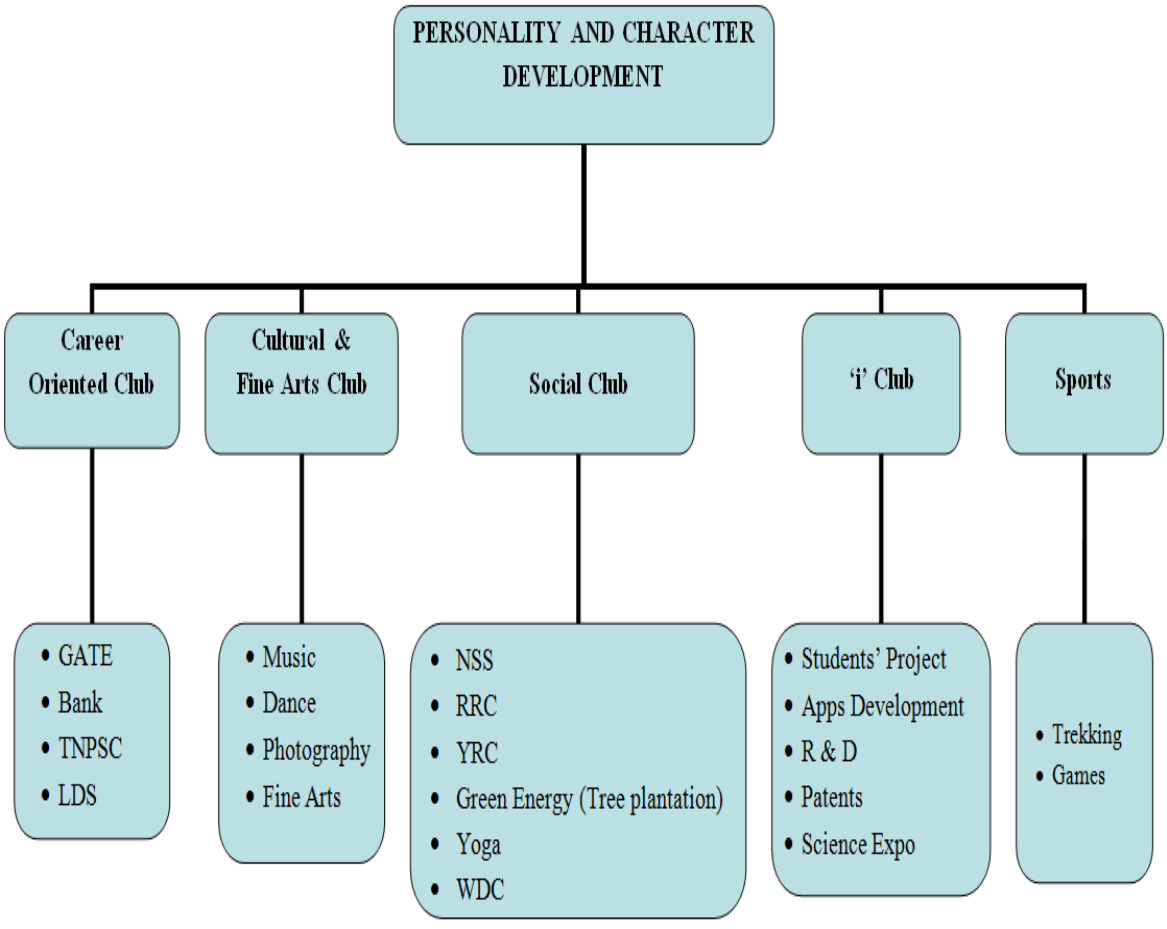
OBJECTIVES:

Career Oriented Club	Cultural & Fine Arts Club	Social Club	'i' club	Sports
• To provide support for identifying specific career field of interests and career path • To provide support for preparing for competitive exams	• To bring out the hidden talent of students in music, dance and other fine arts. • To promote photography skill among the students • To develop and enhance the performance of students by participating in various events • To inculcate managerial capabilities such as event management and stage organization	• To create social awareness and develop a sense of social and civic responsibility • To inculcate socially and environmentally sound practices and be aware of the benefits • To encourage the students to work along with the people in rural areas, thereby developing their character, social consciousness, commitment, discipline and being helpful towards the community.	• To inculcate the basic concepts of innovation • To foster the networking between students, build teams, exchange ideas, do projects and discuss entrepreneurial opportunities • To enrich the academic experience, build competencies and relationships beyond the classroom	• To provide opportunities to excel at sports • To promote an understanding of physical and mental well-being through an appreciation of stress, rest and relaxation. • To develop an ability to observe, analyze and judge the performance of self and peers in sporting activities. • To develop leadership skills and nurture the team building qualities. **<u>Trekking:</u>** • To provide opportunities to explore nature and educating about the purity of nature • To improve physical and mental health.

COURSE OUTCOMES:

At the end of this course, the students will be able to

• Find a better career of their interest. • Make use of their knowledge during competitive exams and interviews.	• Take part in various events • Develop team spirit, leadership and managerial qualities	• Develop socially responsive qualities by applying acquired knowledge • Build character, social consciousness, commitment and discipline	• Apply the acquired knowledge in creating better solutions that meet new requirements and market needs • Develop skills on transforming new knowledge or new technology into viable products and services on commercial markets as a team	• Demonstrate positive leadership skills that contribute to the organizational effectiveness • Take part an active role in their personal wellness (emotional, physical, and spiritual) that supports a healthy lifestyle • Create inclination towards outdoor activity like nature study and Adventure.



TOTAL: 4 x (P:15) = 60 PERIODS
(Cumulatively for Four Semesters)

15CE831 PROJECT WORK

L	T	P	C
0	0	16	8

OBJECTIVE:

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same.
- To train the students in preparing project reports and to face reviews and viva voce examination.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1: Identify the objectives of the project by thorough understanding of the problem.
CO2: Develop methodology using appropriate tools for the problem.
CO3: Take up any challenging practical problems and find solution based on literature.
CO4: Analyze the problem based on the methodology and tabulate the results.
CO5: Conclude the results and submit the project report.

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepare a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

EVALUATION PROCEDURE

The method of evaluation will be as follows:

1. Internal Marks : 100 marks
   (Decided by conducting 3 reviews by the guide appointed by the Institution)
2. Evaluation of Project Report : 60 marks
   (Evaluated by the external examiner appointed the University)
   Every student belonging to the same group gets the same mark
3. Viva voce examination : 40 marks
   (Evaluated by the internal examiner appointed by the HOD with the approval of HoI, external examiner appointed by the COE and Guide of the course - with equal Weightage)

TOTAL: 200 MARKS

TOTAL: P: 300 = 300 PERIODS

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Cos	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X		X			X	X	X		X	X
2	X		X	X		X	X				X	X
3	X	X	X	X				X			X	
4		X		X		X	X	X		X		X
5	X	X	X		X	X			X		X	X

PROFESSIONAL ELECTIVES

15CEX01 ARCHITECTURE AND TOWN PLANNING

L	T	P	C
3	0	0	3

OBJECTIVE:

- To give exposure about architectural principles in the design of buildings.
- To demonstrate competency in the technical, practical skills of landscape architecture and their role in investigating complex and innovative ideas.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Understand the various elements of architecture and principles of orientation,

CO2: Choose the various building material as per the interior design aspects.

CO3: Make plan for the buildings by considering our Indian climatic conditions

CO4: Solve the problem that is coming in Town Planning level.

CO5: Know various rules and regulation of town planning and development authorities.

UNIT I INTRODUCTION TO ARCHITECTURE (9)

Fundamentals concepts of architecture – Principles of planning – Qualities, Strength, Refinement, Repose, Scale, Proportion, Colour, Solids and Voids and Symmetry

UNIT II INTERIOR DECORATIONS (9)

Interior Planning and treatment - Use of natural and synthetic building materials – Thermal and Acoustical materials - Lighting & illumination

UNIT III PLANNING AND CONCEPTS OF TOWN PLANNING (9)

Planning Surveys - Importance of Climate topography, drainage and water supply in the selection of site for the development - Residential - Commercial – Industrial – Public – Transportation, Basic amenities and services

UNIT IV FUNCTIONAL PLANNING OF BUILDINGS (9)

Occupancy classification of buildings-general requirements of site and building – building codes and rules – licensing of building works. Functional planning of building such as residential, institutional, public, commercial, industrial buildings – the process of identifying activity areas and linkages

UNIT V COUNTRY PLANNING AND HOUSING (9)

Plan implementation: Town planning legislation and municipal acts – Planning control development schemes – Urban financing – Land acquisitions – Slum clearance schemes. Examples of planned cities and housing in India – Applications of Remote Sensing and GIS in town planning

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Pramar. V.S. “Design fundamental in Architecture”, Somiya Publications Pvt. Ltd., New Delhi, 1997.
2. Biswas Hiranmay, “Principles of Town Planning and Architecture” ,VAYU Education of India, New Delhi., 1st ed., 2012
3. G.K. Hiraskar, “Fundamentals of Town Planning”, Dhanpat Rai Publications Pvt.Ltd., New Delhi.,2012

REFERENCES:

1. Arthur Gallion., Simon Eisner., “The Urban Pattern: City Planning and Design”, Charotar Publishing House Pvt. Ltd., Gujarat, 5th ed., 1986.
2. S.C.Rangwala, K.S.Rangwala and P.S.Rangwala, ‘Town Planning”, Charotar Publishing House, 18th ed., 2003.
3. National Building Code of India, SP7 (Group 1) Bureau of Indian Standards, New Delhi, 2017

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1				x	x		x					x
2			x		x		x		x	x		x
3			x		x		x					
4				x	x		x				x	x
5			x	x	x		x	x	x		x	x

15CEX02 REMOTE SENSING AND GIS

L	T	P	C
3	0	0	3

OBJECTIVE:

- To introduce the students to the basic concepts and principles of various components of remote sensing and to provide an exposure to GIS and its practical applications in civil engineering

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Identify the basic remote sensing concepts and its characteristics.
CO2: Implement the photogrammetric concepts and fundamentals of Air photo Interpretation.
CO3: Interpret and analyze the images
CO4: Study on GIS and analyze the data using DBMS.
CO5: Apply remote sensing and GIS techniques for various engineering related problems

UNITI INTRODUCTION TO REMOTE SENSING (12)

Energy Sources and Radiation principles – electromagnetic radiation – characteristic of real remote sensing system, platforms & sensors - Airborne space borne, TIR and microwave sensors, satellite - Pay load description of important Earth Resources and Meteorological satellites

UNIT II PHOTOGRAMMETRY (8)

Geometric elements of a vertical photograph – Ortho photos & Flight planning - Stereoscopic plotting instruments

UNIT III IMAGE INTERPRETATION (8)

Elements of visual image interpretation, concepts of digital image processing image Rectification and Restoration, Image enhancement & Image classification. Application of Remote sensing in Civil Engineering.

UNIT IV INTRODUCTION TO GIS (9)

Introduction to GIS - history of development of GIS - elements of GIS, Computer hardware – Software, Data Input, Verification, data storage and database management and output

UNIT V GIS ANALYSIS AND APPLICATIONS (8)

Map Overlay - Vector and raster data model, mapping concept - Definitions – Map projections - types of map projections – map analysis, overlay operation Errors and quality control – Current issues and Trends in GIS application in Civil Engineering

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Bhatta. B, “Remote Sensing and GIS”, Oxford University Press, Second Edition 2011.
2. AnjiReddy.M., “Remote Sensing and Geographical information systems”, BS Publications 2013

REFERENCES:

1. Lillesand, T.M. & Kiefer R.W., “Remote Sensing and image interpretation”, John Wiley & Sons (Asia), Newyork, 2015.
2. Burrough P.A., Principle of Geographical Information Systems for land resources assessment, Clarendon Press, Oxford University Press, 2004.
3. Clarke Parks & Crane, Geographic Information Systems & Environmental Modeling, Prentice-Hall of India 2005.
4. Wolf, P.R., “Elements of Photogrammetry with Applications in GIS”, Mc.Graw- Hill International Book Company, 4th ed., 2014.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1			x	x	x		x		x		x	x
2					x		x		x		x	x
3					x		x		x		x	
4	x	x	x	x	x		x				x	x
5		x	x	x	x		x	x			x	x

15CEX03 CONSTRUCTION PLANNING AND SCHEDULING

L	T	P	C
3	0	0	3

OBJECTIVE:

- To study the necessity of the planning in the diverse construction projects
- To make awareness among the learners about management information system

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Understand the requirement of planning techniques exercised in the construction projects
CO2: Choose suitable scheduling technique for the particular project.
CO3: Practice modern cost account systems and control techniques adopted.
CO4: Employ the advanced management tools for quality control and monitoring towards speedy and guaranteed projects.
CO5: Work with MIS for large projects.

UNIT I CONSTRUCTION PLANNING (12)

Basic concepts in the development of construction plans - choice of Technology and Construction method - Defining Work Tasks – Definition - Precedence relationships among activities - Estimating Activity Durations - Estimating Resource Requirements for work activities - coding systems.

UNIT II SCHEDULING PROCEDURES AND TECHNIQUES (8)

Relevance of construction schedules - Bar charts - The critical path method - Calculations for critical path scheduling - Activity float and schedules - Presenting project schedules - Critical path scheduling for Activity – on-node and with leads, Lags and Windows - Calculations for scheduling with leads, lags and windows - Resource oriented scheduling - Scheduling with resource constraints and precedences -Use of Advanced Scheduling Techniques - Scheduling with uncertain durations - Crashing and time/cost tradeoffs - Improving the Scheduling process – Introduction to application software.

UNIT III COST CONTROL MONITORING AND ACCOUNTING (8)

The cost control problem - The project Budget - Forecasting for Activity cost control - financial accounting systems and cost accounts - Control of project cash flows - Schedule control - Schedule and Budget updates - Relating cost and schedule information.

UNIT IV QUALITY CONTROL AND SAFETY DURING CONSTRUCTION (9)

Quality and safety Concerns in Construction - Organizing for Quality and Safety - Work and Material Specifications - Total Quality control - Quality control by statistical methods - Statistical Quality control with Sampling by Attributes - Statistical Quality control by Sampling and Variables – Safety

UNIT V ORGANIZATION AND USE OF PROJECT INFORMATION (8)

Types of project information - Accuracy and Use of Information - Computerized organization and use of Information - Organizing information in databases - relational model of Data bases - Other conceptual Models of Databases - Centralized database Management systems - Databases and application programs - Information transfer and Flow.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1.Chitkara, K.K. “Construction Project Management Planning”, Scheduling and Control, Tata Mc Graw Hill Publishing Co., New Delhi, 2005
2. Srinath,L.S., “Pert and CPM Principles and Applications“, Affiliated East West Press, 2001

REFERENCES:

1. Chris Hendrickson and Tung Au, “Project Management for Construction – Fundamentals Concepts for Owners”, Engineers, Architects and Builders, Prentice Hall, Pitsburgh, 2000.
2. Moder.J., Phillips. C. and Davis E, “Project Management with CPM”, PERT and Precedence Diagramming, Van Nostrand Reinhold Co., 3rd ed., 1985.
3. Willis., E.M., “Scheduling Construction projects”, John Wiley and Sons,1986.
4. Halpin,D.W., “Financial and Cost Concepts for Construction Management”, John Wiley and Sons, New York, 1985.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1					x		x				x	x
2					x		x		x		x	x
3	x	x	x	x			x			x	x	x
4							x				x	
5	x		x						x		x	

15CEX04 TRANSPORT PLANNING AND MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand the concepts of transport planning and evaluation techniques.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Study scope and types of the transportation planning system
CO2: Understand the trip generation and its analysis
CO3: Adopt various distribution methods in transport planning
CO4: Manage the traffic congestion using the available management measures.
CO5: Evaluate the transportation planning alternates

UNITI TRANSPORT PLANNING PROCESS (12)

Scope – interdependence of land use and traffic – systems approach to transport planning – survey of existing conditions and forecasting future conditions. Transport survey – definition of study area – zoning survey – types and methods – inventory on transport facilities – inventory of land use and economic activities.

UNIT II TRIP GENERATION (8)

Factors governing trip generation and attraction rates – multiple linear regression analysis – category analysis – critical appraisal of techniques

UNIT III DISTRIBUTION METHODS (8)

Uniform factor method & average factor methods – gravity model and its calibration – opportunity model – use of software in transportation engineering.

UNIT IV TRIP ASSIGNMENT AND MODAL SPLIT (9)

Traffic assignment – general principles – assignment techniques – all nothing assignment – multiple root assignment – capacity – restraint assignment – diversion curves Modal split – advantages and limitations.

UNIT V EVALUATION TECHNIQUES (8)

Economic evaluation techniques – performance evaluation – rating and ranking methods – case studies in evaluation – rating and ranking methods – case studies in evaluation of transport projects – land use transport models – transport planning for medium and small sized towns.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. L.R. Kadiyali, Traffic Engineering and Transport planning, Khanna Publishers, New Delhi,2011

REFERENCES:

1. Paul.H.Wright, Transportation Engineering – Planning & Design, John Wiley & Sons, New York Fourth Edition 1998.
2. John W Dickey, Metropolitan Transportation Planning, Tata McGraw-Hill Publishing Company Ltd, New Delhi 1997.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1			x		x		x					
2					x		x		x		x	
3									x		x	
4							x				x	
5			x		x		x		x			

15CEX05 GROUND IMPROVEMENT TECHNIQUES

L	T	P	C
3	0	0	3

OBJECTIVE:

- To improve the characteristics of difficult soils as well as design techniques required to implement various ground improvement methods.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Identify the soil and select suitable ground improvement methods.
CO2: Choose the suitable dewatering techniques
CO3: Identify the type of soil and select suitable compaction method
CO4: Apply suitable techniques for improving the soil properties in the field
CO5: Use various types of techniques to strengthen the soil

UNITI INTRODUCTION (9)

Role of ground improvement in foundation engineering - Methods of ground improvement – Geotechnical problems in alluvial, laterite and black cotton soils -Selection of suitable ground improvement techniques based on soil condition.

UNIT II DRAINAGE AND DEWATERING (9)

Drainage techniques - Ground water lowering by well points – Deep well – Vacuum and electro–osmosis methods- Seepage analysis for two dimensional flow-Fully and partially penetrating slots in homogenous deposits (Simple cases only).

UNIT III INSITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS (9)

In-situ densification of cohesion less and consolidation of cohesive soils -Dynamic compaction and consolidation - Vibroflotation - Sand pile compaction - Preloading with sand drains and fabric drains – Stone columns – Lime piles - Installation techniques only - relative merits of various methods and their limitations.

UNIT IV EARTH REINFORCEMENT (9)

Concept of reinforcement - Types of reinforcement material - Applications of reinforced earth –use of Geotextiles for filtration, drainage and separation in road and other works.

UNIT V GROUT TECHNIQUES (9)

Types of grouts - Grouting equipment and machinery - Injection methods - Grout monitoring –Stabilization with cement, lime and chemicals - Stabilization of expansive soils.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Purushothama Raj, P. “Ground Improvement Techniques”, Tata McGraw Hill Publishing Company, New Delhi, 2007.
2. Robert M Koerner, “Design with Geosynthetics”, Prentice Hall, New Jersey, 2005.

REFERENCES:

1. Joseph E Bowles, “Foundation Analysis and Design”, McGraw Hill Companies. Inc., New York, 1997.
2. Braja M Das, “Principles of Foundation Engineering”, Thomson Publishing Company, Brooks/Cole Division, 1999.
3. Shashi K Gulhati and Manoj Datta, “Geotechnical Engineering”, Tata McGraw Hill Education (P) Ltd., New Delhi, 2010.
4. Kenneth D Weaver and Donald A Bruce, “Dam Foundation Grouting”, ASCE Press, Virginia, 2007.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1			x		x		x		x		x	x
2					x		x		x		x	
3		x	x	x				x	x	x	x	x
4			x		x		x				X	
5			x		x		x					x

15CEX06 HYDROLOGY

L	T	P	C
3	0	0	3

OBJECTIVE:

- To impart knowledge on hydrological cycle, spatial and temporal measurement and analysis of rainfall and their applications including flood routing and ground water hydrology

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1:To analyze the rainfall-runoff data and predict the quantity of water that can be derived from nature

CO2: Gain the knowledge needed on hydrologic cycle, hydrometeorology and formation of precipitation

. CO3: Study on various types of hydrographs and their applications

CO4: Estimate the flood by various methods and concept of flood routing.

CO5: Know the basics of groundwater and hydraulics of subsurface flows

UNITI PRECIPITATION (9)

Hydrologic cycle – Types of precipitation – Forms of precipitation – Measurement of Rainfall – Spatial measurement methods – Temporal measurement methods – Frequency analysis of point rainfall – Intensity, duration & frequency relationship – Probable maximum precipitation.

UNIT II ABSTRACTION FROM PRECIPITATION (9)

Losses from precipitation – Evaporation process – Reservoir evaporation – Infiltration process – Infiltration capacity – Measurement of infiltration – Infiltration indices – Effective rainfall.

UNIT III HYDROGRAPHS (9)

Factors Affecting Hydrograph – Baseflow Separation – Unit Hydrograph – Derivation Of Unit Hydrograph – Hortons Equation – S Curve Hydrograph – Unit Hydrograph Of Different Deviations - Synthetic Unit Hydrograph – Infiltration Indices

UNIT IV FLOODS AND FLOOD ROUTING (9)

Flood frequency studies – Recurrence interval – Gumbel‘s method – Flood routing – Reservoir flood routing – Muskingum‘s Channel Routing – Flood control

UNIT V GROUND WATER HYDROLOGY (9)

Types of aquifers – Darcy‘s law – Dupuit‘s assumptions – Confined Aquifer – Unconfined Aquifer – Recuperation test – Transmissibility – Conductivity - Specific capacity – Pumping test – Steady flow analysis only

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Subramanya, K., ―Engineering Hydrology‖, Tata McGraw-Hill Publishing Co., Ltd, 2006
2. Raghunath, H.M., ―Hydrology‖, Wiley Eastern Ltd., 2000

REFERENCES:

1. Chow, V.T. and Maidment, Hydrology for Engineers‖, McGraw-Hill Inc., Ltd., 2000
2. Ven T Chow, David R Maidment, Larry W Mays, Applied Hydrology‖, McGraw Hill Inc., Ltd 2012
3. Singh, V.P., Hydrology, McGraw-Hill Inc., Ltd., 2000.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1					x		x		x	x	x	x
2			x				x					x
3				x	x		x					
4			x		x		x					x
5			x				x					

15CEX07 MODERN CONSTRUCTION MATERIALS

L	T	P	C
3	0	0	3

OBJECTIVE:

- To study properties of modern construction materials used in construction
- To understand about the special concretes, metals, composites, water proofing compounds, non weathering materials, and smart materials.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Study about the properties and materials to concrete on high strength and high Performance concrete.
CO2: Learn about the types of steel and coatings.
CO3: Understand the types of plastics and Fibre reinforced polymer.
CO4: Know about the properties of water proofing compounds and construction chemicals.
CO5: Study about the smart and intelligent materials.

UNITI SPECIAL CONCRETES (9)

Concretes, Behaviour of concretes – Properties and Advantages of High Strength and High Performance Concrete – Properties and Applications of Fibre Reinforced Concrete, Self-compacting concrete, Alternate Materials to concrete on high performance & high Strength concrete.

UNIT II METALS (9)

Types of Steels – Manufacturing process of steel – Advantages of new alloy steels – Properties and advantages of aluminium and its products –Tendons. Types of Coatings & Coatings to reinforcement –Applications of Coatings.

UNIT III COMPOSITES (9)

Types of Plastics – Properties & Manufacturing process – Advantages of Reinforced polymers –Types of FRP – FRP on different structural elements – Applications of FRP.

UNIT IV OTHER MATERIALS (9)

Types and properties of Water Proofing Compounds construction chemicals, sealants– Types of Non-weathering Materials and its uses – Types of Flooring and Facade Materials and its application.

UNIT V SMART AND INTELLIGENT MATERIALS (9)

Types & Differences between Smart and Intelligent Materials – Special features – Case studies showing the applications of smart and Intelligent Materials.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Santhakumar.A.R. Concrete Technology, Oxford University press, New Delhi.
2. Shan Somayaji, Civil Engineering Materials, Prentice Hall Inc., 2001
3. Shetty M.S, Concrete Technology: Theory and Practice, S.Chand & Company Ltd., 2005.

REFERENCES:

1. ACI Report 440.2R-02, “Guide for the design and construction of externally bonded FRP systems for strengthening concrete structures”, American Concrete Institute 2002.
2. Aitkens , “High Performance Concrete”, McGraw Hill, 1999.
3. Mamlouk, M.S. and Zaniewski, J.P., “Materials for Civil and Construction Engineers”, Prentice Hall Inc.,1999
4. Ashby, M.F. and Jones. D.R.H.H. “Engineering Materials : An introduction to Properties, Applications and Designs”, Elsevier Publications, 2005

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1				x	x		x					x
2				x	x		x					x
3					x		x		x		x	x
4				x	x							x
5					x		x					

15CEX08 RAILWAYS, AIRPORTS AND HARBOUR ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVE:

- To give exposure to railway planning, geometric design, railway track construction, maintenance.
- To study the concept of airport planning and design.
- To understand the different types of structures used in harbour.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Plan and design the railway track components.
CO2: Understand about the railway construction and maintenance.
CO3: Plan and design the components of airport.
CO4: Use the techniques for airport runway and taxiway design.
CO5: Plan and design a harbor

UNIT I RAILWAY PLANNING AND DESIGN (10)

Significance of Road, Rail, Air and Water transports - Coordination of all modes to achieve sustainability - Elements of permanent way - Rails, Sleepers, Ballast, rail fixtures and fastenings, - Track Stress, coning of wheels, creep in rails, defects in rails - Route alignment surveys, conventional and modern methods- - Soil suitability analysis - Geometric design of railways, gradient, super elevation, widening of gauge on curves- Points and Crossings.

UNIT II RAILWAY CONSTRUCTION AND MAINTENANCE (9)

Earthwork – Stabilization of track on poor soil - Tunneling Methods, drainage and ventilation –- Calculation of Materials required for track laying - Construction and maintenance of tracks –Modern methods of construction & maintenance - Railway stations and yards and passenger amenities- Urban rail – Infrastructure for Metro, Mono and underground railways.

UNIT III AIRPORT PLANNING (8)

Air transport characteristics-airport classification-airport planning: objectives, components, airport layouts - apron, terminal building, hangars, motor vehicle parking area and circulation pattern, socio-economic characteristics of the Catchment area, criteria for airport site selection and ICAO stipulations

UNIT IV AIRPORT DESIGN (8)

Runway Design: Orientation, Wind Rose Diagram (Problems) - 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

UNIT V HARBOUR ENGINEERING (10)

Definition of Basic Terms: Harbor, 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, Break waters, Wharves, Jetties, Quays, Spring Fenders, Dolphins and Floating Landing Stage -mooring, types of mooring - Inland Water Transport - Wave action on Coastal Structures and Coastal Protection Works.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Saxena Subhash C and Satyapal Arora, "A Course in Railway Engineering", Dhanpat Rai and Sons, Delhi, 2010
2. Khanna S K, Arora M G and Jain S S, "Airport Planning and Design", Nemchand and Brothers, Roorkee, 2012.
3. Bindra S P, "A Course in Docks and Harbour Engineering", Dhanpat Rai and Sons, New Delhi, 2013

REFERENCES:

1. Rangwala, "Railway Engineering", Charotar Publishing House, 2013.
2. Rangwala, "Airport Engineering", Charotar Publishing House, 2013.
3. Rangwala, "Harbor Engineering", Charotar Publishing House, 2013.
4. Oza.H.P. and Oza.G.H., “A course in Docks & Harbour Engineering”. Charotar Publishing Co., 2013

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x				x		x			
2				x	x		x					
3	x		x		x		x		x			x
4	x		x		x				x	x	x	x
5					x		x		x		x	

15CEX09 IRRIGATION ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVE:

- To get exposure to basic principles of Irrigation
- To emphasis the need and importance of Irrigation
- To impart required knowledge on hydraulic design of different structures and the concept of maintenance

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Get exposure about the developments of irrigation for the purpose of controlling and utilizing water for a variety of purposes.
CO2: Identify the different types & methods of irrigation for better water management.
CO3: Study about different types of structures for irrigation.
CO4: Learn the concept and hydraulic design of canal structures.
CO5: Understand the concepts of irrigation, supply of water, water losses and water management

UNIT I INTRODUCTION (9)

Irrigation – Need and mode of irrigation – Merits and demerits of irrigation – Crop and crop seasons – consumptive use of water – Duty – Factors affecting duty – Irrigation efficiencies – Planning and Development of irrigation projects.

UNIT II IRRIGATION METHODS (6)

Canal irrigation – Lift irrigation – Tank irrigation – Flooding methods –Merits and demerits –Sprinkler irrigation – Drip irrigation.

UNIT III DIVERSION AND IMPOUNDING STRUCTURES (12)

Weirs – elementary profile of a weir – weirs on pervious foundations - Types of impounding structures - Percolation ponds – Tanks, Sluices and Weirs – Gravity dams – Earth dams – Arch dams – Spillways – Factors affecting location and type of dams – Forces on a dam – Hydraulic design of dams.

UNIT IV CANAL IRRIGATION (9)

Alignment of canals – Classification of canals – Canal drops – Hydraulic design of drops – Cross drainage works – Hydraulic design of cross drainage works – Canal Head works – Canal regulators – River Training works.

UNIT V IRRIGATION WATER MANAGEMENT (9)

Need for optimisation of water use – Minimising irrigation water losses – On farm development works - Participatory irrigation management – Water users associations – Changing paradigms in water management – Performance evaluation

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Asawa, G.L., "Irrigation Engineering", New Age International Publishers, 2000
2. Punmia B.C. & Pande B.B .Lal Irrigation and Water Power Engineering, Laxmi Publishing, New Delhi 2007
3. Michael, A.M, Irrigation Theory and Practical, Vikas Publishing Pvt Ltd, 2006
4. Gupta, B.L, & Amir Gupta, "Irrigation Engineering", Satya Praheshan, New Delhi, 2007

REFERENCES:

1. Dilip Kumar Majumdar, "Irrigation Water Management (Principles & Practices)", Prentice Hall of India (P), Ltd, 2000
2. Basak, N.N, "Irrigation Engineering", Tata McGraw-Hill Publishing Co. New Delhi, 1999
3. Sharma R.K. "Irrigation Engineering", S.Chand & Co. 2007.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1							x				x	
2			x		x		x		x			
3			x		x							x
4			x	x			x					
5							x				x	

15CEX10 GREEN BUILDINGS

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand about the concepts and need of green buildings in environment
- To impart required knowledge on assessment of green buildings

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Get exposure about green building requirements
CO2: Identify the materials and design strategies
CO3: Study about implementation of green building systems.
CO4: Learn the concept and assessment of standards.
CO5: Apply to environmental benefits

UNIT I INTRODUCTION (9)

Historical Perspective Buildings. Conventional versus Green Buildings – Comparison. Minor and major aspects of Green Buildings – The Integrated Design Process. Green Building Documentation Requirements. Conventional - Contemporary and Future Ecological Design – Green Design to Regenerative Design

UNIT II GREEN BUILDING SYSTEMS (9)

Sustainable sites and landscaping – Enhancing ecosystems. Building envelops – selection of green materials, products and applications. Passive design strategies. Internal load reduction – Indoor environment quality. Building water and waste water management. Use of LEED / IGBC standards

UNIT III GREEN BUILDING IMPLEMENTATION (9)

Site Planning, Health and Safety Planning, Construction and Demolition. Waste Management – Reducing the Footprint of Construction Operations – Maximizing the Value of Building Commissioning. HVAC Systems, Lighting and cleaning systems for green buildings. Costs and Benefits of Building Commissioning – use of LEED / IGBC standards

UNIT IV GREEN BUILDING ASSESSMENT (9)

International Building Assessment Systems – The USGBC/ LEED Building Assessment Standard – The LEED Certification Process – The Green Globes Building Assessment Protocol- Example of a Platinum / Gold / Silver Building. Comparison of present Building Rating Systems – Code compilation requirements – Leed Griha

UNIT V ECONOMICS OF GREEN BUILDINGS (9)

Economic aspects of Green Buildings – Quantifying Green Building Benefits – Managing Costs and Barriers. Short and long term environment benefits. Some typical case studies of Green Buildings

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Jerry Yudelson, “Green Buildings A to Z”, Understanding the buildings, www. newsociety.com, 2008.
2. Jerry Yudelson, “Green Buildings through Integrated Design”, Tata McGraw Hill, 2008.
3. “Green building guidelines: Meeting the demand for low-energy, resource-efficient homes”, Sustainable Buildings Industry Council, 2004.
4. Means R.S., “Green building: project planning and cost estimating: a practical guide to materials, systems and standards”, 2nd Edition, Kingston, Mass., 2006.

REFERENCES:

1. Alex Wilson and Mark Peipkorn, “Green Building Products: The Green Spec guide to residential building materials”, 2nd ed., Gabriola Island.
2. Jane Anderson, David E. Shiers, and Mike Sinclair, “The green guide to specification: an environmental profiling system for building materials and components”, 3rd ed., Oxford; Malden, MA: Blackwell Science, 2002.
3. Charles J. Kibert, “Sustainable Construction: Green Building Design and Delivery”, 2nd ed.,Wiley, 2007

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1				x	x		x					x
2		x	x		x		x			x		x
3	x				x		x				x	x
4			x				x					
5							x					x

15CEX11 SMART MATERIALS AND STRUCTURES

L	T	P	C
3	0	0	3

OBJECTIVE:

- To give an insight into the latest developments regarding smart materials and their use in structures. Further, this also deals with structures which can self adjust their stiffness with load.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Understand the fundamentals of Smart material.
CO2: Use the measuring techniques using smart materials for solving civil engineering problems.
CO3: Select suitable sensors for analyzing various measurements.
CO4: Adapt the different actuator material in structural components.
CO5: Apply signal processing and control system in smart structures.

UNIT I INTRODUCTION **(9)**

Introduction to Smart Materials and Structures – Instrumented structures functions and response – Sensing systems – Self diagnosis – Signal processing consideration –Actuation systems and effectors

UNIT II MEASURING TECHNIQUES **(9)**

Strain Measuring Techniques using Electrical strain gauges, Types – Resistance –Capacitance – Inductance – Wheatstone bridges – Pressure transducers – Load cells – Temperature Compensation – Strain Rosettes.

UNIT III SENSORS **(9)**

Sensing Technology – Types of Sensors – Physical Measurement using Piezo Electric Strain measurement – Inductively Read Transducers – The LVOT – Fiber optic Techniques. Chemical and Bio-Chemical sensing in structural Assessment – Absorptive chemical sensors – Spectroscopes – Fibre Optic Chemical Sensing Systems and Distributed measurement

.

UNIT IV ACTUATORS **(9)**

Actuator Techniques – Actuator and actuator materials – Piezoelectric and Electrostrictive Material – Magneto structure Material – Shape Memory Alloys – Electro orheological Fluids– Electromagnetic actuation – Role of actuators and Actuator Materials.

UNIT V SIGNAL PROCESSING AND CONTROL SYSTEMS **(9)**

Data Acquisition and Processing – Signal Processing and Control for Smart Structures – Sensors as Geometrical Processors – Signal Processing – Control System – Linear and Non-Linea
r.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. L. S. Srinath – Experimental Stress Analysis – Tata McGraw-Hill, 1998.
2. Brain Culshaw – Smart Structure and Materials Artech House, Boston. London-1996.
3. J. W. Dally & W. F. Riley – Experimental Stress Analysis, Tata McGraw-Hill, 1998

REFERENCES:

1. Green building guidelines: Meeting the demand for low-energy, resource-efficient homes", Sustainable Buildings Industry Council, 2004.
2. Charles J. Kibert, "Sustainable Construction: Green Building Design and Delivery", 2nd ed., Wiley, 2007
3. A.V. Srinivasan, Smart Structures: Analysis and Design, Cambridge University Press, Cambridge; New York, 2001

apping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1					x		x					x
2	x	x	x		x		x		x		x	x
3			x	x	x							
4	x	x	x		x							
5	x	x		x	x		x					x

15CEX12 HOUSING PLANNING AND MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVE:

- Train the students to have a comprehensive knowledge of planning, design, evaluation, construction and financing of housing projects.
- The course focuses on cost effective construction materials and methods.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Plan and design the housing projects as per regulations.
CO2: Design the various housing programme with sustainability concepts
CO3: Formulate and design the housing layouts by conducting site analysis
CO4: Evaluate the suitability of various cost effective construction materials.
CO5: Perform the economic analysis. Based project appraisal of housing projects.

UNIT I INTRODUCTION TO HOUSING (10)

Definition of Basic Terms – House, Home, Household, Apartments, Multi storied Buildings, Special Buildings, Objectives and Strategies of National Housing Policies including Slum Housing Policy, Principle of Sustainable Housing – Integrated approach on arriving holding capacity and density norms - All basic infrastructure consideration - Institutions for Housing at National, State and Local levels.

UNIT II HOUSING PROGRAMMES (10)

Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services, Neighborhoods - Plotted land development programs, Open Development Plots, Apartments, Gated communities, Townships, Rental Housing, Co-operative Housing & Slum Housing Programmes - Slum improvement – Slum redevelopment and Relocation – Use of GIS and MIS in Slum Housing Projects,, Role of Public housing agencies, and Private sector in supply, quality, infrastructure and pricing – Role of Non-Government Organizations in slum housing.

UNIT III PLANNING AND DESIGN OF HOUSING PROJECTS (9)

Formulation of Housing Projects – Land Use and Soil suitability analysis - Building Byelaws and Rules and Development Control Regulations - Site Analysis, Layout Design, Designs of Housing Units (Design Problems) – Housing Project Formulation

UNIT IV CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS (8)

New Constructions Techniques – Cost Effective Modern Materials and methods of Construction - Green building concept- Building Centers – Concept, Functions and Performance Evaluation.

UNIT V HOUSING FINANCE AND PROJECT APPRAISAL (8)

Evaluation of Housing Projects for sustainable principles – Housing Finance, Cost Recovery – Cash Flow Analysis, Subsidy and Cross Subsidy- Public Private Partnership Projects – Viability Gap Funding - Pricing of Housing Units (Problems).

TOTAL: L: 45 = 45 PERIODS

TEXTBOOKS:

1. Meera Mehta and Dinesh Mehta, "Metropolitan Housing Markets", Sage Publications Pvt. Ltd., New Delhi, 1999.
2. Francis Cherunilam and Odeyar D Heggade, "Housing in India", Himalaya Publishing House, Bombay, 1997.

REFERENCES:

1. Wiley- Blackwell, "Neufert Architects" Data, 4th Edition, Blackwell Publishing Ltd, 2012
2. Donald Watson and Michael J.Crosbie, "Time Saver Standards for Architectural Design", 8th ed.,Tata McGraw Hill Edition, 2011
3. Walter Martin Hosack, "Land Development Calculations", McGraw Hill 2nd ed., USA 2010
4. Development Control Rules for Chennai Metropolitan Area, CMA, Chennai, 2004.
5. UNCHS, National Experiences with Shelter Delivery for the Poorest Groups, UNCHS Habitat, Nairobi, 1994
6. Government of India, National Housing Policy, 1994

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x		x			x				x
2	x	x				x	X					
3		x	x		x			x				
4	x							x	x			
5		x					X	x	x			

Approved by Sixth Academic Council

15CEX13 TRAFFIC ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVE:

- To give an overview of Traffic engineering, various surveys to be conducted, traffic regulation, management and traffic safety

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Analyse traffic problems and plan for traffic systems various uses
CO2: Plan and design the traffic signal duration
CO3: Practice the traffic engineering and practice the control measures.
CO4: Analyse the causes and report the accident
CO5: Manage the traffic congestion using the available management measures

UNIT I TRAFFIC STUDIES (9)

Road user and Vehicle Characteristics - Traffic Studies -Traffic volume and composition - speed, Headway - Concentration and Delay and Flow principles - Capacity and level of service.

UNIT II TRAFFIC SIGNALS (9)

Traffic signals- types- advantages - optimal cycle time - signal setting for an intersection-fixed time signals. Co-ordination of signals- types- area traffic control - delay at signalized intersection.

UNIT III TRAFFIC ENGINEERING AND CONTROL (9)

Review of various traffic surveys - traffic Studies-statistical methods - traffic engineering and their applications – distributions - sampling theory - significance testing - regression and correlation- intersection design-principles - various available alternatives - rotary design – roundabouts

UNIT IV ACCIDENTS AND ROAD SAFETY (9)

Accident – causes - reporting system - types of accidents - recording system- analysis and preventive measures. accident cost - alternative methodologies for calculation – modeling – collision diagram-road safety- road users - awareness- road users cost.

UNIT V TRAFFIC SYSTEM MANAGEMENT (9)

Traffic system management -various measures – scope - relative merits and demerits. Highway capacity - passenger car units (PCU) - level of service - factor affecting capacity -level of service- influence of mixed traffic.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Kadiyali.L.R. “Traffic Engineering and Transportation Planning”, Khanna Publishers, 2014.
2. Subhash Saxena, “A Course in Traffic Engineering and Design”, Dhanpat Rai & Sons, 2010

REFERENCES:

1. S.K.Sharma, “Principles, Practice and design of highway Engineering”, S.Chand & Co Ltd, New Delhi, 1998.
2. S.K. Khanna & E.G. Justo, Highway Engineering, Nemchand Brothers, Roorkee, 1998.
3. Pratab Chraborthy & Animesh Das, Principles of Transportation Engineering, Tata McGraw Hill Co, 2004.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x		x		x	x				
2					x		x		x		x	
3					x		x					x
4		x	x		x		x	x		x		x
5			x				x		x		x	x

15CEX14 GROUND WATER ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand various hydrogeological parameters and their estimation
- To impart knowledge of well hydraulics
- To be familiar with various ground water management techniques
- To provide information on ground water quality and its application
- To emphasis the importance of ground water conservation

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Estimate the various aquifer parameters
CO2: estimate the ground water yield from an open well/ bore well
CO3: Apply mathematical models for ground water management
CO4: Implement various saline water prevention techniques
CO5: Adopt appropriate rainwater harvesting techniques

UNIT I HYDROGEOLOGICAL PARAMETERS (9)

Introduction – water bearing Properties of Rock – Type of aquifers – Aquifer properties – Permeability, specific yield, transmissivity and storage coefficient – methods of Estimation – Ground water table fluctuation and its interpretations – ground water development and Potential in India – GEC norms

UNIT II WELL HYDRAULICS (9)

Objectives of Ground water hydraulics – Darcy's Law – Ground water equation – steady state flow – Dupuit Forchheimer assumption – unsteady state flow – thesis method – Jacob method –

UNIT III GROUND WATER MANAGEMENT (9)

Need for management model- Database for groundwater management – ground water balance study – Introduction to mathematical model – Conjuctive use – Collector well and infiltration gallery.

UNIT IV GROUNDWATER QUALITY (9)

Groundwater chemistry – origin, movement and quality – water quality standards – health and aesthetic aspects of water quality – Saline intrusion – Environmental concern and regulatory requirements

UNIT V GROUNDWATER CONSERVATION (9)

Artificial recharge techniques – Remediation of Saline Intrusion – Groundwater management studies – protection zone delineation, Contamination source inventory, remediation schemes-Ground water Pollution and legislation.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Raghunath H.M." Ground Water Hydrology", New Age International (P) Limited, New Delhi, 2010.
2. Todd D.K., "Ground Water Hydrology", John Wiley and Sons, New York, 2000.

REFERENCES:

1. Fitts R Charles. Groundwater Science. Elsevier, Academic Press, 2002
2. Ramakrishnan, S, "Ground Water Hydrology", K.J. Graph arts, Chennai, 1998

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and Pos												
COs	**Pos**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x				x		x					
2			x				x					x
3	x	x	x		x		x				x	x
4							x					
5	x		x	x	x		x		x	x		x

15CEX15 PREFABRICATED STRUCTURES

L	T	P	C
3	0	0	3

OBJECTIVE:

- To impart knowledge to students on modular construction, industrialised construction and design of prefabricated elements and construction methods.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Know the basic principles involved in prefabrication.
CO2: Calculate the handling and erection stresses.
CO3: Prepare dimensioning and detailing of joints.
CO4: Perform erection of the prefabricated structure.
CO5: Design the various functional requirements of an industrial building

UNIT I INTRODUCTION (9)

Modular co-ordination – Components - Prefabrication systems and structural schemes - Types of foundation - Design considerations - Economy of prefabrication - Prefabrication of load-carrying members - Disuniting of structures - Structural behaviour of precast structures.

UNIT II HANDLING AND ERECTION STRESSES (9)

Handling and erection stresses - Application of pre stressing of roof members – Floor systems - Two way load bearing slabs - Wall panels

UNIT III DIMENSIONING AND DETAILING OF JOINTS (9)

Dimensioning and detailing of joints for different structural connections – Construction joints and expansion joints

UNIT IV ERECTION OF STRUCTURES (9)

Production - Transportation and Erection - Organizing of production - Storing and erection equipment - Shuttering and mould design - Dimensional tolerances, Erection of R.C. structures -Total prefabricated buildings

UNIT V DESIGN OF PRE FABRICATED UNITS (9)

Prefabricated units for Industrial structures, Multi-storied buildings and Water tanks etc., Application of pre stressed concrete in prefabrication

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Hubert Bachmann, Alfred Steinle, “Precast Concrete Structures”, Ernst and Sohn GMBH & Co., K.G., 2011.
2. "Structural design manual", Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 2009.

REFERENCES:

1. Levit, M., Precast concrete materials, Manufacture properties and usage, Applied Science Publishers, London, 2000.
2. Kim S. Elliott, “Precast Concrete Structures” Butter Heinemann, 2002.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and Pos												
COs	**Pos**											
	1	2	3	4	5	6	7	8	9	10	11	12
1			x		x		x					
2			x		x		x				x	
3			x		x				x			
4			x			x				x		x
5	x		x		x		x			x	x	x

Approved by Sixth Academic Council

15CEX16 MUNICIPAL SOLID WASTE MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVE:

- To make the students conversant with different aspects of the types, sources, generation, storage, collection, transport, processing and disposal of municipal solid waste.
- The overall aim of the subject is to give deeper knowledge in the problems and possibilities of waste management.
- The course will employ a holistic view on the solutions, recycle and reuse opportunities as well as examine feasibility and technical aspects.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Give solutions for effects of improper disposal of wastes.
CO2: Illustrate the management rules and role of NGO's.
CO3: Implement the advanced techniques for various waste and sludge
CO4: Demonstrate the process technologies and tests.
CO5: Understand the design and operation of waste landfill.

UNIT I SOURCES AND TYPES **(8)**

Sources and types of municipal solid wastes-waste generation rates-factors affecting generation, characteristics-methods of sampling and characterization; Effects of improper disposal of solid wastes-Public health and environmental effects. Elements of solid waste management –Social and Financial aspects – Municipal solid waste (M&H) rules – integrated management-Public awareness; Role of NGO's.

UNIT II COLLECTION AND TRANSFER **(8)**

Methods of Residential and commercial waste collection – Collection vehicles – Manpower– Collection routes – Analysis of collection systems; Transfer stations – Selection of location, operation & maintenance; options under Indian conditions – Modern tools for collection and transfer systems.

UNIT III ON-SITE STORAGE AND PROCESSING **(8)**

On-site storage methods – Effect of storage, materials used for containers – segregation of solid wastes – Public health and economic aspects of open storage – waste segregation and storage – case studies under Indian conditions – source reduction of waste – Reduction, Reuse and Recycling.

UNIT IV OFF-SITE PROCESSING **(12)**

Objectives of waste processing – Physical Processing techniques and Equipments; Resource recovery from solid waste composting and biomethanation; Thermal processing options – case studies under Indian conditions.

UNIT V DISPOSAL **(9)**

Land disposal of solid waste; Sanitary landfills – site selection, design and operation of sanitary landfills – Landfill liners – Management of leachate and landfill gas- Landfill bioreactor– Dumpsite Rehabilitation.

TOTAL: L: 45 = 45 PERIODS

TEXTBOOKS:

1. George Tchobanoglous, "Integrated Solid Waste Management", McGraw Hill Publishers, 1993.
2. Tchobanoglous, G., Theisen, H. M., and Eliassen, R. "Solid. Wastes: Engineering Principles and Management Issues". McGraw Hill, New York, 1993.
3. Vesilind, P.A. and Rimer, A.E., "Unit Operations in Resource Recovery Engineering", Prentice Hall, Inc., 1981
4. Paul T Willams, "Waste Treatment and Disposal", John Wiley and Sons, 2000

REFERENCES:

1. Government of India, "Manual on Municipal Solid Waste Management", CPHEEO, Ministry of Urban Development, New Delhi, 2000.
2. Bhide A.D. and Sundaresan, B.B. "Solid Waste Management Collection", Processing and Disposal, 2001
3. Manser A.G.R. and Keeling A.A.," Practical Handbook of Processing and Recycling of Municipal solid Wastes", Lewis Publishers, CRC Press, 1996
4. George Tchobanoglous and Frank Kreith"Handbook of Solid Waste Management", McGraw Hill, New York, 2002

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and Pos												
COs	**Pos**											
	1	2	3	4	5	6	7	8	9	10	11	12
1			x				x		x			
2			x		x		x					
3					x				x		x	
4			x	x	x				x		x	
5			x				x		x			

15CEX17 REPAIR AND REHABILITATION OF STRUCTURES

L	T	P	C
3	0	0	3

OBJECTIVE:

- To get the knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: To study the maintenance and repair of structures
CO2: To learn the durability of concrete
CO3: To study the special concrete
CO4: To learn the techniques for repair and demolition
CO5: To study about the retrofitting of structures

UNIT I MAINTENANCE AND REPAIR STRATEGIES **(9)**

Maintenance, repair and rehabilitation, Facets of Maintenance, importance of Maintenance various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration

UNIT II SERVICEABILITY AND DURABILITY OF CONCRETE **(11)**

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 & IS Code Book for Cover thickness.

UNIT III MATERIALS FOR REPAIR **(9)**

Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, Fibre reinforced concrete.

UNIT IV TECHNIQUES FOR REPAIR AND DEMOLITION **(8)**

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, shoring and underpinning. Methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings and cathodic protection. Engineered demolition techniques for dilapidate structures - case studies.

UNIT V REPAIRS, REHABILITATION AND RETROFITTING OF STRUCTURES **(8)**

Repairs to overcome low member strength, Test on Deflection, Cracking, Chemical disruption, weathering corrosion, wear, fire, leakage and marine exposure.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Guha, P.K, “Maintenance and Repairs of Buildings”, New Central Book Agency (P) Ltd, Calcutta, 2011
2. R.T.Allen and S.C.Edwards, “Repair of Concrete Structures”, Blakie and Sons, UK, 1987.

REFERENCES:

1. M.S.Shetty, “Concrete Technology” Theory and Practice, S.Chand and Company, New Delhi, 2012.
2. Santhakumar, A.R., “Training Course notes on Damage Assessment and repair in Low Cost Housing” "RHDC-NBO" Anna University, 1992.
3. Raikar, R.N., Learning from failures - Deficiencies in Design, Construction and Service - R&D Centre (SDCPL), Raikar Bhavan, Bombay, 1987.
4. Lakshmipathy, M. Lecture Notes of Workshop on "Repairs and Rehabilitation of Structures", 29th - 30th October 1999.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and Pos												
COs	**Pos**											
	1	2	3	4	5	6	7	8	9	10	11	12
1		x	x	x	x		x	x	x		x	
2	x		x		x		x			x		x
3	x		x	x	x		x		x		x	x
4		x	x	x	x		x		x	x	x	x
5	x	x	x		x		x		x	x	x	x

Approved by Sixth Academic Council

15CEX18 INDUSTRIAL WASTES TREATMENT AND DISPOSAL

L	T	P	C
3	0	0	3

OBJECTIVE:

- To know the various processes of wastewater treatment and the engineering requirements for that treatment facilities.
- To provide adequate knowledge about phenomena of atmospheric environment and treatment, sources, characteristics and treatment processes of various types of industries.
- This subject deals with the polluting potential of major industries and methods of control the pollution.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Implement sophisticated wastewater treatment technology.
CO2: Give solutions for biological treatment and biosensors applied to biological process control
CO3: Use new techniques for collection, recycling and disposal of waste and sludge
CO4: Demonstrate the cleaner production technologies and legislations.
CO5: Identify the common effluent treatment plant for the industries

UNIT I INTRODUCTION **(9)**

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 – Pollution Control Boards.

UNIT II WASTE MANAGEMENT APPROACH **(8)**

Waste management approach – Waste Audit – Volume and strength reduction – material and process modifications – Recycle, reuse and byproduct recovery – Applications.

UNIT III TREATMENT TECHNIQUES **(10)**

Equalisation – Neutralisation – Removal of suspended and dissolved organic solids - Chemical oxidation – Adsorption – Removal of dissolved inorganic solids – Combined treatment of industrial and municipal wastes – Residue management – Dewatering – Secured landfills – Legal Provisions

UNIT IV HAZARDOUS WASTE MANAGEMENT **(8)**

Hazardous wastes types of Wastes – Sources of wastes / Methods of Handling - Physio chemical treatment – solidification – incineration – Secured land fills

UNIT V CASE STUDY FROM MAJOR INDUSTRIES **(10)**

Sources & their Characteristics, waste treatment flow sheets for selected industries such as textiles, tanneries, dairy, sugar, paper, distilleries, steel plants, refineries, fertilizer, and thermal power plants – wastewater reclamation concepts.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. M.N.Rao & A.K.Dutta "Wastewater Treatment", Oxford IBH Publication, 1995.
2. Eckenfelder W.W Jr.,"Industrial Water Pollution Control",McGrawHill Book Company, New Delhi, 2000.
3. Manivasakam N, "Industrial Effluents", Sakthi Publications, Coimbatore, 1997

REFERENCES:

1. T.T.Shen,, "Industrial Pollution Prevention", Springer publications, 1999
2. R.L.Stephenson & J.B.Blackburn Jr., Industrial Wastewater Systems Hand book, Lewis Publishers, New York, 1998
3. H.M.Freeman, "Industrial Pollution Prevention Hand Book", McGraw Hill Inc., New Delhi, 1995.
4. Bishop, P.L., "Pollution Prevention: Fundamental & Practice", McGraw Hill, 2000.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and Pos												
COs	**Pos**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x		x					x	x	x	
2	x	x		x	x	x		x				
3	X	x		x		x		x	x		x	
4	X					x	x		x	x		
5	X	x		x				x		x	x	

Approved by Sixth Academic Council

15CEX19 CONSTRUCTION MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVE:

- To provide techniques to develop personal skills of practical use in the Management and implementation of Civil Engineering projects
- To know the Management techniques, the development of personal, interpersonal and Project Management skills
- To know the project management skills
- To provide a fundamental of understanding of the social, economic, resource management within which the Construction Project takes place.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Know about contracts and organizational structure
CO2: Study the acts and safety aspects.
CO3: Learn graphical representation and networks.
CO4: Become a skilled at tenders and report preparation
CO5: Trained to make out the bills and accounts

UNIT I PRINCIPLES OF MANAGEMENT (9)

Definition – Importance – Functions of Management – Relevance to government and Quasi Government departments – Private Contractors – Contracting firms – Organizational structure – Basics of Green Building Concepts.

UNIT II CONSTRUCTION PLANNING AND LABOUR WELFARE (8)

Collection of field data – Preliminary estimates – Approval and sanction of estimates – Budget provisions – Scheduling methods - Relationships between management and labour problems – Labour legislations – Minimum Wages act – Industrial Psychology – Safety procedures in construction – MS Project Application.

UNIT III MANAGEMENT TECHNIQUES (10)

Concepts of Network – Network methods CPM/PERT – Cost control –Principles – Control by graphical representation, by bill of quantities and by network analysis.

UNIT IV EXECUTION OF WORKS AND PROJECT MANAGEMENT (8)

Tender- Definition – calling for tenders – tender documents – submission of tenders – processing of tenders – negotiations and settlement of contracts. Contract system – types of contracts – specifications, documents, procedures, conditions, taxes, law of constructions and Legal implications and penalties.

UNIT V ACCOUNTS AND STORES (10)

Measurements of work – Checking – Types of bills – Mode of payment – Claims – Banking settlements – Types of accounts - Cash book – Storing – Maintenance Inspection - Inventories – Transfer of surplus and accounting of shortage stores – Procedures adopted in PWD and CPWD

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Seetharaman, S., “Construction Engineering and Management”, Umesh Publications, Delhi, 2008.
2. Sengupta, B and Guha, H., “Construction Management and Planning”, Tata McGraw-Hill Co.,1998.
3. J.L. Sharma.”Construction Management and accounts”, Satya Publications, 2010

REFERENCES:

1. Sanga Reddy, S., and Meyyappan, PL., Construction Management, Kumaran Publications, Coimbatore, 1995.
2. Subramaniam, “Construction Management”, Anuradha Agencies, 2010.
3. Joseph L.Massie, “Essentials of Management”, Prentice Hall of India, 2009.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and Pos												
COs	**Pos**											
	1	2	3	4	5	6	7	8	9	10	11	12
1						x		x			x	x
2			x		x	x	x			x		x
3	x				x					x		
4						x				x	x	x
5								.		x	x	

Approved by Sixth Academic Council

15CEX20 SAFETY IN CONSTRUCTION

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand the reasons of accidents & hazards.
- To identify method of safety against construction accidents.
- To provide exposure on obligations for the duration of contract.
- To implement plan for safety technology for the protection of workers.
- To know the different way of health practice.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Identify the correct and proper method of managing accidents by analysing the actual situations.
CO2: Implement appropriate safety programmes at the site to make accident free construction
CO3: Adopt the contractual obligations which are essential in the site
CO4: Monitor safety precautions using technology
CO5: Realize the occupation al hazards and to take remedial actions.

Unit I INTRODUCTION TO CONSTRUCTION ACCIDENTS AND SAFETY PROGRAMME (9)

Accidents and causes - Accident prevention - Definition and principles - Concept of safety - Evolution of modern safety concept- Safety policy - Safety Organization - line and staff - functions for safety- Safety Committee – Accident management.

UNIT II OCCUPATIONAL HEALTH PRACTICE (9)

Noise - noise exposure regulation - occupational damage - risk factors - permissible exposure limit. Ionizing radiation – types - effects - monitoring instruments - control measures – Dust hazards - Methods of Control, pre employment and post-employment medical examinations.

UNIT III FIRE ENGINEERING AND EXPLOSION CONTROL (9)

Fire chemistry – Dynamics of fire behavior – Fire properties of solid, liquid and gas – Fire spread – Toxicity of products of combustion. Building evaluation for fire safety – Fire load –Fire resistance materials and fire testing – Structural Fire protection – Exits and egress. Statutory Rules and Techniques of fire fighting - Indian Explosive acts and rules –Techniques of fire fighting and demonstration.

UNIT IV SAFETY IN CONSTRUCTION (9)

General safety consideration – analyzing construction jobs for safety – Contract document –Safety certificate for statutory authorities for old building and construction. Safety in Erection and closing operation - Construction materials –Specifications – suitability – Limitations. Safety in typical civil structures – Dams-bridges-water Tanks-Retaining walls-Critical factors for failure-Regular Inspection and monitoring.

UNIT V SAFETY IN MATERIAL HANDLING (9)

General safety consideration in material handling - Ropes, Chains, Sling, Hoops, Clamps, Arresting gears. Selection, operation and maintenance of Industrial Trucks – Mobile Cranes – Tower crane –Checklist - Competent persons.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Krishnan N.V. “Safety Management in Industry” Jaico Publishing House, Bombay, 1997
2. Jimmy W. Hinze, “Construction Safety”, Pearson Education, Inc., 2006.
3. Richard J. Coble, Jimmie Hinze and Theo C. Haupt, Construction Safety and Health Management, Prentice Hall Inc., 2001.

REFERENCES:

1. Gupta R.S., Handbook of Fire Technology, Orient Longman, Bombay, 1997.
2. Darryl C. Hill, "Construction Safety Management and Engineering,2nd ed., " American Society of Safety Engineers, 2014
3. David L. Goetsch, Stephen Beach, "Construction Safety and Health",2nd ed., Pearson Education, Inc., 2012.
4. The Factories Act, 1948, Department of Labour, Government of India
5. Tamilnadu Factory Rules, 1950, Department of Inspectorate of factories, Tamil nadu

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and Pos												
COs	**Pos**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x				x				x	x
2			x		x				x		x	x
3			x				x			x		x
4					x		x				x	x
5							x	x	x		x	

15CEX21 ENVIRONMENTAL IMPACT ASSESSMENT

L	T	P	C
3	0	0	3

OBJECTIVE:

- To impart knowledge on Environmental management and Environmental Impact Assessment.
- To introduce the relevant legal systems and to examine the processes by which normative rules are adopted and enforced
- To develop an understanding of the use of EIA procedures and methods within the project and planning cycle to promote more sustainable forms of development
- To promote more effective use of Environmental Management Systems and implementation of Environmental requirements.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Carry out scoping and screening of developmental projects for environmental and social assessments
CO2: Explain different methodologies which are used at different stages in EIA process
CO3: Evaluate environmental prediction and assessment reports
CO4: Develop on Environmental Management Systems.
CO5: Study on infrastructure projects.

UNIT I INTRODUCTION (9)

Impact of development projects – Sustainable development - Need for Environmental Impact Assessment (EIA) - Environmental Impact Statement (EIS) - EIA capability and limitations - Legal provisions on EIA - Stages of EIA & Types of EIA.

UNIT II METHODOLOGIES (9)

Methods of EIA – Check lists – Matrices – Networks – Cost-benefit analysis – Analysis of alternatives

UNIT III PREDICTION AND ASSESSMENT (9)

Assessment of Impact on land, water, air, social & cultural activities and on flora & fauna- Mathematical models - Public participation.

UNIT IV ENVIRONMENTAL MANAGEMENT PLAN (9)

Plan for mitigation of adverse impact on environment – Options for mitigation of impact on water, air, land on flora & fauna - Addressing the issues related to the Project Affected People. Post project monitoring

UNIT V CASE STUDIES (9)

EIA for infrastructure projects – Dams – Highways – Multi-storey Buildings – Water Supply and Drainage Projects – Waste water treatment plants & STP.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Canter, R.L., "Environmental Impact Assessment", McGraw Hill Inc, New Delhi, 1996.
2. Shukla, S.K. and Srivastava, P.R., "Concepts in Environmental Impact Analysis", Common Wealth Publishers, New Delhi, 1992

REFERENCES:

1. John G. Rau and David C Hooten "Environmental Impact Analysis Handbook", Tata McGraw Hill Book Company, 1990.
2. "Environmental Assessment Source book", Vol. I, II& III. The World Bank, Washington, D.C, 1991.
3. Judith Petts, "Handbook of Environmental Impact Assessment Vol. I & II" Blackwell Science, 1999.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and Pos												
COs	**Pos**											
	1	2	3	4	5	6	7	8	9	10	11	12
1		x		x		x		x		x	x	
2	x		x		x	x			x			x
3	x				x		x		x	x		x
4		x		x				x				x
5	x	x		x		x		x			x	

Approved by Sixth Academic Council

15CEX22 CORROSION AND ITS CONTROL

L	T	P	C
3	0	0	3

OBJECTIVE:

- To know the forms of corrosion, its forms and protection methods.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Know the classification and its principals
CO2: Study the forms of corrosion
CO3: Identify the measuring and exposure techniques.
CO4: Carry out the protection methods.
CO5: Identify the structural corrosion.

UNIT I INTRODUCTION (9)

Corrosion – Theoretical Background –Corrosion Damage – Classification – Principals – Electrochemical aspects – Polarization – passivity - Environmental effects – Effects of oxygen, oxidizers, velocity, Temperature – Corrosive Concentration – Galvanic compiling – inspection

UNIT II FORM OF CORROSION (9)

Galvanic corrosion – creative corrosion pitting – Intergranular corrosion – Selective leaching – Erosion Corrosion – Stress Corrosion – Hydrogen Damage.

UNIT III CORROSION DESTINY (9)

Clarification – Purpose – Specimens – Surface Preparation – Measuring and washing – Exposure Technique - Duration – Planned – Internal tests – Aeration – Temperature – Corrosion Rate – NACE test methods – Slav Strain Rosette.

UNIT IV CORROSION PROTECTION (9)

Corrosion inhibitors – Electroplated coatings – Conversion coatings – Anodizing – Hot dipping – Sprayed metal coatings – Zinc coating – Alloying – Powder coating – Composite materials in Corrosion management – Electrical methods – Thermal sprayed coatings – Halogen corrosion challemyl.

UNIT V STRUCTURAL CORROSION (9)

Corrosion of reinforcement in concrete – Factors influencing corrosion – Damages caused by corrosion – Preventive measures in constructions – tests for existing structures – remedial measures – Corrosion Analyzer.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOK:

1. Mars.G. Fontana, Corrosion Engg., Mc Graw Hill International, 1981.

REFERENCES:

1. Corrosion Hand Book, Electro Chemical Society of India, 1998.
2. A.R. Santhakumar, Concrete Technology, Oxford University. 2007

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and Pos												
COs	**Pos**											
	1	2	3	4	5	6	7	8	9	10	11	12
1							x					x
2			x		x		x					
3			x		x		x					
4					x						x	x
5			x				x		x			

Approved by Sixth Academic Council

15CEC23 INTERIOR DECORATION

L	T	P	C
3	0	0	3

OBJECTIVE:

- To introduce the fundamentals related to the interior design.
- To provide knowledge on principles of interior design.
- To create awareness about the uses of materials in interior design.
- To impart knowledge on utilization of furniture in various rooms.
- To provide knowledge on various types of staircases.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Apply the concepts of interior design into practice.
CO2: Analyse the fundamentals of interior design based on site conditions.
CO3: Practice the interior design using locally available materials.
CO4: Design the rooms elegantly with various types of furniture styles.
CO5: Apply the fundamental concepts in the choice of staircases.

UNIT I ELEMENTS OF INTERIOR DESIGN (9)

Drawing instruments-materials used-care and maintenance. Introduction to code of practice - general Interior and Interior drawings-definitions- construction of plan-elevation- section-Use anthropometrics in interiors.

UNIT II PRINCIPLES OF INTERIOR DESIGN (9)

Introduction - basic interiors- elements -principles of design - Color & color scheme –choice and use of colours-balance-order

UNIT III MATERIALS UTILIZATION IN INTERIOR DESIGN (9)

Introduction -properties of materials-Types of ceramic materials-glasses and plywood -their utilization in interior design.

UNIT IV INTERIOR LAYOUT (9)

Space selection - furniture styles - selection of furniture- use of furniture templates-design of furniture -different purposes– bedrooms- dining hall- kitchen-office space -measurement of drawing as per design.

UNIT V STAIRCASES (9)

Materials - plan and design of staircase-details of construction-bricks- stone - R.C.C –mezzinine floor-elegance-order in choice of staircase

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Pratap R.M,"Interior Design principles and practice", Standard publishers distribution, Delhi,1988.
2. Faulkner, S.-and Faulkner,R, "Inside Today's Home", Rine hart publishing company, New york. 1987

REFERENCES:

1. Seetharaman P. "Interior Design And Decoration", Text books zone, 2014.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and Pos												
COs	**Pos**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x			x	x				x	x	x	x
2			x		x		x		x			x
3	x	x	x		x		x					
4					x		x		x	x	x	
5	x		x		x					x		x

15CEX24 PRE STRESSED CONCRETE STRUCTURES

[IS 1343 code book is to be permitted]

L	T	P	C
3	0	0	3

OBJECTIVE:

- To introduce the need for prestressing as well as the methods, types and advantages of prestressing to the students.
- Students will be introduced to the design of prestressed concrete structures subjected to flexure and shear

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Selection of various methods of prestressing.
CO2: Apply the design codes relevant to the design of prestressed concrete structures.
CO3: Design for deflection and crack control of prestressed concrete structures.
CO4: Analysis and design of composite beam construction
CO5: Design of various prestressed concrete members

UNIT I INTRODUCTION – THEORY AND BEHAVIOUR (9)

Basic Principles of prestressing – Classification and types – Advantages over ordinary reinforced concrete – Materials – High strength concrete and high tensile steel – Methods of prestressing – Freyssinet, Magnel Blaton, Lee Mac Call anchorage systems- Analysis of sections for stresses by stress concept, Strength concept and load balancing concept, Loss of Prestress.

UNIT II DESIGN FOR FLEXURE AND SHEAR (9)

Basic assumptions for calculating flexural stresses – Permissible stresses in steel and concrete as per IS1343 Code – Design of sections of Type I and Type II post-tensioned and pre-tensioned beams – Check for strength as per IS 1343 Code – Layout of cables in post-tensioned beams – Location of wires in pre-tensioned beams – Design for shear based on IS 1343 Code, Layout of Cables.

UNIT III DEFLECTION AND DESIGN OF ANCHORAGE ZONE (9)

Factors influencing deflections – Short term deflections of uncracked members – Prediction of long term deflections due to creep and shrinkage – Check for serviceability limit state of deflection. Determination of anchorage zone stresses in post-tensioned beams by Magnel's method, Guyon's method and IS1343 code – design of anchorage zone reinforcement.

UNIT IV COMPOSITE BEAMS AND CONTINUOUS BEAMS (9)

Analysis and design of composite beams – Methods of achieving continuity in continuous beams – Analysis for secondary moments – Concordant cable and linear transformation – Calculation of stresses – Principles of design.

UNIT V THEORY OF MISCELLANEOUS STRUCTURES (9)

Pipes– Partial prestressing – Definition, methods of achieving partial prestressing, Merits and demerits of partial prestressing

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Krishna Raju N., "Prestressed Concrete", 5th Edition, Tata McGraw Hill Company, New Delhi, 2012
2. Pandit G.S. and Gupta S.P. "Prestressed Concrete", CBS Publishers and Distributers Pvt. Ltd, New Delhi, 2012.

REFERENCES:

1. Dayaratnam.P, "Prestressed Concrete Structures", Oxford and IBH, Bangalore, 2013.
2. Lin T.Y. and Ned.H.Burns, "Design of Prestressed Concrete Structures", 3rd ed., Wiley India Pvt.Ltd. New Delhi, 2013.
3. IS 1343:2012, Code of Practice for Prestressed Concrete Structures, Bureau of Indian Standards, New Delhi.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and Pos												
Cos	Pos											
	1	2	3	4	5	6	7	8	9	10	11	12
1			x	x	x	x	x	x				
2	x	x	x	x	x	x	x	x		x		x
3	x	x	x	x	x	x	x	x		x		x
4	x	x	x	x		x		x		x		x
5	x	x	x	x		x		x		x		x

15CEX25 PAVEMENT DESIGN

L	T	P	C
3	0	0	3

OBJECTIVE:

- Gains knowledge on various IRC guidelines for designing rigid and flexible pavements.
- To assess quality and serviceability conditions of roads

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Identify the pavement types.
CO2: Design the flexible pavement using empirical methods
CO3: Design rigid pavements by IRC method and evaluate the pavements.
CO4: Assess quality and serviceability conditions of roads
CO5: Apply the various design procedure of pavement design in real time.

UNIT I TYPE OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM (9)

Introduction – Pavement as layered structure – Pavement types- rigid and flexible. Resilient modulus - Stress and deflections in pavements under repeated loading.

UNIT II DESIGN OF FLEXIBLE PAVEMENTS (9)

Flexible pavement design Factors influencing design of flexible pavement, Empirical – Mechanistic empirical and theoretical methods – Design procedure as per IRC guidelines – Design and specification of rural roads.

UNIT III DESIGN OF RIGID PAVEMENTS (9)

Cement concrete pavements Factors influencing CC pavements – Modified Westergaard's approach – Design procedure as per IRC guidelines – Concrete roads and their scope in India

UNIT IV PERFORMANCE EVALUATION AND MAINTENANCE (9)

Pavement Evaluation - Causes of distress in rigid and flexible pavements – Evaluation based on Surface Appearance, Cracks, Patches and Pot Holes, Undulations, Raveling, Roughness, Skid Resistance. Structural Evaluation by Deflection Measurements - Pavement Serviceability index, - Pavement maintenance (IRC Recommendations only).

UNIT V STABILIZATION OF PAVEMENTS (9)

Stabilization with special reference to highway pavements – Choice of stabilizers – Testing and field control - Stabilization for rural roads in India – Use of Geosynthetics in roads.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS :

1. Khanna, S.K. and Justo C.E.G and Veeraragavan, A, "Highway Engineering", New Chand and Brothers, Revised 10th ed., 2014.
2. Kadiyali, L.R., "Principles and Practice of Highway Engineering", Khanna Tech. Publications, New Delhi, 2005.

REFERENCES:

1. Yoder, R.J. and Witchak M.W. "Principles of Pavement Design", John Wiley 2000.
2. Guidelines for the Design of Flexible Pavements, IRC-37–2001, The Indian roads Congress, New Delhi.
3. Guideline for the Design of Rigid Pavements for Highways, IRC 58-1998, The Indian Road Congress, New Delhi.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and Pos												
Cos	**Pos**											
	1	2	3	4	5	6	7	8	9	10	11	12
1					x				x			
2	x	x	x	x	x		x	x	x			x
3	x	x	x	x	x		x	x	x			x
4			x		x		x					x
5			x		x		x		x			

Approved by Sixth Academic Council

15CEX26 GEO SYNTHETICS IN CIVIL ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVE:

- To introduce the students to the different types of geosynthetics, their manufacturing technique, testing methods and their applications in different types of Civil Engineering projects.

COURSE OUTCOMES:

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

CO1: Understand the concepts of types of geosynthetics.
CO2: Acquire the knowledge of raw materials.
CO3: Learn the physical properties of geo synthetics
CO4: Determine mechanical properties.
CO5: Apply Geosynthetics in different projects.

UNIT I AN OVERVIEW (9)

Historical Development – Types of Geosynthetics – Geotextiles – Geogrids- Geonets – Geomembranes – Geocomposites – Functions – Reinforcement – Separation – Filtration – Drainage – Barrier Functions.

UNIT II RAW MATERIALS AND MANUFACTURING METHODS (9)

Methods – Polyamide – Polyster – Polyethylene – Polypropylene – Poly Vinyl Chloride – Woven – Monofilament – Multifilament – Slit Filament – Non-Woven – Mechanically bonded Chemically bonded – Thermally bonded

UNIT III PHYSICAL AND HYDRAULIC PROPERTIES (9)

Physical properties: Mass per unit
area – Thickness – Specific gravity; Hydraulic properties :Apparent open size – Permittivity – Transmissivity.

UNIT IV MECHANICALLY PROPERTIES AND DURABILITY (9)

Mechanical Properties: Uniaxial Tensile Strength – Burst and Puncture Strength – Soil Geosynthetics friction tests; Durability: Abrasion resistance – Ultraviolet resistance.

UNIT V APPLICATIONS OF GEOSYNTHETICS (9)

Use of geosynthetics for filtration and drainage – Use of Geosynthetics in roads – Use of reinforced soil in Retaining walls – Improvement of bearing capacity – Geosynthetics in landfills.

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. G.Venkatappa Rao and G.V.S Suryanarayana Raju," Engineering with Geosynthetics",Tata McGraw Hill, New Delhi, 1990.
2. Koerner, R. M."Designing with geosynthetics", 5th ed., Prentice Hall, New Jersey, USA, 2005.
3. G.V. Rao, PK Banerjee, J.T. Shahu, G.V. Ramana, " Geosynthetics", New Horizons- Asian Books Private Ltd., New Delhi, 2004.

REFERENCES:

1. Shukla, S.K. "Handbook of Geosynthetic Engineering", 2nd ed., ICE Publishing, London, 2012.
4. Robert M. Koerner,"Construction and Geotechnical Methods in Foundation Engineering", McGraw Hill, New York, 1985.
5. Jewell, R.A., "Soil Reinforcement with Geotextiles", Special Publication, CIRIA, Thomas Telford. London, UK, 1996.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and Pos												
Cos	**Pos**											
	1	2	3	4	5	6	7	8	9	10	11	12
1							x					
2			x		x		x					x
3			x	x			x			x		
4			x									x
5	x	x	x	x	x		x					x

Approved by Sixth Academic Council

15GEC01 PRINCIPLES OF MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVE:

- To provide knowledge on planning, organizing, leading and controlling at different conditions in organizations.

COURSE OUTCOMES:

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

CO1: To acquire comprehensive knowledge on management concepts.
CO2: To learn about the planning under different conditions and situations.
CO3: To accomplish organizing of the human resources.
CO4: To obtain employees motivation and project managements in working environments.
CO5: To do the budgetary and non-budgetary control of projects.

UNIT I OVERVIEW OF MANAGEMENT (9)

Definition of management – Science & Art – Management & Administration - Role of managers – Evolution of Management thoughts – Contribution of Taylor and Fayol – Functions of management – Strategies for International business.

UNIT II PLANNING (9)

Nature and purpose of planning - Planning process - Types of plans – Objectives – Managing by objective (MBO) Strategies - Types of strategies - Policies - Decision Making - Types of decision - Decision Making Process - Rational Decision Making Process - Decision Making under different conditions.

UNIT III ORGANIZING (9)

Nature and purpose of organizing - Organization structure - Formal and informal organization - Line and Staff authority - Departmentation - Span of control - Centralization and Decentralization - Delegation of authority - Staffing - Selection and Recruitment - Orientation -Career Development - Career stages – Training - Performance Appraisal.

UNIT IV DIRECTING (9)

Creativity and Innovation - Motivation and Satisfaction - Motivation Theories - Leadership – Types of Leadership –Job enrichment - Communication - hurdles to effective communication – Organization Culture - Elements and types of culture - Managing cultural diversity.

UNIT V CONTROLLING (9)

System and Process of controlling - Types of control - Budgetary and non-budgetary control techniques - Managing Productivity - Cost Control - Purchase Control - Maintenance Control – Quality Control - Planning operations.

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOK:

1. Harold Koontz, Heinz Weihrich, “Essentials of Management”, Tata McGraw Hill, 8th ed., Second Reprint 2010.

REFERENCES:

1. Andrew J. Dubrin, “Essentials of Management”, Thomson Southwestern, 9th ed., 2012.
2. Stephen P. Robbins and Mary Coulter, “Management”, Prentice Hall of India, 10th ed., 2010.
3. Charles W L Hill, Steven L Mc Shane, “Principles of Management”, Mc Graw Hill Education, Special Indian Edition, 2008.
4. Hellriegel, Slocum & Jackson, “Management - A Competency Based Approach”, Thomson South Western, 10th edition, 2007.
5. Harold Koontz, Heinz Weihrich and Mark V Cannice, “Management - A global & Entrepreneurial Perspective”, Tata Mc Graw Hill, 12th ed., 2007.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and Pos												
COs	**Pos**											
	1	2	3	4	5	6	7	8	9	10	11	12
1							x				x	
2			x						x		x	x
3							x		x		x	x
4			x					x	x		x	x
5		x	x		x				x			

15GEC03 PROFESSIONAL ETHICS AND HUMAN VALUES

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand the theory of engineering ethics.
- To enable the students to create an awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values and Loyalty and to appreciate the rights of others.

COURSE OUTCOMES:

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

CO1: Understand the concepts of ethics and values.
CO2 : Acquire the knowledge of interpersonal and organizational issues in ethics
CO3: Highlight the ethical issues related to engineering.
CO4: Learn the concepts of engineer's responsibilities and their rights.
CO5: Understand the role of global issues and professional bodies.

UNIT I HUMAN VALUES (9)

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality.

UNIT II ENGINEERING ETHICS (9)

Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's Theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION (9)

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law – The Challenger case study – Bhopal Gas Tragedy and Chernobyl case studies.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS (9)

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

UNIT V GLOBAL ISSUES (9)

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility.

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", 4th ed., Tata Mc Graw Hill, New Delhi, 2014.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India Private Limited, New Delhi, 20012.
3.

REFERENCES:

1. Charles D. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Cengage Learning, 2009
3. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2008
4. http://www.slideworld.org/slidestag.aspx/human-values-and- Professional-ethics www.mne.psu.edu/lamancusa/ProdDiss/Misc/ethics.ppt.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and Pos												
COs	**Pos**											
	1	2	3	4	5	6	7	8	9	10	11	12
1			x					x			x	x
2					x			x		x	x	
3			x		x			x				
4		x			x			x			x	
5			x				x				x	x

15GEC04 TOTAL QUALITY MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand total quality management concept s and principles and the various tools available to achieve total quality management, statistical approach for quality control, ISO & QS certification process and its needs for the industries.

COURSE OUTCOMES:

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

CO1: Acquire various concepts of quality management.
CO2: Implement various principles of quality management.
CO3: Impart quality using statistical process.
CO4: Use the various tools to maintain quality.
CO5: Implement the quality system for ISO certification
.

UNIT I INTRODUCTION (9)

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Quality statements- Quality planning- Quality councils - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Costs of quality.

UNIT II TQM PRINCIPLES (9)

Leadership - Employee involvement - Motivation, Empowerment, Team and Teamwork, Quality circles Recognition and Reward, Performance appraisal – Continuous process improvement – PDSA cycle,5S,Kaizen – Supplier Partnership – Partnering, Supplier selection - Supplier Rating.

UNIT III TQM TOOLS AND TECHNIQUES - I (9)

The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.

UNIT IV TQM TOOLS AND TECHNIQUES- II (9)

Control Charts - Process Capability - Concepts of Six Sigma - Quality Function Deployment (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

UNIT V QUALITY SYSTEMS (9)

Need for ISO 9000 - ISO 9001-2008 Quality System - Elements, Documentation, Quality Auditing - QS 9000 - ISO 14000 - Concepts, Requirements and Benefits - TQM Implementation in manufacturing and service sectors.

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOK:

1. Dale H. Besterfiled, "Total quality Management", Pearson Education Asia, 3rd ed., Indian Reprint, 2011.

REFERENCES:

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th ed., First Indian Edition, Cengage Learning, 2012.
2. Subburaj Ramasamy , “Total Quality Management”, Tata Mc Graw Hill, First reprint 2009.
3. Suganthi. L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.
4. Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and Pos												
COs	**Pos**											
	1	2	3	4	5	6	7	8	9	10	11	12
1			x				x				x	
2					x				x		x	
3			x						x		x	x
4							x		x		x	x
5			x				x				x	x

Approved by Sixth Academic Council

15GEC07 ECONOMICS AND BUSINESS FINANCE FOR CIVIL ENGINEERS

L	T	P	C
3	0	0	3

OBJECTIVE:

- To bring about an exposure to construction economics, financing and accounting methods and their usefulness in controlling constructions projects.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Know about the economic law of returns and demand
CO2: Identify the elements of construction economics
CO3: Study the need for financial management and means of achieving the same
CO4: Understand the financial accounting and reporting
CO5 : Knowledge of elements of lending to contractors

UNIT I INTRODUCTION **(9)**

Role of civil engineering in industrial development - Advances in civil engineering and engineering economics - Support matters of economy as related to engineering Market demand and supply choice of technology and quality control and quality production - Audit in economic, Law of returns governing production.

UNIT II ECONOMICS OF ECOLOGY **(9)**

Urban land use and values - Construction development in housing, transport and other infrastructures - Economics of ecology, environment, energy resources, local material selection, form and functional designs - Construction workers -Urban problems - Poverty - Migration - Unemployment - Pollution.

UNIT III FINANCIAL MANAGEMENT **(11)**

The need for financial management - Types of financing - Short term borrowing - Long term borrowing - Leasing -Equity financing - Internal generation of funds - External commercial borrowings - Assistance from government budgeting support and international finance corporations - analysis of financial statement - Balance Sheet - Profit and Loss account - Funds flow statement - Ratio analysis - Investment and financing decision - Financial control Job control and centralized management.

UNIT IV ACCOUNTING **(8)**

General overview - Cash basis of accounting - Accrual basis of accounting - Percentage - Completion method - Completed contract method - Accounting for tax reporting purposes and financial reporting purposes.

UNIT V FINANCING **(8)**

Loans to contractors – Tender documents - Interim construction financing - Security and risk aspects-Pricing policy.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Warneer Z, Hirsch, "Urban Economics", Macmillan, New York, 1993
2. Prasanna Chandra, "Project Management", Tata McGraw Hill, New Delhi, 2009

REFERENCES:

1. Kwaku A, Tenah, Jose M.Guevara, "Fundamental of Construction Management and Organization", Prentice -Hall of India, 1995
2. Chitkara.K.K., "Construction Project Management", Tata McGraw Hill, 1998

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1		x	x				x	x			x	x
2		x	x		x		x	x	x		x	x
3		x	x		x			x			x	x
4	x	x	x	x	x		x		x			x
5								x			x	x

15CEZ01 ENERGY CONSERVATION IN BUILDINGS
(*Common to All branches except Civil Engineering)*

L	T	P	C
3	0	0	3

OBJECTIVE:

- To get idea on energy estimates considering about climate zones.
- To gain knowledge on energy conservation in buildings and monitoring systems

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Get idea on climate effects on building systems.
CO2: Perform energy estimation for buildings
CO3: Implement thermal insulation techniques in buildings.
CO4: Plan for the energy conservation methods in buildings.
CO5: Apply monitoring and control of energy systems in buildings.

UNIT I CLIMATE (6)

Climate and shelter – Historic buildings – Modern architecture – Examples from different climate zones.

UNIT II ENERGY ESTIMATION (9)

Thermal comfort – Solar geometry and shading – Heating and cooling loads – Energy estimates and site planning – Integrative Modeling methods and building simulation

UNIT III PRINCIPLES OF ENERGY (9)

Principles of Energy conscious building design – Energy conservation in buildings – Day lighting – Water heating and photovoltaic systems – Advances in thermal insulation – Heat gain / loss through building components – Solar architecture

UNIT IV ENERGY CONSERVATION (9)

Passive solar heating – Direct gain – Thermal storage wall – Sunspace – Convective air loop – Passive cooling – Ventilation – Radiation – Evaporation and Dehumidification – Mass effect – Design guidelines

UNIT V MONITORING AND CONTROL SYSTEMS (12)

Energy conservation in building – Air conditioning – HVAC equipment – Computer packages for thermal design of buildings and performance prediction – Monitoring and instrumentation of passive buildings – Control systems for energy efficient buildings – Illustrative passive buildings – Integration of emerging technologies – Intelligent building design principles.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. J.K. Nayak and J.A. PrajapatiHadbook on Energy Consious Buildings, Solar Energy Control MNES, 2006.
2. J.A. Clarke, Energy Simulation in Building Design (2e) Butterworth 2001.

REFERENCES:

1. J.R. Williams, Passive Solar Heating, Ann Arbar Science, 1983.
2. R.W. Jones, J.D. Balcomb, C.E. Kosiewiez, G.S. Lazarus, R.D. McFarland and W.O. Wray, Passive Solar Design Hanbook, Vol.3, Report of U.S. Department of Energy (DOE/CS-0127/3), 1982.
3. M.S. Sodha, N.K., Bansal, P.K. Bansal, A.Kumar and M.A.S. Malik. Solar Passive Building, Science and Design, Pergamon Press, 1986.
4. J.L. Threlkeld, Thermal Environmental Engineering, Prentice Hall, 1970.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**Pos**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x				x					
2	x	x	x				x					x
3	x		x		x		x					x
4	x		x				x		x			x
5		x		x			x				X	

15CEZ02 WASTE MANAGEMENT

(*Common to All branches except Civil Engineering)*

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand of the basic principles of waste and resource management will be supplemented, where appropriate, by practical problem-solving exercises.
- To provide detailed knowledge and skills in the management, treatment, disposal and recycling options for solid wastes.
- To provide details on resource efficiency plays in conserving resources and contributing to a low carbon economy.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Understand and apply the basic for solving practical waste management challenges.
CO2: Understand the collection of waste and recycling.
CO3: Understand the fundamental principles of existing and emerging technologies for the treatment of waste.
CO4: Appreciate the role of decision-making tools in the critical assessment of major waste issues.
CO5: Understand the economy and financial aspects of waste management.

UNIT I INTRODUCTION & TYPES OF SOURCES (9)

Problems and need of solid and hazardous waste management - Waste management planning - Toxicology and risk assessment - Legislations on management and handling of different types of wastes.

UNIT II WASTE GENERATION RATES (9)

Composition - Hazardous Characteristics – TCLP tests – waste sampling- reduction of wastes at source – Recycling and reuse. Handling and segregation of wastes at source – storage and collection of municipal solid wastes – Analysis of Collection systems - Need for transfer and transport – Transfer stations -labeling and handling of hazardous wastes.

UNIT III WASTE PROCESSING (9)

Processing technologies – biological and chemical conversion technologies – Composting - thermal conversion technologies - energy recovery – incineration – solidification and stabilization of hazardous wastes - treatment of biomedical wastes.

UNIT IV DISPOSAL (9)

Site selection - design and operation of sanitary landfills - secure landfills and landfill bioreactors – leachate and landfill gas management – landfill closure and environmental monitoring – landfill remediation

UNIT V ECONOMY AND FINANCIAL ASPECTS (9)

Elements of integrated waste management - Economy and financial aspects of waste management. Other Waste Types: Nuclear and Radio Active Wastes.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. 1. Hilary Theisen and Samuel A, Vigil, George Tchobanoglous, Integrated Solid Waste Management, McGraw- Hill, New York, 1993.

REFERENCES:

1. CPHEEO, Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organization, Government of India, New Delhi, 2000
2. Michael D. LaGrega, Philip L Buckingham, Jeffrey C. E vans and Environmental Resources Management, Hazardous waste Management, Mc-Graw Hill International edition, New York, 2001.
3. Vesilind P.A., Worrell W and Reinhart, Solid waste Engineering, Thomson Learning Inc., Singapore, 2002.
4. Charles A. Wentz, Hazardous Waste Management, Second Edition, Pub: McGraw Hill International Edition, New York, 1995.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**Pos**											
	1	2	3	4	5	6	7	8	9	10	11	12
1		x	x		x		x					
2			x		x		x					
3				x	x							x
4		x	x				x					
5			X		x				x		x	x

Approved by Seventh Academic Council

15CEZ03 AIR POLLUTION MANAGEMENT
(*Common to All branches except Civil Engineering)*

L	T	P	C
3	0	0	3

OBJECTIVE:

- To study about the characteristics and effects of air and noise pollution and the methods of controlling the same.
- To know about source inventory and control mechanism.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Understand about nature and characteristics of air pollutants.
CO2: Identify the basic elements of atmosphere and its stability.
CO3: Design stacks and particulate air pollution control devices to meet applicable standards.
CO4: Understand the basic concepts of air quality management.
CO5: Identify, formulate and solve air and noise pollution problems.

UNIT I SOURCES AND EFFECTS OF AIR POLLUTANTS (9)

Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution – Source inventory – Effects of air pollution on human beings, materials, vegetation, animals – global warming-ozone layer depletion, Sampling and Analysis – Basic Principles of Sampling – Source and ambient sampling – Analysis of pollutants – Principles.

UNIT II DISPERSION OF POLLUTANTS (9)

Elements of atmosphere – Meteorological factors – Wind roses – Lapse rate - Atmospheric stability and turbulence – Plume rise – Dispersion of pollutants – Dispersion models – Applications.

UNIT III AIR POLLUTION CONTROL (12)

Concepts of control – Principles and design of control measures – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment - gaseous pollutant control by adsorption, absorption, condensation, combustion – Pollution control for specific major industries.

UNIT IV AIR QUALITY MANAGEMENT (8)

Air quality standards – Air quality monitoring – Preventive measures - Air pollution control efforts – Zoning – Town planning regulation of new industries – Legislation and enforcement – Environmental Impact Assessment and Air quality.

UNIT V NOISE POLLUTION (7)

Sources of noise pollution – Effects – Assessment - Standards – Control methods – Prevention.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Anjaneyulu, D., “Air Pollution and Control Technologies”, Allied Publishers, Mumbai, 2002.
2. Rao, C.S. Environmental Pollution Control Engineering, Wiley Eastern Ltd., New Delhi, 1996.
3. Rao M.N., and Rao H. V. N., Air Pollution Control, Tata McGraw Hill, New Delhi, 1996.

REFERENCES:

1. Heumann. W.L., "Industrial Air Pollution Control Systems", McGraw Hill, New Yark, 1997.
2. Mahajan S.P., "Pollution Control in Process Industries", Tata McGraw Hill Publishing Company, New Delhi, 1991.
3. Peavy S.W., Rowe D.R. and Tchobanoglous G. "Environmental Engineering", McGraw Hill, New Delhi, 1985.
4. Garg, S.K., “Environmental Engineering Vol. II”, Khanna Publishers, New Delhi, 1998
5. Mahajan, S.P., “Pollution Control in Process Industries”, Tata McGraw Hill, New Delhi, 1991.
6. Thod Godesh, "Air Quality, Lewis India Edition, 2013.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**Pos**											
	1	2	3	4	5	6	7	8	9	10	11	12
1		x					x					
2			x		x		x					x
3	x	x	x		x		x				x	x
4			x				x				X	
5		x	x		x						X	x

15CEZ04 BUILDING SERVICES

(*Common to All branches except Civil Engineering)*

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand about electrical systems in building and its specifications.
- To know about the concepts of refrigeration and other safety installations as per NBC
- Planning and scheduling the frequency of inspection and maintenance of building including drainage

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Know about the basic electrical systems in buildings
CO2: Gain knowledge about the modern lighting systems.
CO3: Study about the HVAC systems.
CO4: Be familiar with the concept of planning considerations and fire safety installation in buildings.
CO5: Study about the concepts of plumbing and drainage in building.

UNIT I ELECTRICAL SYSTEMS IN BUILDINGS (9)

Basics of electricity – Single / Three phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems and their choice – Planning electrical wiring for building – Main and distribution boards – Transformers and switch gears – Layout of substations

UNIT II PRINCIPLES OF ILLUMINATION & DESIGN (9)

Visual tasks – Factors affecting visual tasks – Modern theory of light and colour –Synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candela – Solid angle illumination – Utilisation factor – Depreciation factor – MSCP – MHCP – Lans of illumination – Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering. Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

UNIT III REFRIGERATION PRINCIPLES & APPLICATIONS (9)

Thermodynamics – Heat – Temperature, measurement transfer – Change of state – Sensible heat – Latent heat of fusion, evaporation, sublimation – saturation temperature – Super heated vapour – Sub cooled liquid – Pressure temperature relationship for liquids – Refrigerants – Vapour compression cycle – Compressors – Evaporators – Refrigerant control devices – Electric motors – Starters – Air handling units – Cooling towers – 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

UNIT IV FIRE SAFETY INSTALLATION (9)

Causes of fire in buildings – Safety regulations – NBC – Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies, fire escapes and A.C. systems. Special features required for physically handicapped and elderly in building types – Heat and smoke detectors – Fire alarm system, snorkel ladder – Fire lighting pump and water storage – Dry and wet risers – Automatic sprinklers.

UNIT V PLUMBING AND DRAINAGE (9)

Plumbing fixtures and fixture fittings – Water conserving fittings – Over flows – Strainers and connectors – Prohibited fixtures – Special fixtures – Installation of water closet – Urinals - Flushing devices – Floor drains – Shower stall – Bath tub – Bidets – Minimum plumbing facilities – Rain water harvesting systems – Necessity – Construction – Different types .

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Udayakumar, “A Text Book on Building Services”, Eswar Press, 2007.
2. Handbook for Building Engineers in Metric systems, NBC, New Delhi, 1968.

REFERENCES:

1. E.R.Ambrose, “Heat Pumps and Electric Heating”, John and Wiley and Sons, Inc., New York, 1968.
2. Handbook for Building Engineers in Metric systems, NBC, New Delhi, 1968.
3. R.G.Hopkinson and J.D.Kay, “The Lighting of buildings”, Faber and Faber, London, 1969.
4. William H.Severns and Julian R.Fellows, “Air-conditioning and Refrigeration”,John Wiley and Sons, London, 1988.
5. A.F.C. Sherratt, “Air-conditioning and Energy Conservation”, the Architectural Press, London, 1980.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and Pos												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1		x	x				x					
2			x				x					
3			x				x					x
4		x	x		x				x			
5		x	x		x		x					x

15CSZ01 SOFTWARE ENGINEERING METHODOLOGIES

(Common to All branches except CSE Branch)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To Understand the life cycle models of software process
- To Understand fundamental concepts of requirements engineering .
- To learn the systematic procedure for software design
- To Implement the strategies for software testing
- To explore the significance of project planning and management.

COURSE OUTCOMES:

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

CO1: Identify the key activities in managing a software project.
CO2: Compare different process models.
CO3: Implement the Concepts of requirements engineering.
CO4: Apply systematic procedure for software design and deployment.
CO5: Compare and contrast the various testing and maintenance.

UNIT I: SOFTWARE PROCESS (9)

Introduction –Software Engineering Paradigm – life cycle models (water fall, incremental, spiral, WINWIN spiral, evolutionary, prototyping, object oriented) - system engineering – computer based system – verification – validation.

UNIT II: SOFTWARE REQUIREMENTS (9)

Functional and non-functional - user – system –requirement engineering process – feasibility studies – requirements – elicitation – validation and management – software prototyping – prototyping in the software process – rapid prototyping techniques – user interface prototyping -Software document. Analysis and modeling – data, functional and behavioral models – structured analysis and data dictionary.

UNIT III: SOFTWARE DESIGN (9)

Design process – Design Concepts-Design Model– Design Heuristic – Architectural Design – Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components.

UNIT IV: SOFTWARE TESTING (9)

Taxonomy of software testing – levels – test activities – types of software test – black box testing – testing boundary conditions – structural testing – test coverage criteria based on data flow mechanisms – regression testing – testing in the large - software testing strategies - testing using extreme programming.

UNIT V: SOFTWARE PROJECT MANAGEMENT (9)

Estimation – FP Based, LOC Based, Make/Buy Decision, COCOMO II - Planning – Project Plan, Planning Process, RFP Risk Management – Identification, Projection, RMMM - Scheduling and Tracking –Relationship between people and effort, Task Set & Network, Scheduling, EVA – Process and Project Metrics

. **TOTAL (L:45) = 45 PERIODS**

TEXT BOOK:

1. Roger S. Pressman, “Software Engineering – A Practitioner’s Approach”, 7th ed., Mc Graw-Hill International Edition, 2010.

REFERENCES :

1. Ian Sommerville, “Software Engineering”, 9th ed., Pearson Education Asia, 2011.
2. Rajib Mall, “Fundamentals of Software Engineering”, Third Edition, PHI COURSE Private Limited, 2009.
3. Pankaj Jalote, “Software Engineering - A Precise Approach”, Wiley India, 2010.
4. Kelkar S.A., “Software Engineering”, Prentice Hall of India Pvt Ltd, 2007.
5. Stephen R.Schach, “Software Engineering”, Tata McGraw-Hill Publishing Company.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x	x					x		
2		x	x		x							x
3	x	x	x	x	x				x	x		x
4	x		x	x								x
5	x	x		x	x						x	x

15CSZ02 DESIGN THINKING

(Common to All branches except CSE Branch)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To acquire Design Thinking skills.
- To learn by doing projects.
- To solve so called "wicked problems" (problems for which neither question nor answer is well defined).

COURSE OUTCOMES:

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

CO1: Have a sense of self-efficacy & creative confidence

CO2: Interpret and visualize the scenario..

CO3: Know how to manage a Design Thinking workshop Layout, roles, times and process.

CO4: Apply Design thinking tools to increase research output.

CO5: Do experiments by creating prototype and by obtaining feedback.

UNIT I INTRODUCTION TO DESIGN THINKING (9)

Overview - Use of Design Thinking – Design Process. Getting Started: Define Challenges – Create a Project Plan. Design Thinking Tools.

UNIT II DISCOVERY (9)

Understand the Challenge: Review the Challenge - Build your Team - Refine your Plan. Prepare Research: Identify Sources of Inspiration - Select Research Participants - Prepare For Fieldwork. Gather Inspiration: Immerse Yourself in Context - Seek Inspiration In Analogous Settings - Learn From Experts - Learn From Users.

UNIT III INTERPRETATION (9)

Tell Stories: Capture Your COURSEs- Share Inspiring Stories. Search for meaning: Find Themes - Make Sense of Findings - Define Insights. Frame Opportunities: Create a Visual Reminder - Make Insights Actionable.

UNIT IV IDEATION (9)

Generate Ideas: Prepare for Brainstorming - Facilitate Brainstorming - Select Promising Ideas - Sketch to Think. Refine Ideas - Do a Reality Check - Describe Your Idea.

UNIT V EXPERIMENTATION AND EVOLUTION (9)

Make Prototypes: Create a Prototype. Get Feedback: Identify Sources for Feedback - Select Feedback Participants - Facilitate Feedback Conversations - Capture Feedback COURSEs - Integrate Feedback. Track COURSEs: Define Success - Document Progress. Move Forward: Plan Next.

TOTAL :(L: 45) = 45 PERIODS

REFERENCES:

1. http://www.designthinkingforeducators.com/toolkit
2. https://hbr.org/2008/06/design-thinking
3. http://asimetrica.org/wp-content/uploads/2014/06/design-thinking.pdf

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x				x	x		x		
2					x							x
3	x			x	x		x	x				x
4	x		x									x
5	x	x		x	x	x	x		x	x		

13CSZ03 OPEN SOURCE SOFTWARE
(*Common to All branches except CSE Branch)*

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand the basics of open source operating systems.
- To gain the knowledge of working with Linux platform and open source database.
- To be familiar with programming languages PHP, Perl, Python.

COURSE OUTCOMES:

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

CO1: Install and run open-source operating systems.
CO2: Gather information about Free and Open Source Software projects from software releases and from sites on the internet.
CO3: Develop programs using PHP.
CO4: Solve problems using Python programming.
CO5: Develop programs using Perl.

UNIT I: INTRODUCTION **(9)**

Introduction to Open sources – Need of Open Sources – Advantages of Open Sources –Application of pen Sources. Open source operating systems: LINUX: Introduction – General Overview – Kernel Mode and user mode – Process – Advanced Concepts – Scheduling – Personalities – Cloning – Signals –Development with Linux.

UNIT II: OPEN SOURCE DATABASE **(9)**

MySQL: Introduction – Setting up account –Starting, terminating and writing your own SQL programs – Record selection Technology – Working with strings –Date and Time – Sorting Query Results – Generating Summary – Working with metadata – Using sequences –MySQL and Web.

UNIT III: OPEN SOURCE PROGRAMMING LANGUAGES **(9)**

PHP: Introduction – Programming in web environment – variables – constants – data types – operators – Statements – Functions – Arrays – OOP –String Manipulation and regular expression – File handling and data storage – PHP and SQL database – PHP and LDAP – PHP Connectivity – Sending and receiving E-mails –Debugging and error handling – Security –Templates.

UNIT IV: PYTHON **(9)**

Syntax and Style – Python Objects – Numbers – Sequences – Strings –Lists and Tuples – Dictionaries – Conditionals and Loops – Files – Input and Output –Errors and Exceptions – Functions – Modules – Classes and OOP –Execution Environment.

UNIT V: PERL **(9)**

Perl backgrounder – Perl overview – Perl parsing rules – Variables and Data – Statements and Control structures – Subroutines, Packages, and Modules- Working with Files –Data Manipulation.

TOTAL (L:45) = 45 PERIODS

TEXT BOOKS:

1. Remy Card, Eric Dumas and Frank Mevel, “The Linux Kernel Book”, Wiley Publications, 2003.
2. Steve Suchring, “MySQL Bible”, John Wiley, 2002.

REFERENCES:

1. Rasmus Lerdorf and Levin Tatroe, "Programming PHP", O'Reilly, 2002
2. Wesley J. Chun, "Core Phython Programming", Prentice Hall, 2001
3. Martin C. Brown, "Perl: The Complete Reference", 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.
4. Steven Holzner, "PHP: The Complete Reference", 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x						x	x		x
2	x	x	x		x					x		x
3	x	x	x	x	x							x
4	x		x	x			x			x	x	x
5	x	x		x	x		x			x	x	x

Approved by Seventh Academic Council

15CSZ04 INFORMATION SECURITY

(*Common to All branches except CSE branch)*

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand the basics of Information Security
- To know the legal, ethical and professional issues in Information Security
- To know the aspects of risk management
- To become aware of various standards in this area
- To know the technological aspects of Information Security

COURSE OUTCOMES:

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

CO1: Understand the basics of Information Security

CO2: Know the legal, ethical and professional issues in Information Security

CO3: Know the aspects of risk management

CO4: Become aware of various standards in this area

CO5: Know the technological aspects of Information Security

UNIT I: INTRODUCTION **(9)**

History, What is Information Security?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.

UNIT II: SECURITY INVESTIGATION **(9)**

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues.

UNIT III: SECURITY ANALYSIS **(9)**

Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk

UNIT IV: LOGICAL DESIGN **(9)**

Blueprint for Security, Information Security Poicy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity

UNIT V: PHYSICAL DESIGN **(9)**

Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel

TOTAL (L:45) = 45 PERIODS

TEXT BOOK:

1. Michael E Whitman and Herbert J Mattord, “Principles of Information Security”, Vikas Publishing House, New Delhi, 2017.

REFERENCES:

1. Micki Krause, Harold F. Tipton, “ Handbook of Information Security Management”, Vol 1-3 CRC Press LLC, 2004.
2. Stuart Mc Clure, Joel Scrambray, George Kurtz, “Hacking Exposed”, Tata McGraw Hill, 2003
3. Matt Bishop, “ Computer Security Art and Science”, Pearson/PHI, 2002.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x				x		x		x
2		x	x	x	x							x
3	x			x	x			x	x	x		x
4	x		x	x				x				x
5	x	x	x	x	x			x	x	x		x

15ECZ01 - AVIONICS

(Common to All Branches except ECE branch)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand the needs for avionics for both Civil and military aircraft.
- To introduce various digital electronic principles and working operations of digital circuit.
- To integrate the digital electronics with cockpit equipments.
- To understand the various principles in flight disk and cockpit panels.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1 : Describe the hardware required for aircraft.
CO2 : Interfacing with analog and digital systems.
CO3 : Design avionics system architecture.
CO4 : Describe Civil and Military Cockpits.
CO5 : Design of flight control systems and Radar systems.

UNIT- I INTRODUCTION TO AVIONICS (9)

Need for Avionics in civil and military aircraft and space systems – Integrated Avionics system – Typical avionics sub systems – Design approaches and recent advances - Application Technologies.

UNIT- II PRINCIPLES OF DIGITAL SYSTEMS (9)

Digital Computers – Digital number system- number systems and codes-Fundamentals of logic and combinational logic circuits –Digital arithmetic – interfacing with analogue systems - Microprocessors – Memories.

UNIT- III DIGITAL AVIONICS ARCHITECTURE (9)

Avionics system architecture– salient features and applications of Data buses MIL–STD 1553 B–ARINC 429–ARINC 629.

UNIT- IV FLIGHT DECK AND COCKPITS (9)

Control and display technologies CRT, LED, LCD, EL and plasma panel - Touch screen - Direct voice input (DVI) - Civil cockpit and military cockpit : MFDS, HUD, MFK, HOTAS 63.

UNIT- V AVIONICS SYSTEMS (9)

Communication Systems - Navigation systems - Flight control systems - Radar electronic warfare - Utility systems Reliability and maintainability - Certification .

TOTAL :(L: 45) =45 PERIODS

TEXT BOOKS:

1. Middleton, D.H. “Avionics Systems”, Longman Scientific and Technical, Longman Group UK.Ltd, England, 1989.
2. Spitzer, C.R. “Digital Avionics Systems”, Prentice Hall, Englewood Cliffs, N.J., U.S.A., 1987.

REFERENCES:

1. Malcrno A.P. and Leach, D.P., “Digital Principles and Application”, Tata McGraw-Hill, 1990.
2. Gaonkar, R.S., “Microprocessors Architecture – Programming and Application”, Wiley and Sons Ltd., New Delhi, 1990.
3. Cary R .Spitzer, “The Avionics Handbook”, CRC Press, 2000.
4. Brain Kendal, “Manual of Avionics”, The English Book House, 3rd Edition, New Delhi, 1993.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x									
2	x	x		x								x
3		x	x	x								x
4		x		x	x							x
5		x	x		x							x

Approved by Seventh Academic Council

15ECZ02 - CONSUMER ELECTRONICS
(Common to All Branches except ECE branch)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To study the basics of audio and video technology.
- To understand the electronic gadgets and telecommunication systems.
- To analyze and design consumer appliances.

COURSE OUTCOMES:

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

CO1 : Know the concepts of audio system.
CO2 : Know the concepts of video system.
CO3 : Analysis different techniques involved in audio and video processing.
CO4 : Identification of new developments in office equipment and domestic appliances.
CO5 : Know the working concepts of consumer applications.

UNIT - I AUDIO SYSTEM COMPONENTS (9)

Introduction to wave motion – Interference and superposition of waves – Beats, Resonance, Echos – characteristics of microphones – types of microphone – wireless microphones – Types of headphones – Loudspeakers

UNIT-II AUDIO PROCESSING (9)

Audio Filters, Types of AGC – Loudspeaker Impedance matching – Pre-emphasis and De-emphasis noise reduction – Optical recording and reproduction – stereophony, Quadraphony – Stereo controls –Equalizers –Mixer.

UNIT - III VIDEO STANDARDS AND SYSTEMS (9)

Elements of a TV system, scanning process – resolution, interlacing, composite signal The Kell factor. LED, LCD, Types of TV camera-Color TV systems- The NTSC system-The PAL systems- The SECAM system. Broadcasting of TV programs-Digital Video Recorder and CCTV Surveillance system

UNIT - IV COMMUNICATION AND CONSUMER GADGETS (9)

Radio system – VHF and UHF – Cellular communication - Types of mobile phones – Establishing cell- Smart card– Facsimile machine – electronic calculators – Digital clocks– Xerography - TV Remote.

UNIT - V CONSUMER APPLICATIONS (9)

Washing Machines – electronic controller, fuzzy logic, Hardware and Software development – Air Conditioners – Components, Remote Controls, Unitary and central air conditioner systems – Bar Coders – Bar codes, scanner and decoder – Set Top Box – Types, firmware development, Interactive program guides.

TOTAL :(L: 45)= 45 PERIODS

TEXT BOOK:

1. S.P.Bali, Consumer Electronics, Pearson Education, 2005.

REFERENCES:

1. C.A. Schuler and W.L.Mc Namee, Modern Industrial Electronics, McGraw Hill, 2002.
2. D.J. Shanefield, Industrial Electronics for Engineers, Chemists and Technicians, Jaico Publishing House, 2007

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x			x					x			x
2		x			x			x		x		
3					x							x
4	x							x		x		
5	x		x		x			x		x		

15ECZ03 - MODERN WIRELESS COMMUNICATION SYSTEMS

(Common to All Branches except ECE branch)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To learn the comprehensive background concepts of wireless and mobile communication.
- To know the flavor of personal communication systems.
- To study the highlights of the latest communication networks and out the next generation networks.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1 : Know the fundamentals of basic mobile communication wireless networks.

CO2 : Have a detailed overview of different networking topologies and multiple access methods.

CO3 : Have the information about the several generation of personal communication technologies

CO4 : Know about the principles of operation of the different access technologies like FDMA,TDMA, SDMA and CDMA

CO5 : Identify the different data services and short range networks used in mobile networks.

UNIT- I TRANSMISSION FUNDAMENTALS (9)

Cellphone Generations: 1G, 2G, 2.5G, 3G & 4G Transmission Fundamentals: Time domain & Frequency domain concep Carrier-based signalling, spread- spectrum signalling.

UNIT –II NETWORK CONCEPTS (9)

Communication Networks: LANs, MANs, WANs, circuit switching, packet switching, ATM Cellular Networks: Cells, duplex FDMA, TDMA, SDMA, CDMA, spectral efficiency.

UNIT- III PERSONAL COMMUNICATION SERVICES (9)

GSM, HSCSD, GPRS, D-AMPS, CDMA One, CDMA Two, Packet Data Systems.

UNIT- IV 3G & BEYOND (9)

IMT-2000, W-CDMA, CDMA 2000, EDGE, Wi-Fi, WiMAX, OFDM.

UNIT- V MOBILE DATA SERVICES & SHORT-RANGE NETWORKS (9)

Mobile Data Services: Messaging, wireless web, WAP, site design Short-Range Wireless Networks:Unlicensed spectrum phones, mobile OSs, smart phone applications.

TOTAL :(L: 45)= 45 PERIODS

TEXT BOOKS:

1. Andy Dornan, “The essential guide to wireless communications applications: from cellular systems to Wi-Fi”, 2nd Edition, Prentice Hall, 2002.
2. Misra, “Wireless Communications and Networks: 3G & Beyond”, Tata McGraw-Hill, 2013.

REFERENCES:

1. Theodore S. Rappaport, “Wireless Communications: Principles and Practice”, 2nd Edition,
2. Pearson Education, 2009.
3. William Stallings, “Wireless communications and networking”, Prentice Hall, 2005

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x									
2	x	x		x								x
3		x	x	x								x
4		x		x	x							x
5		x	x		x							x

15ECZ04 - ELECTRONIC TESTING

(Common to All Branches except ECE branch)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand the basics of testing and the testing equipments.
- To understand the different testing methods.
- To learn about testable system design.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1 : Have knowledge of different types of faults and fault modeling.
CO2 : Design the different testing schemes for Digital circuits.
CO3 : Know the testing schemes for memories and mixed signal systems.
CO4 : Have knowledge of various testability design schemes.
CO5 : Diagnosis the Faults at module level.

UNIT I - INTRODUCTION **(9)**

Test process and automatic test equipment, test economics and product quality, fault modeling.

UNIT II - DIGITAL TESTING **(9)**

Logic and fault simulation, testability measures, combinational and sequential circuit test generation.

UNIT III - ANALOG TESTING **(9)**

Memory Test, DSP Based Analog and Mixed Signal Test, Model based analog and mixed signal test, delay test, IIDQ test.

UNIT IV - DESIGN FOR TESTABILITY **(9)**

Built-in self-test, Scan chain design, Random Logic BIST, Memory BIST, Boundary scan test standard, Analog test bus, Functional Microprocessor Test, Fault Dictionary, Diagnostic Tree, Testable System Design, Core Based Design and Test Wrapper Design, Test design for SOCs, Pre-Silicon to Post silicon test for FPGA.

UNIT V - LOADED BOARD TESTING **(9)**

Unpowered short circuit tests, unpowered analog tests, Powered in-circuit analog, digital and mixed Signal tests, optical and X-ray inspection procedures, functional block level design of in-circuit test Equipment

TOTAL :(L: 45) =45 PERIODS

TEXT BOOKS:

1. Michael L. Bushnell and Vishwani D. Augural, “Essentials of Electronic Testing for Digital, Memory & Mixed-Signal VLSI Circuits”, Springer, 2006.
2. Mehdi Dehbashi, Görschwin Fey “Debug Automation from Pre-Silicon to Post-Silicon” Springer, 25-Sep-2014.

REFERENCE:

1. Dimitris Gizopouilos, “Advances in Electronic Testing”, Springer 2006.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x			x					x			x
2		x			x			x		x		
3					x							x
4	x							x		x		
5	x		x		x			x		x		

15EEZ01 RENEWABLE ENERGY TECHNOLOGY

L	T	P	C
3	0	0	3

(Common to All Branches except EEE branch)

OBJECTIVE:

- To emphasis the current energy status and role of renewable energy
- To know about the various concept of solar and wind energy
- To know about the various concept of biomass and other renewable energy sources

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1: Plan appropriate kind of energy for the future development.
CO2: Know about solar energy concepts, techniques and its applications.
CO3: Identify the concepts, various wind turbines, storage and environmental aspects of wind energy.
CO4: Understand the concepts of biomass energy conversion technologies and plant design considerations.
CO5: Know some other renewable energy sources.

UNIT I : INTRODUCTION (9)

World energy status, Current energy scenario in India, Environmental aspects of energy utilization, Environment-Economy - Energy and Sustainable Development, Energy planning. Reserves of Energy resources - Renewable energy resources - Potentials - Achievements - applications - Technical and social implications, issues in grid integration of power from renewable energy sources.

UNIT II : SOLAR ENERGY (9)

Basic concepts, Solar radiation – Measurement, Solar thermal systems – Flat plate and concentrating collectors, Solar passive space – Solar heating and cooling techniques – Solar desalination – Solar Pond – Solar cooker – Solar dryers – Solar furnaces – Solar pumping – Solar green house- Solar thermal electric power plant – Solar photo voltaic conversion – Solar cells – PV applications – Hybrid systems.

UNIT III : WIND ENERGY (9)

Introduction – Availability- Wind power plants, Power from the wind, Wind energy conversion systems, site characteristics – Wind turbines types – Horizontal and vertical axis – Design principles of wind turbine – Blade element theory - Magnus effect – Performance – Wind energy Applications – Hybrid systems – Wind energy storage – Safety and environmental aspects.

UNIT IV : BIOMASS ENERGY (9)

Biomass – Usable forms- composition – Fuel properties – Applications – Biomass resource – Biomass conversion technologies – Direction combustion – Pyrolysis – Gasification – Anaerobic digestion –Bioethanol and Biodiesel Production – Economics – Recent developments – Energy farming – Biogas technology – Family biogas plants – Community and institutional biogas plants – design consideration – Applications

UNIT V : OTHER RENEWABLE ENERGY SOURCES (9)

Tidal energy – Wave energy – Open and closed OTEC Cycles – Small hydro – Geothermal energy – Social and environmental aspects – Fuel cell technology: Types, principle of operation, applications –Hydrogen energy production – Storage – Transportation – Utilization.

TOTAL: 45 PERIODS

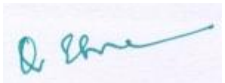
TEXTBOOKS:

1. Godfrey Boyle, “Renewable Energy”, Power for a Sustainable Future, Oxford University Press, U.K, 1996.
2. Twidell.J.W & Weir.A, “Renewable Energy Sources”, EFN Spon Ltd., UK, 1986.
3. Tiwari.G.N, “Solar Energy - Fundamentals Design”, Modelling and applications, Narosa PublishingHouse, NewDelhi, 2002.

REFERENCES:

1. Kothari P, K C Singal and Rakesh Ranjan, “Renewable Energy Sources and Emerging Technologies”, PHI Pvt. Ltd.,New Delhi, 2008.
2. G.D. Rai, “Non Conventional Energy Sources”, Khanna Publishers, New Delhi, 1999.
3. S.P. Sukhatme, “Solar Energy”, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1997.

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x			x					x			x
2		x			x			x		x		
3					x							x
4	x							x		x		
5	x		x		x			x		x		



15EEZ02 ENERGY CONSERVATION AND AUDITING | **L T P C**
(Common to All Branches except EEE branch) | **3 0 0 3**

OBJECTIVE:

- To enable the students to acquire the knowledge of energy conservation measures in thermal and electrical energy systems.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1: Understand the concepts of energy status and conservation principle.
CO2: Measure the energy conservation in steam systems
CO3: Know about the energy conservation concepts of various fluid machineries
CO4: Identify electrical energy conservation in various industries
CO5: Know the energy management techniques and policies

UNIT I ENERGY CONSERVATION PRINCIPLES **(9)**

Energy scenario - Principles of energy conservation - Resource availability - Energy savings - Current energy consumption in India - Roles and responsibilities of energy managers in industries.

UNIT II ENERGY CONSERVATION IN STEAM SYSTEMS **(9)**

Power plant components - Conservation measures in steam systems, losses in boiler - Methodology of upgrading boiler performance - Blow down control, excess air control - Pressure reducing stations - Condensate recovery - Condensate pumping - Thermo compressor - Recovery of flash steam - Air removal and venting - Steam traps -Cooling towers.

UNIT III ENERGY CONSERVATION IN FLUID MACHINERY **(9)**

Centrifugal pumps - Energy consumption and energy saving potentials - Design consideration - Minimizing over design - Fans and blowers : specification, safety margin, choice of fans, controls and design considerations - Air compressor and compressed air systems: selection of compressed air layout, energy conservation aspects to be considered at design stage.

UNIT IV ELECTRICAL ENERGY CONSERVATION **(9)**

Potential areas for electrical energy conservation in various industries: conservation methods, energy management opportunities in electrical heating, lighting system, cable selection - Energy efficient motors - Factors involved in determination of motor efficiency - Adjustable AC drives - Variable speed drives - Energy efficiency in electrical system.

UNIT V ENERGY AUDITING **(9)**

Energy audit : need, preliminary audit, detailed audit, methodology and approach - Instruments for audit, monitoring energy and energy savings.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Reay.D.A, "Industrial energy conservation", Pergamon Press, 1st ed., 2003.
2. Albert Thumann, "Handbook of energy audits", 6th ed., The Fairmount Press, 2003.

REFERENCES:

1. Smith.C.B, “Energy Management Principles”, Pergamon Press, 2006.
2. Hamies, “Energy Auditing and Conservation; Methods, Measurements, Management and Case study”, Hemisphere, 2003.
3. Trivedi. P.R and Jolka .K.R, “ Energy Management”, Common Wealth Publication, 2002.

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x			x					x			x
2		x			x					x		
3												x
4	x											
5	x		x		x			x		x		

15EEZ03 ELECTRICAL MACHINES

(Common to All Branches except EEE branch)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To disseminate an overview of various electric machines used in industries, power generation and home appliances with a technical know-how on the control techniques

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1: Understand the constructional details and principle of operation of DC motors,induction machines, alternators, transformers and fractional horse-power motors

CO2: Evaluate the performance of starting and operating characteristics of various electrical machines used in industrial and domestic applications

CO3: Choose an appropriate method of speed control and braking for the drive motors

CO4: Understand the concepts of synchronous motors

CO5: Understand the manufacturing concepts in machines

UNIT I : DC MOTORS **(9)**

Construction and working principle, emf equation, torque equation, starting and running characteristics, speed control, braking, duty of operation, choice of motors.

UNIT II : TRANSFORMERS **(9)**

Construction and working principle, equivalent circuit, regulation and efficiency, autotransformers, industrial applications – welding transformer and furnace transformer.

UNIT III : THREE PHASE INDUCTION MACHINES **(9)**

Construction and working principle. Induction motors - torqueequation, torque–slip characteristics, starting and running characteristics, speed control, braking, choice of motor for industrial applications and traction.

UNIT IV : SYNCHRONOUS MACHINES **(9)**

Construction, principle of operation and types, various types of excitation systems, stand alone and grid connected modes of operation, voltage and frequency control.

UNIT V : FRACTIONAL HORSE POWER MACHINES **(9)**

Factory Automation: Flexible Manufacturing Systems concept – Automatic feeding lines, ASRS, transfer lines, automatic inspection – Computer Integrated Manufacture – CNC - Intelligent automation - Industrial networking, - Bus standards - HMI Systems - DCS and SCADA - Wireless controls.

TOTAL: 45 PERIODS

TEXTBOOKS:

1. D.P.Kothari and I.J.Nagrath, 'Electric Machines', McGraw Hill Education Private Limited, 4th ed, 2010.
2. Ashfaq Husain, 'Electric machines', Dhanpat Rai & Company, 2nd ed, 2002.

REFERENCES:

1. Gopal K. Dubey, 'Fundamentals of Electrical Drives', Narosa publishing house, 2nd ed, 2011.
2. A Fitzgerald , Charles Kingsley , Stephen Umans, 'Electric Machinery', McGraw Hill Education Private Limited, 6th ed, 2002.
3. K. Murugesh Kumar, 'Induction & Synchronous Machines', Vikas Publishing House Pvt Ltd., 2009.
4. Edward Hughes, 'Electrical and Electronic Technology', Dorling Kindersley (India) Pvt. Ltd., 10th ed, 2011.

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x			x					x			x
2		x			x	x	x					
3		x						x	x			
4		x			x	x		x	x			
5		x						x				

15EEZ04 WIND AND SOLAR ELECTRICAL SYSTEMS

L	T	P	C
3	0	0	3

(Common to All Branches except EEE branch)

OBJECTIVE:

- To familiarize the students with basics of solar and wind energy systems and various techniques for the conversion of solar and wind energy into electrical energy.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1: Describe the solar radiation, measurements and characteristics of solar PV cell.
CO2: Develop the model of a PV system and its applications.
CO3: Describe the basic types and mechanical characteristics and model of wind turbine.
CO4: Analyze the electrical characteristics and operation of various wind-driven electrical generators.
CO5: Understand various power electronic converters used for hybrid system.

UNIT I INTRODUCTION TO SOLAR (9)

Basic characteristics of sunlight – solar spectrum – insolation specifics– irradiance and irradiation pyranometer – solar energy statics- Solar PV cell – I-V characteristics –P-V characteristics– fill factor- Modeling of solar cell– maximum power point tracking.

UNIT II PHOTO VOLATIC (9)

PV module – blocking diode and bypass diodes– composite characteristics of PV module – PV array– PV system –PV-powered fan–PV fan with battery backup – PV-powered pumping system – PV powered lighting systems–grid- connected PV systems.

UNIT III WIND ENERGY (9)

Wind source–wind statistics-energy in the wind –turbine power characteristics - aerodynamics – rotor types – parts of wind turbines– braking systems–tower- control and monitoring system.

UNIT IV GENERAL CHARACTERISTICS OF INDUCTION GENERATORS (9)

Grid-connected and self-excited systems – Steady state equivalent circuit - Performance predetermination – Permanent magnet alternators: steady-state performance.

UNIT V HYBRID SYSTEMS (9)

Power electronic converters for interfacing wind electric generators – Power quality issues - Wind-diesel systems – Wind-solar systems.

TOTAL = 45 PERIODS

TEXT BOOKS:

1. S N Bhadra, S Banerjee and D Kastha, 'Wind Electrical Systems', Oxford University Press, 1st Edition, 2005.
2. Chetan Singh Solanki, 'Solar Photovoltaics: Fundamentals, Technologies and Applications' PHI Learning Publications, 2nd Edition, 2011.

REFERENCES:

1. Roger A. Messenger and Jerry Ventre, “Photovoltaic Systems Engineering”, Taylor and Francis Group Publications, 2nd Edition, 2003.
2. M. Godoy Simoes and Felix A. Farret, “Alternative Energy Systems: Design and Analysis with Induction Generators”, CRC Press, 2nd Edition, 2008.
3. Ion Boldea, ‘The Electric Generators Handbook- Variable Speed Generators’, CRC Press, 2010.
4. Bin Wu, Yongqiang Lang, Navid Zargari, Samir Kouro, “Power Conversion and Control of Wind Energy Systems”, IEEE Press Series on Power Engineering, John Wiley & Sons, 2011.
5. S. Sumathi,L. Ashok Kumar,P. Surekha ,‘Solar PV and Wind Energy Conversion Systems’, Springer 2015.

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x			x					x			x
2		x			x			x		x		
3					x							x
4	x							x		x		
5	x		x		x			x		x		

15EIZ01 AUTOTRONIX

(Common to ALL Branches Except EIE)

L	T	P	C
3	0	0	3

OBJECTIVE:

This course focuses on the extent and nature of electronic circuitry in automotive systems including monitoring and control circuits for engines, emission control system, ignition systems and fuel systems. The course imparts applications of sensors on automotive systems .

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Understand the application of electronics in automotive industry.
CO2: Identify different control systems in automotives and their control.
CO3: Design and implement various control algorithms in automotives.
CO4: Demonstrate different instrumentation systems in automotives.
CO5: Identify, formulate and solve real time engineering problems.

UNIT I FUNDAMENTALS OF AUTOMOTIVE ELECTRONICS (9)

Electronic Engine Management System – Components – Open and Closed Loop Control Strategies – PID Control – Look Up Tables – Introduction – Modern Control Strategies Like Fuzzy Logic and Adaptive Control – Controlled Parameters – SI and CI Engines.

UNIT II SENSORS AND ACTUATORS (9)

Introduction – Basic Sensor Arrangement – Types Of Sensors – Hall Effect Sensor – Hot Wire Anemometer – Thermistor – Piezo-Electric Sensor – Piezo-Resistive Sensors – Oxygen Concentration Sensor – Lambda Sensor – Crankshaft Angular Position Sensor – Cam Position Sensor – Mass Air Flow (MAF) Rate – Manifold Absolute Pressure (MAP) – Throttle Plate Angular Position – Engine Oil Pressure Sensor – Vehicle Speed Sensor – Stepper Motors – Relays – Detonation Sensor – Emission Sensors.

UNIT III SPARK IGNITION ENGINE MANAGEMENT (9)

Feedback Carburetor System – Throttle Body Injection – Multi Point Fuel Injection System – Injection System Controls –Advantage of Electronic Ignition Systems – Three Way Catalytic Converter – Conversion Efficiency Versus Lambda – Group and Sequential Injection Techniques – Fuel System Components – Advantages of Electronic Ignition Systems – Solid State Ignition Systems – Principle Of Operation – Types – Contact Less Electronic Ignition System – Electronic Spark Timing Control.

UNIT IV COMPRESSION IGNITION ENGINE MANAGEMENT (9)

Fuel Injection System – Parameters Affecting Combustion – Noise and Emissions in CI Engines – Pilot, Main, Advanced – Post Injection and Retarded Post Injection – Electronically Controlled Unit Injection System – Layout of the Common Rail Fuel Injection System – Fuel Injector – Fuel Pump – Rail Pressure Limiter – Flow Limiter – Working Principle – EGR Valve Control in Electronically Controlled Systems.

UNIT V DIGITAL ENGINE CONTROL SYSTEM (9)

Open Loop and Closed Loop Control System – Engine Cooling and Warm Up Control – Idle Speed Control – Acceleration and Full Load Enrichment – Deceleration Fuel Cut-off – Fuel Control Maps – Open Loop Control of Fuel Injection – Closed Loop Lambda Control – Exhaust Emission Control – On Board Diagnostics: Diagnostics – Future Automotive Electronic Systems.

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. Arthur Primrose Young, Leonard Griffiths, “Automobile Electrical and Electronic Equipment: Theory and Practice for Students, Designers, Automobile Electricians and Motorists”, London Butterworths, Ninth Edition, 1986.
2. William Ribbens, “Understanding Automotive Electronics: An Engineering Perspective”, Butterworth-Heinemann, Seventh Edition, 2013.

REFERENCES:

1. Allan Bonnick, “Automotive Computer Controlled Systems” Taylor & Francis, Fifth Edition, 2001.
2. Tom Denton, “Automobile Electrical and Electronics Systems”, Butterworth- Heinemann, Fourth Edition, 2004.
3. Robert Bosch GmbH and Horst Bauer, “Gasoline-Engine Management”, Bentley Publishers, Second Edition, 2006.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1				x			x	x				
2						x	x		x			
3	x		x	x		x	x					
4	x	x									x	
5			x	x		x	x					

15EIZ02 FIBER OPTIC SENSORS
(Common to ALL Branches Except EIE)

L	T	P	C
3	0	0	3

OBJECTIVE:

- This course introduces fundamental physical principles of both classical and modern optics as well as principles of optical design used in the engineering of optical systems.
- The course also provides exposure to practical aspects of optical materials and devices.
- The intention of the course is to provide foundation of basic principles, design methodology, and practical considerations needed to design or use optical and laser instruments in engineering practice.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Understand the basic concepts of optical fibres and their properties.
CO2: Have adequate knowledge about the Industrial applications of optical fibres.
CO3: Relate and identify different types of lasers and their applications.
CO4: Demonstrate industrial applications of lasers.
CO5: Understand holography and medical applications of laser.

UNIT I OPTICAL FIBRES AND THEIR PROPERTIES (9)

Principles of light propagation through a fibre - Different types of fibres and their properties, fibre characteristics – Absorption losses – Scattering losses – Dispersion – Connectors & splicers – Fibre termination – Optical sources – Optical detectors.

UNIT II INDUSTRIAL APPLICATION OF OPTICAL FIBRES (9)

Fibre optic sensors–Fibre optic instrumentation system – Different types of modulators –Interferometric method of measurement of length – Moire fringes – Measurement of pressure, temperature, current, voltage, liquid level and strain.

UNIT III LASER FUNDAMENTALS (9)

Fundamental characteristics of lasers –Three level and four level lasers – Properties of laser – Laser modes – Resonator configuration – Q-switching and mode locking – Cavity damping – Types of lasers – Gas lasers, solid lasers, liquid lasers, semiconductor lasers.

UNIT IV INDUSTRIAL APPLICATION OF LASERS (9)

Laser for measurement of distance, length, velocity, acceleration, current, voltage and atmospheric effect – Material processing – Laser heating, welding, melting and trimming of material – Removal and vaporization.

UNIT V HOLOGRAM AND MEDICAL APPLICATIONS (9)

Holography – Basic principle - Methods – Holographic interferometry and application, Holography for non-destructive testing – Holographic components – Medical applications of lasers, laser and tissue interactive – Laser instruments for surgery, removal of tumours of vocal cards, brain surgery, plastic surgery, gynaecology and oncology.

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. J.M. Senior, 'Optical Fibre Communication – Principles and Practice', Prentice Hall of India, 2009.
2. J. Wilson and J.F.B. Hawkes, 'Introduction to Opto Electronics', Prentice Hall of India, 2001.

REFERENCES:

1. Donald J.Sterling Jr, 'Technicians Guide to Fibre Optics', 3rd Edition, Vikas Publishing House, 2000.
2. M. Arumugam, 'Optical Fibre Communication and Sensors', Anuradha Agencies, 2002.
3. John F. Read, 'Industrial Applications of Lasers', Academic Press, 2004.
4. Monte Ross, 'Laser Applications', McGraw Hill, 2008
5. G. Keiser, 'Optical Fibre Communication', McGraw Hill, 2003.
6. Mr. Gupta, 'Fiber Optics Communication', Prentice Hall of India, 2004.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1				x			x	x				
2						x	x		x			
3	x		x	x		x	x					
4	x	x									x	
5			x	x		x	x					

Approved by Seventh Academic Council

15EIZ03 INDUSTRIAL AUTOMATION
(Common to ALL Branches Except EIE)

L	T	P	C
3	0	0	3

OBJECTIVE:

- This course produces students who can use their multidisciplinary skills to meet growing demand from an industry that is pushing the limits of technology by exploiting the growing convergence of these fields.
- The course aims to provide knowledge on fundamentals of robots, robot programming, and its vision system and apply to demonstrate their knowledge in real time application.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Demonstrate the concepts of robotic principles and various robot configurations.
CO2: Develop solutions for the robot position and orientation for given application.
CO3: Identify the appropriate configuration for the application.
CO4: Design intelligence systems incorporating real time data capturing using vision systems.
CO5: Understand robotic programming and develop simple robotic systems.

UNIT I BASIC CONCEPTS (9)

Definition and origin of robotics –different types of robotics–various generations of robots –degrees of freedom – Asimov's laws of robotics – dynamic stabilization of robots.

UNIT II POWER SOURCES AND SENSORS (9)

Hydraulic, pneumatic and electric drives–determination of HP of motor and gearing ratio–variable speed arrangements –path determination –micro machines in robotics–machine vision–ranging –laser –acoustic–magnetic, fiber optic and tactile sensors.

UNIT III MANIPULATORS, ACTUATORS AND GRIPPERS (9)

Construction of manipulators–manipulator dynamics and force control–electronic and pneumatic manipulator control circuits–end effectors–U various types of grippers–design considerations.

UNIT IV KINEMATICS AND PATH PLANNING (9)

Solution of inverse kinematics problem–multiple solution jacobian work envelop–hill climbing Techniques – robot programming languages

UNIT V CASE STUDIES (9)

Mutiple robots–machine interface–robots in manufacturing and non-manufacturing applications –robot cell design–selection of robot.

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. Industrial Robotics (SIE): Technology, Programming and Applications Nicholas Odrey, Mitchell Weiss, Mikell Groover, Roger Nagel, Ashish Dutta , Mcgrawhill, 2012.
2. Ghosh, Control in Robotics and Automation: Sensor Based Integration, Allied Publishers, Chennai, 1999.

REFERENCES:

1. S.R. Deb, Robotics technology and flexible Automation, John Wiley, USA 1992.
2. C.R. Asfahl., Robots and manufacturing Automation, John Wiley, USA 1992.
3. R.D. Klafter, T.A. Chimielewski, M. Negin, Robotic Engineering –An integrated approach, Prentice Hall of India, New Delhi, 1994.
4. P.J. Mc Kerrow, Introduction to Robotics, Addison Wesley, USA, 1991.
5. Issac Asimov I Robot, Ballantine Books, New York, 1986.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1				x			x	x				
2						x	x		x			
3	x		x	x		x	x					
4	x	x									x	
5			x	x		x	x					

15EIZ04 ULTRASONIC INSTRUMENTATION
(Common to ALL Branches Except EIE)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To know the generation and detection of ultrasonic waves and to provide knowledge on the concepts of Ultrasonic Instrumentation.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Understand the applications of ultrasonic instrumentation
CO2: Characterize the ultrasonic waves
CO3: Analyze the sensors used in ultrasonic application
CO4: Apply the concepts to make simple applications
CO5: Model and analyze ultrasonic systems.

UNIT I ULTRASONIC WAVE CHARACTERISTICS (9)

Principles and propagation of various waves, Characterization of ultrasonic transmission, Reflection and Transmission coefficients, Intensity and attenuation of sound beam.

UNIT II GENERATION/DETECTION OF ULTRASONIC WAVES (9)

Magnetostrictive and piezoelectric effects, Detection of Ultrasonic Waves: Mechanical, Optical and Electrical Method, Precise Measurement: Pulse– echo Overlap, Cross correlation

UNIT III ULTRASONIC TEST METHODS (9)

Ultrasonic test methods: pulse echo, transit time, resonance, direct contact and immersion type and ultrasonic methods of flaw detection.

UNIT IV ULTRASONIC MEASUREMENTS (9)

Ultrasonic measurements: ultrasonic methods of measuring thickness, depth and flow, variables affecting ultrasonic testing in various applications.

UNIT V ULTRASONIC APPLICATIONS (9)

Ultrasonic methods of flaw detection, Flow meters, Density measurement, Viscosity measurement, Level measurement, Sensor for Temperature and Pressure measurements, Measuring thickness, Depth, Rail Inspection, SONAR, Inspection of Welds and defect detection in welds

TOTAL :(L: 45) = 45 PERIODS

TEXTBOOKS:

1. Baldev Raj, V.Rajendran, P.Palanichamy, “Science and Technology of Ultrasonics”,Alpha Science International, UK, 2004.
2. LawrenceE.Kinsler, Austin R.Frey, Alan B.Coppens, James V. Sanders, “Fundamentals of Acoustics,” John Wiley and Sons Inc,USA, 2000.

REFERENCES:

1. J.David N.Cheeke,”Fundamentals and Applications of Ultrasonic Waves,” CRC Press, Florida, 2002
2. L.A. Bulavin, YU.F.Zabashta, “Ultrasonic Diagnostics in Medicine,” VSP, Koninklijke, Brill,Boston, 2007.
3. Emmanuel P. Papadakis, “Ultrasonic Instruments and Devices”Academic Press,1999.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1				x			x	x				
2						x	x		x			
3	x		x	x		x	x					
4	x	x									x	
5			x	x		x	x					

15ITZ01 - PC HARDWARE AND TROUBLE SHOOTING

(Common to All branches except IT Branchs)

L	T	P	C
3	0	0	3

OBJECTIVE:

- This course will provide participant a much needed knowledge of computer hardware and networking, enabling them to identify and rectify the onboard computer hardware, software and network related problems.
- Upgrading of existing hardware / software as and when required. The main aspect of this program is to eliminate cost for the computer engineer boarding the vessel for troubleshoot, install / configure the application program and network related problems and there by charging exorbitant fees to ship owners / managers.

COURSE OUTCOMES:

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

CO1: Disassemble and reassemble a working computer Handle and repair

CO2 : Establish a local computer network & Load and configure a working Windows Operating System

CO3 : Make minor repairs and upgrades to a laptop computer& evaluate a computer system for individual customers, making suggestions to optimize the system for the individual

CO4 : Implement the design using Objective C and Ios

CO5 : Configure the power management features on a computer system, Troubleshoot, configure and repair printers.

UNIT I INTRODUCTION (9)

Introduction - Computer Organization – Number Systems and Codes – Memory – ALU – CU – Instruction prefetch – Interrupts – I/O Techniques – Device Controllers - Error Detection Techniques – Microprocessor – Personal Computer Concepts – Advanced System Concepts – Microcomputer Concepts – OS – Multitasking and Multiprogramming – Virtual Memory – Cache Memory – Modern PC and User.

UNIT II PERIPHERAL DEVICES (9)

Introduction – Keyboard – CRT Display Monitor – Printer – Magnetic Storage Devices – FDD – HDD – Special Types of Disk Drives – Mouse and Trackball – Modem – Fax Modem – CD ROM Drive – Scanner – Digital Camera – DVD – Special Peripherals.

UNIT III PC HARDWARE OVERVIEW (9)

Introduction – Hardware BIOS DOS Interaction – The PC family – PC hardware – Inside the System Box – Motherboard Logic – Memory Space – Peripheral Interfaces and Controllers – Keyboard Interface – CRT Display interface – FDC – HDC.

UNIT IV INSTALLATION AND PREVENTIVE MAINTENANCE (9)

Introduction – system configuration – pre installation planning – Installation practice – routine checks – PC Assembling and integration – BIOS setup – Engineering versions and compatibility – preventive maintenance – DOS – Virus – Data Recovery.

UNIT V TROUBLESHOOTING (9)

Introduction – computer faults – Nature of faults – Types of faults – Diagnostic programs and tools – Microprocessor and Firmware – Programmable LSI's – Bus Faults – Faults Elimination process – Systematic Troubleshooting – Symptoms observation and analysis – fault diagnosis – fault rectification – Troubleshooting levels – FDD, HDD, CD ROM Problems.

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOK:

1. B. Govindarajalu, "IBM PC Clones Hardware, Troubleshooting and Maintenance", 2/E, TMH, 2002.

REFERENCES:

1. Peter Abel, Niyaz Nizamuddin, “IMB PC Assembly Language and Programming”, Pearson Education, 2007.
2. Scott Mueller, “Repairing PC's”, PHI,1992

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	
1							x	x	x		x	
2				x								
3		x							x			
4		x		x			x			x	x	
5		x	x		x		x	x			x	

15ITZ02 - CYBERCRIME INVESTIGATIONS AND DIGITAL FORENSICS

(Common to All branches except IT Branch)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To give knowledge of constitutional and case law to search and capture digital evidence, determine the most effective and appropriate forensic response strategies to digital evidence, and provide effective proof in a case involving digital evidence.

COURSE OUTCOMES:

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

CO1: To have various ideas about cybercrime.

CO2: To have knowledge of the various issues of cybercrime.

CO3 : To investigate and find the cybercrime.

CO4: To identify the cybercrime.

CO5: To have clear idea of the various laws and acts.

UNIT I INTRODUCTION **(9)**

Introduction and Overview of Cyber Crime - Nature and Scope of Cyber Crime - Types of Cyber Crime: Social Engineering - Categories of Cyber Crime - Property Cyber Crime.

UNIT II CYBER CRIME ISSUE **(9)**

Unauthorized Access to Computers - Computer Intrusions - White collar Crimes - Viruses and Malicious Code - Internet Hacking and Cracking - Virus Attacks – Software Piracy - Intellectual Property - Mail Bombs - Exploitation - Stalking and Obscenity in Internet - Digital laws and legislation - Law Enforcement Roles and Responses.

UNIT III INVESTIGATION **(9)**

Introduction to Cyber Crime Investigation - Investigation Tools – Discovery - Digital Evidence Collection - Evidence Preservation - E-Mail Investigation – Tracking - IP Tracking - E-Mail Recovery - Hands on Case Studies - Encryption and Decryption Methods - Search and Seizure of Computers - Recovering Deleted Evidences - Password Cracking.

UNIT IV DIGITAL FORENSICS **(9)**

Introduction to Digital Forensics - Forensic Software and Hardware - Analysis and Advanced Tools - Forensic Technology and Practices - Forensic Ballistics and Photography - Face, Iris and Fingerprint Recognition - Audio Video Analysis - Windows System Forensics - Linux System Forensics - Network Forensics.

UNIT V LAWS AND ACTS **(9)**

Laws and Ethics - Digital Evidence Controls - Evidence Handling Procedures - Basics of Indian Evidence ACT IPC and CrPC - Electronic Communication Privacy ACT - Legal Policies.

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. Nelson Phillips and Enfinger Steuart, —Computer Forensics and Investigationsll, Cengage Learning, New Delhi, 2009.
2. Kevin Mandia, Chris Prosise, Matt Pepe, —Incident Response and Computer Forensics —Tata McGraw - Hill, New Delhi, 2006.

REFERENCES:

1. Robert M Slade, Software Forensics , Tata McGraw Hill, New Delhi, 2005.
2. Bernadette H Schell, Clemens Martin, —Cybercrime, ABC – CLIO Inc, California, 2004.
3.Understanding Forensics in IT — NIIT Ltd, 2005.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	
1							x	x	x			
2				x			x		x			
3						x			x			
4				x		x				x	x	
5			x		x		x	x			x	

15ITZ03 - DEVELOPING MOBILE APPS

(Common to All branches except IT Branch)

L	T	P	C
3	0	0	3

OBJECTIVE:

- Understand system requirements for mobile applications.
- Generate suitable design using specific mobile development frameworks.
- Generate mobile application design.
- Implement the design using specific mobile development frameworks.
- Deploy the mobile applications in marketplace for distribution.

.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: Describe the requirements for mobile applications

CO2: Explain the challenges in mobile application design and development

CO3: Implement the design using Android SDK

CO4: Implement the design using Objective C and iOS

CO5: Deploy mobile applications in Android and iPone marketplace for distribution

UNIT I INTRODUCTION **(9)**

Introduction to mobile applications – Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications.

UNIT II BASIC DESIGN **(9)**

Introduction – Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – User interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security, availability and modifiability.

UNIT III ADVANCED DESIGN **(9)**

Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment – Design patterns for mobile applications.

UNIT IV TECHNOLOGY I - ANDROID **(9)**

Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and Wifi – Integration with social media applications.

UNIT V TECHNOLOGY II - IOS **(9)**

Introduction to Objective C – iOS features – UI implementation – Touch frameworks – Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application – Using Wifi - iPhone marketplace.

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. http://developer.android.com/develop/index.html.

2. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012

REFERENCES:

1. Charlie Collins, Michael Galpin and Matthias Kappler, “Android in Practice”, DreamTech,2012
2. James Dovey and Ash Furrow, “Beginning Objective C”, Apress, 2012
3. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, “Beginning iOS 6 Development: Exploring the iOS SDK”, Apress, 2013.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	
1								x				
2					x		x					
3		x				x			x			
4				x		x		x		x	x	
5			x		x		x	x			x	

15ITZ04 - SOFTWARE PROJECT MANAGEMENT

(Common to All branches except IT Branch)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To plan and manage projects at each stage of the software development life cycle (SDLC).
- To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.
- To understand successful software projects that support organization's strategic goals.

.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: Evaluate and select the most desirable projects & Identify desirable characteristics of effective project managers.

CO2: Apply appropriate approaches to plan a new project.

CO3: Apply appropriate methodologies to develop a project schedule.

CO4: Develop a suitable budget for a new project & Identify important risks facing a new project.

UNIT I INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT (9)

Project Definition – Contract Management – Activities Covered By Software Project Management – Overview Of Project Planning – Stepwise Project Planning.

UNIT II PROJECT EVALUATION (9)

Strategic Assessment – Technical Assessment – Cost Benefit Analysis –Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation.

UNIT III ACTIVITY PLANNING (9)

Objectives – Project Schedule – Sequencing and Scheduling Activities –NetworkPlanning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning And Control.

UNIT IV MONITORING AND CONTROL (9)

Creating Framework – Collecting The Data – Visualizing Progress – Cost Monitoring – Earned Value – Priortizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types Of Contract – Stages In Contract Placement – Typical Terms Of A Contract – Contract Management – Acceptance.

UNIT V MANAGING PEOPLE AND ORGANIZING TEAMS (9)

Introduction – Understanding Behavior – Organizational Behaviour: A Background –Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation– The Oldman – Hackman Job Characteristics Model – Working In Groups – Becoming A Team –Decision Making – Leadership – Organizational Structures – Stress – Health And Safety – Case Studies.

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOK:

1. Bob Hughes, Mikecotterell, “Software Project Management”, Third Edition, Tata McGraw Hill, 2004.

REFERENCES:

1. Ramesh, Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
2. Royce, “Software Project Management”, Pearson Education, 1999.
3. Jalote, “Software Project Management in Practice”, Pearson Education, 2002.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	
1	x							x	x			
2			x				x					
3		x				x			x			
4	x			x				x		x	x	
5			x		x		x	x			x	

15MEZ01 SIX SIGMA

(Common to All Branches except Mechanical Engineering)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To introduce the techniques and phases of six sigma
- To acquire knowledge on design for six sigma during product development stage
- To introduce the lean concepts in service sectors

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Formulate the six sigma project definition for process improvement in an industry
CO2: Summarize the stages in preparation of technical requirements and team formation
CO3: Create a project definition document and/or assess the process condition through collected data
CO4: Apply the six sigma tools the analyze the process parameters and/or identify the scope for process improvement
CO5: Recommend a system to sustain the results and/or list the tools in design for six sigma and lean servicing

UNIT I : INTRODUCTION **(9)**

Overview of Six Sigma and Lean Manufacturing - 6 sigma, TQM & MBNQA - common terms - organizational success factors - leadership, strategic initiative - internal communication - launching of 6 sigma - organizational structure - six sigma training plan - project selection - assessing organizational readiness - common pitfalls - work as a process - vertical functions and horizontal processes.

UNIT II : PREPARATION PHASE **(9)**

Voice of the customer - importance, identify the customer, collect VOC data, Critical-to-Quality customer requirements - project management - challenges - project culture - project management processes - team typing-team stages - understanding team dynamics - forming, storming, norming, performing, characteristics of effective teams.

UNIT III : DEFINE AND MEASURE PHASE **(9)**

DMAIC Phases - define phase overview - project charter - voice of the customer - high level process map - project team - measure phase overview - statistical methods - normal distribution - Population Parameters Vs Sample Statistics - sampling plan - data collection plan - choosing statistical software - measure tools - measurements - cost of poor quality - probability distributions - measurement system analysis - Process Capability.

UNIT IV: ANALYZE AND IMPROVE PHASE **(9)**

Overview - process analysis - hypothesis testing - statistical tests and tables - tools for analyzing relationships among variables - survival analysis - improve phase overview - process redesign - generating improvement alternatives - design of experiments - pilot experiments - Cost/Benefit Analysis - implementation plan - card one case study improve phase results.

UNIT V : CONTROL PHASE, DESIGN FOR SIX SIGMA AND LEAN SERVICING **(9)**

Control phase overview - control plan - process scorecard - failure mode and effects analysis - SPC Charts - final project report and documentation - design for six sigma overview - DFSS Tools - Quality Function Deployment - TRIZ - Lean Production Overview - lean servicing concepts - getting started with lean - continuous flow production.

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. Michael L George, David T Rowlands, and Bill Kastle, “What is Lean Six Sigma”, McGraw Hill, New York, 2004
2. Betsi Harris Ehrlich, “Transactional Six Sigma and Lean Servicing”, St. Lucie Press, 2002.

REFERENCES:

1. Kai Yang and Basem El Haik, “Design for Six Sigma”, McGraw Hill, New York, 2004
2. Thomas Pyzdek, “Six Sigma Handbook: Complete Guide for Green belts, Black belts and Managers at All Levels”, Tata McGraw Hill Companies Inc, 2003
3. Donald W Benbow and Kubiak T M, “Certified Six Sigma Black Belt Handbook”, Pearson Education, 2007
4. Urdhwarashe, “Six Sigma for Business Excellence”, 1st ed., Pearson Education India, 2010
5. Gopalakrishnan. N, “Simplified Six Sigma: Methodology, Tools and Implementation, Prentice Hall India, 2012.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x						x			x
2	x	x	x		x		x		x		x	x
3	x	x	x		x		x		x		x	x
4	x	x	x	x	x		x		x		x	x
5	x	x	x	x	x		x		x		x	x

15MEZ02 PROJECT MANAGEMENT
(Common to All Branches except Mechanical Engineering)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To gain knowledge about project, project management and its basics
- To know stages of project management in an organization
- To understand the roles and responsibilities of a project manager

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Demonstrate the skill set of a project manager
CO2: Develop skills in managing project works by effective team building
CO3: Strategize proper plan and premeditate the risks related to projects
CO4: Phase the project work as various stages and develop skills to control the project
CO5: Apply project management concepts by identifying and carrying out a real time project

UNIT I : PROJECTS, PROJECT MANAGEMENT AND PROJECT MANAGER (9)

Project Management - process context - interpersonal and behavioral context - organizational context - defining project success - responsibilities of project manager - common challenges expected to face - skill requirements and functional competencies - unofficial job duties - value of introspection and self-awareness to the soft side

UNIT II : PROJECT DEFINITION, EFFECTIVE TEAM BUILDING (9)

Evolution of projects - understanding the problem - identification of optimum solution - development of solution and preliminary plan - formal launching of project - evaluation of political environment - mechanics of building a team - team leadership - fostering teamwork and synergism - getting the most from team members

UNIT III : PROJECT PLANNING, RISK AND UNCERTAINTY (9)

Project Planning - estimating - scope management - time management - cost management - project management software - understanding risk and uncertainty - managing risk - identifying what can hurt you - quantifying how badly you can get hurt - analyzing the biggest threats - responding to high-threat problems - accommodating uncertainty

UNIT IV: PROJECT CONTROL AND INTERFACES (9)

Project Control - Establishing a Baseline of Measurement - Information Needs - Information Gathering - ensuring Good Information - Analyzing the Information - Reacting to the Information - Project Interfaces - Roles of Internal Stakeholders and External Stakeholders - Other Interfaces - Considerations in Interface Management

UNIT V : PROJECT COMMUNICATION, DOCUMENTATION AND CONCLUSION (9)

Configuration plan - documentation and communication road map - methods of communicating - guidelines for effective communication - conducting high quality meetings - communication skills - key project documentation - early termination - key elements in project closure - punch list approach - project completion checklist

TOTAL (L:45) : 45 PERIODS

TEXTBOOKS:

1. Gary R. Heerkens, "Project Management", 2nd ed., McGraw-Hill Book Company, 2013

REFERENCES:

1. Harold Kerzner, "Project Management", 12th ed., John Wiley & Sons, 2017
2. John M Nicholas, Herman Steyn, "Project Management for Engineering, Business and Technology", 5th ed., Taylor&Francis, 2016
3. Prasanna Chandra, "Projects : Planning, Analysis, Selecting, Financing, Implementation and Review", 8th ed., McGraw Hill Education, 2017
4. Eric W Larson and Clifford F Gray, Gautam V Desai, "Project Management: The Managerial Process", 6thed., McGraw Hill Education, 2017

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x			x			x			x
2	x		x		x		x		x		x	x
3	x		x		x		x		x		x	x
4	x	x	x	x	x		x		x		x	x
5	x	x	x	x	x		x		x		x	x

15MEZ03 ELECTRIC VEHICLE TECHNOLOGY

(Common to All Branches except Mechanical Engineering)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To introduce the working principles of batteries and their types
- To acquire knowledge on applications of alternative energy sources in vehicles
- To introduce the electrical drives, mathematical modeling and design considerations

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Differentiate the types of batteries which are used in electrical vehicles
CO2: List the types of alternative energy sources and/or working principles of fuel cells
CO3: Assess the potential of hydrogen energy in vehicles and energy storage techniques
CO4: Recommend an electrical drive and its controller in vehicular applications
CO5: Explain the concepts of electric vehicle modeling and design aspects

UNIT I : INTRODUCTION AND BATTERIES (9)

Types of electric vehicle - battery parameters - lead acid batteries - nickel based batteries - battery charging - designer‟s choice of battery - use of batteries in hybrid vehicles - battery modelling.

UNIT II : ALTERNATIVE ENERGY SOURCES AND FUEL CELLS (9)

Solar photovoltaics - wind power - flywheels - super capacitors - supply rails - hydrogen fuel cells - fuel cell thermodynamics - connecting cells in series - water and thermal management in PEM fuel cell.

UNIT III : HYDROGEN SUPPLY AND STORAGE (9)

Introduction - fuel reforming - fuel cell requirements, steam reforming, partial oxidation and autothermal reforming, further fuel processing, mobile applications - storage as hydrogen - chemical methods.

UNIT IV: ELECTRIC MACHINES AND CONTROLLERS (9)

Brushed DC electric motor - DC regulation and voltage conversion - brushless electric motors - motor cooling, efficiency, size and mass - electrical machines for hybrid vehicles.

UNIT V : ELECTRIC VEHICLE MODELLING AND DESIGN CONSIDERATIONS (9)

Introduction - tractive effort - modelling vehicle acceleration and electric vehicle range - simulations - aerodynamic considerations - rolling resistance - transmission efficiency - vehicle mass - general issues

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. James Larminie, John Lowry, “Electric Vehicle Technology Explained”, John Wiley & Sons Ltd., 2015
2. Iqbal Husain, “Electric and Hybrid Vehicles”, 2nd ed., CRC Press, 2010.

REFERENCES:

1. Mehrdad Ehsani, Yimin Gao, Ali Emadi, “Modern Electric, Hybrid Electric, and Fuel Cell Vehicles”, 2nd ed., CRC Press 2009
2. Chau.K.T, “Electric vehicle machines and drives”, Wiley-IEEE Press, 2015
3. James D Halderman, “Hybrid and Alternative Fuel Vehicles”, 3rd Revised edition, Pearson Education, 2012
4. Jingyu Yan , Huihuan Qian , Yangsheng Xu, “Hybrid Electric Vehicle Design and Control”, McGraw-Hill Professional Publishing, 2013
5. Chris Mi; M. Abul Masrur and David Wenzhong Gao, “Hybrid Electric Vehicles”, John Wiley & Sons, 2011

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x		x		x				x	x
2	x		x		x		x				x	x
3	x		x		x		x				x	x
4	x		x		x		x				x	x
5	x		x		x		x				x	x

15MEZ04 VALUE ENGINEERING

(Common to All Branches except Mechanical Engineering)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To introduce the concept of value engineering for eliminating the unnecessary costs of a product
- To acquire knowledge on various value engineering techniques, team dynamics and job plan
- To introduce the financial aspects and human factors of value engineering

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Estimate the value of a product and/or identify the primary and secondary functions of a product
CO2: Determine the cost, worth of a product and their elements
CO3: Demonstrate the value engineering techniques for industrial applications
CO4: Summarize the stages in team dynamics and value engineering job plan
CO5: Illustrate the financial aspects and human factors of value engineering

UNIT I : VALUE AND FUNCTION (9)

Seven types values - economic value - cost, use, esteem and exchange values - mathematical model of value - types and levels of functions - function identification - method of finding functions of a product - case study - vocabulary of verbs and nouns.

UNIT II : COST AND WORTH (9)

Cost and price - elements of cost - direct material, direct labour, direct expenses, overheads - calculation of cost - case study - method of determining function cost - evaluation of worth - guidelines to find out worth - value gap and value index.

UNIT III : VALUE ENGINEERING TECHNIQUES (9)

Brainstorming and Gordon techniques - feasibility ranking - morphological analysis technique - ABC analysis - probabilistic approach - make or buy - function-cost-worth analysis - FAST - weighted evaluation method - evaluation matrix - life cycle cost.

UNIT IV: TEAM DYNAMICS AND JOB PLAN (9)

Team structure - team building - physical, intellectual, spiritual transformations - job plan - orientation phase - information phase - function phase - creative phase - evaluation phase - recommendation phase - implementation phase - audit phase.

UNIT V : FINANCIAL ASPECTS AND HUMAN RELATION (9)

Break-even point - payback period - return on investment - discounted cash flows - balance sheet and profit and loss account - human aspects in value engineering - individual ego states - techniques of transactions - human interactions - Managerial grid

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. Mukhophadhyaya A K, "Value Engineering", Sage Publications Pvt. Ltd., New Delhi, 2003
2. Mukhophadhyaya A K, "Value Engineering Mastermind", Sage Publications Pvt. Ltd., New Delhi, 2009

REFERENCES:

1. Richard J Park, "Value Engineering - A plan for inventions", St.Lucie Press, London, 1998.
2. Iyer. S. S, "Value Engineering: A How to Manual", 3rd ed., New age publishers, 2009
3. Larry W Zimmesman. P E , "VE - A Practical approach for owners designers and contractors", 1st ed., CBS Publishers, Delhi, 1992
4. Theodore C. Fowler, "Value Analysis in Design", John Wiley & Sons, 1997
5. Arthus E Mudge, "Value Engineering", McGraw Hill book company, 1971

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x			x				x			x
2	x	x			x				x		x	x
3	x	x			x				x		x	x
4	x	x			x				x		x	x
5	x	x			x				x		x	x

15MYZ01- MATHEMATICAL STRUCTURES

(Common to All Branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand the basic concepts of logic and their applications.
- To give you a familiarity with rigour and a grounding in the art of formal reasoning.
- To understand the concepts of sets and relations.
- To understand basic concepts of functions.
- To understand the characteristic of a group and the coset

.

COURSE OUTCOMES:

At the end of this course, the students would know

CO1 : To extend the logical and mathematical ability to deal with abstraction.
CO2 : Be aware of counting principle
CO3 : Exposed to concepts and properties of set theory
CO4 : Identify and analyze the basic proofs involving functions.:
CO5 : Be exposed to concepts and properties of algebraic structures such as Semi groups

UNIT I - PROPOSITIONAL CALCULUS **(9)**

Propositions - Logical connectives-Compound propositions - Conditional and biconditional propositions - Truth tables - Tautologies and Contradictions - Logical and Equivalences and implications - DeMorgan's Laws - Normal forms

UNIT II – PREDICATE CALCULUS **(9)**

Predicates - Statement Function – Variables - free and bound variables – Quantifiers - Universe of discourse -Logical equivalences and implications for quantified statements

.

UNIT III – SET THEORY **(9)**

Cartesian product of sets- Relations of sets-Types of relations and their properties – Relational matrix and the graph of a relation- Equivalence relations – Partial ordering – Poset – Hasse diagram.

UNIT IV – FUNCTIONS **(9)**

Definition – Classification of functions – Composition of functions – Inverse functions – Binary and n-ary operations – Characteristic function of a set..

.

UNIT V – ALGEBRAIC STRUCTURES **(9)**

Algebraic systems - Semi groups and monoids - Groups – Subgroups - Homomorphisms – Normal subgroup and coset – Lagrange's theorem..

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. **Tremblay J.P and Manohar R**, "Discrete Mathematical Structures with Applications to Computer Science" ,Tata McGraw-HILL, New Delhi, ,30th Reprint 2011.
2. **Veerarajan.T,** "Discrete Mathematics with Graph Theory and Combinatorics", Fourth Edition, Tata McGraw Hill , New Delhi, Reprint 2013.

REFERENCES:

1. **Kenneth H.Rosen**, "Discrete Mathematics and its Applications", Fifth Edition, Tata McGraw- Hill publications, New Delhi 2012.
2. **Venkatraman M.K.,** "Discrete Mathematics", The National Publishing Company, Chennai,2007.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x									
2	x	x		x								x
3	x		x				x					
4	x	x					x		x			
5	x	x	x								x	

Approved by Seventh Academic Council

15MYZ02- OPTIMIZATION TECHNIQUES

(Common to All Branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To provide the concept and an understanding of basic concepts in Operations Research.
- To understand, develop and solve mathematical model of Transport and assignment problems.
- To understand, develop and solve mathematical model of linear programming problems.
- To provide Techniques for Analysis and Modeling in Computer Applications.
- To understand network modeling for planning and scheduling the project activities

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1 : Construct and solve linear programming models to answer business optimization
CO2 : Apply transportation and assignment models to find optimal solution in warehousing and Travelling.
CO3 : Prepare project scheduling using PERT and CPM.
CO4 : Appraise theoretical predictions obtained from Game Theory analyses against real world conflicts.
CO5 : Identify and analyze appropriate queuing model to reduce the waiting time in queue

.

UNIT I - LINEAR PROGRAMMING MODELS **(9)**

Mathematical Formulation - Graphical Solution of Linear Programming Models - Simplex Method - Big-M Method

UNIT II – TRANSPORTATION AND ASSIGNMENT MODELS **(9)**

Mathematical Formulation of Transportation Problem - Methods for Finding Initial Basic Feasible Solution: North West Corner Rule, Least Cost Method, VAM - Optimum solution – Mathematical Formulation of Assignment Models.

UNIT III – PERT AND CPM **(9)**

Network Construction – Critical Path Method – Project Evaluation and Review Technique

UNIT IV– GAME THEORY **(9)**

Definition - Pay-off - Two Person Zero - Sum Games -The Maximin - Minimax Principle - Games without Saddle Points (Mixed Strategies) - 2x2 Games without Saddle Points - Graphical Method for 2xn or mx2 Games.

UNIT V – QUEUING MODELS **(9)**

Characteristics of Queuing Models – Poisson Queues – (M/M/1): (FIFO/∞/∞), (M/M/1): (FIFO/N/∞), (M/M/C): (FIFO/∞/∞), (M/M/C) : (FIFO/N/∞) Models.

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. Taha, H.A. “Operations Research: An Introduction”, 8th Edition, Pearson Education, 2008.
2. V.Sundaresan, K.S.Ganapathy Subramanian, K.Ganesan, ”Resource Management Techniques”, A.R.Publication, 2002.

REFERENCES:

1. A .M. Natarajan, P. Balasubramani, A.Tamilarasi, “Operations Research” , Pearson Education, Asia, 2005.
2. Prem Kumar Gupta , D.S. Hira “Operations Research”, S. Chand & Company Ltd., New Delhi, Third Edition, 2003.
3. Manmohan .,Kandi swarp.,Gupta., “Operations Research”,Sultan Chand & Sons(first edition),New delhi.”.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x								x
2	x	x					x		x		x	x
3	x	x	x			x					x	
4	x		x								x	x
5	x								x		x	x

Approved by Seventh Academic Council

15MYZ03- STATICS FOR ENGINEERS
(Common to All Branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To Aware knowledge of parallel forces
- To know the concept of equilibrium of forces.
- To acquire the knowledge of moments and couples.
- To know resultant of co-planar forces acting on a rigid body.
- To learn the necessary and sufficient conditions of equilibrium.
-

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1 : Knowledge about different types of forces and their resultant
CO2 : To bring the polygon of forces to be in equilibrium.
CO3 : Moments and couples of parallel forces.
CO4 : To know about co-planar forces.
CO5 : Necessary and sufficient conditions to bring the equilibrium of forces.

UNIT I - TYPES OF FORCES **(9)**

Forces acting at a point – Parallelogram law – triangle law

UNIT II – EQUILIBRIUM OF FORCES **(9)**

(λ, μ) theorem – Polygon of forces – conditions of equilibrium.

UNIT III – MOMENTS AND COUPLES **(9)**

Parallel forces – Moments and couples composition of parallel forces (like and unlike).

UNIT IV – CO-PLANAR FORCES **(9)**

Moment of a force about a point – Varignons theorem – Co-planar forces acting on a rigid body – Theorem on three co-planar forces in equilibrium

UNIT V – REDUCTION OF A SYSTEM OF CO-PLANAR FORCES **(9)**

Reduction of a system of co-planar forces to a single force and a couple – necessary and sufficient conditions of equilibrium only – Equation to the line of action of the resultant.

TOTAL (L:45) : 45 PERIODS

TEXT BOOK:

1. M.K.Venkataraman, Statics, Agasthiar Publications, Trichy, 1999

REFERENCES :

1. A.V.Dharmapadam, Statics, S.Viswanathan Printers and Publishing Pvt., Ltd, 1993.

2 P.Duraipandian and Laxmi Duraipandian, Mechanics, S.Chand and Company Ltd, Ram Nagar, New Delhi-55,

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x		x			x		x	
2	x	x	x	x		x			x		x	
3	x	x	x	x		x			x		x	
4	x	x	x	x		x			x		x	
5	x	x	x	x		x			x		x	

15MYZ04- STATISTICS FOR ENGINEERS
(Common to All Branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To assess the validity of statistical conclusions.
- To determine the outcomes and probabilities for experiments.
- To Understand how to develop Null and Alternative Hypotheses
- To understand difference between Parametric and Nonparametric Statistical Procedures.
- To estimate the relationships among variables

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1 : The fundamental knowledge of basic statistics and probability distribution concepts.
CO2 : Empirical distribution of sample means is closer to bell shaped when the size of the sample increases.
CO3 : The knowledge of test of Hypothesis as well as to calculate confidence limits for a given population parameter for single sample and two sample cases.
CO4 : Various methods of non parametric tests and concepts related to the testing of hypothesis.
CO5 : The application of correlation, regression and time series analysis in various aspects.

UNIT I INTRODUCTION TO STATISTICS **(9)**

Statistics – Definition, Types. Types of variables – Organizing data – Descriptive Measures: Mean, Median, Mode, Standard Deviation, Mean Deviation.

UNIT II INTRODUCTION TO PROBABILITY **(9)**

Basic definitions and rules for probability - conditional probability - independence of events - Probability distributions: Binomial, Poisson and Normal distributions.

UNIT III TESTING OF HYPOTHESIS **(9)**

Hypothesis testing: one sample and two sample tests for means and proportions of large samples(z-test), one sample and two sample tests for means of small samples (t-test), F-test for two sample standard deviations. ANOVA one way and two ways.

UNIT IV NON-PARAMETRIC METHODS **(9)**

Chi-square test for single sample standard deviation. Chi-square tests for independence of attributes and goodness of fit. Rank sum test. Kolmogorov – Smirnov – test for goodness of fit, comparing two populations. Mann – Whitney U test and Kruskal Wallis test.

UNIT V CORRELATION, REGRESSION AND TIME SERIES ANALYSIS **(9)**

Correlation analysis, estimation of regression line. Time series analysis: variations in time series, Trend analysis, Cyclical variations, seasonal variations and irregular variations (Self-study).

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. Richard I.Levin, David S.Rubin, Statistics for Management, 7th Ed, 2011.
2. Aczel A.D. and Sounderpandian J., Complete Business Statistics 6th edition, Tata McGraw – Hill, Publishing company Ltd, New Delhi, 2012.

REFERENCES:

1. Srivatsava TN and Shailaja rego, Statistics for Management Tata McGraw Hill, 2008.
2. Ken Black, Business Statistics, 6th Ed., Wiley India Edition, 2009.
3. Anderson D.R. Sweeney D.J. and Williams T.A., Statistics for business and economics, 9th edition, Thomson (South- Western) Asia, Singapore, 2012.
4. N.D.Vohra, Business Statistics, Tata McGraw Hill, 2012.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x					x		x	
2	x	x	x		x	x	x			x	x	
3	x	x	x			x	x				x	
4	x	x	x	x					x	x	x	
5	x	x	x		x	x					x	

Approved by Seventh Academic Council

15PYZ01- NANOMATERIALS
(Common to All Branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To provide basic knowledge about nanomaterials
- To understand the properties of nanomaterials and the mechanisms used in characterization
- To provide in-depth knowledge in characterization of nanomaterials in engineering and biology.
- To provide knowledge various testing mechanisms adopted for nanomaterials
- To understand the ways of full utilization of nanomaterials in various fields

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1 : Acquire knowledge of basics of nanomaterials
CO2 : Understand the peculiar properties of nanomaterials
CO3 : Know the various microscopy techniques involved in analysis of nanomaterials
CO4 : Understand the synthesis of different types of nanomaterials
CO5 : Appreciate the application of nanomaterials in engineering and biology

UNIT I - FUNDAMENTAL PRINCIPLES OF NANOMATERIALS **(9)**

Size & scale, units, scaling Laws, atoms, molecules & clusters, super molecules, nanoscale phenomena; Tunneling, Chemical Bonds (types and strength); Intermolecular forces, molecular and crystalline structures; Hierarchical structures and functionality; Surfaces and interfaces, bulk to surface transition, self-assembly and surface reconstruction.

UNIT II – PROPERTIES OF NANO MATERIALS **(9)**

Size dependence of properties, phenomena and properties at nanoscale; Mechanical/frictional, optical, electrical transport; Magnetic properties.

UNIT III – SYNTHESIS OF NANOMATERIALS **(9)**

Fabrication techniques: Self-assembly, self-replication, sol-gels; Langmuir-Blodgett thin films, nanolithograph, bio-inspired syntheses, microfluidic processes; Chemical vapor deposition; Semiconductors, cadmium sulfide, silicon, fullerenes carbon nanotubes; Nano-composites, nanoporous materials, biological materials.

UNIT IV –NANOMATERIAL CHARACTERIZATION **(9)**

Electron microscopy, scanning probe microscopies, near field microscopy, micro- and near field Raman spectroscopy, surface-enhanced Raman, spectroscopy, X-ray photoelectron spectroscopy.

UNIT V –APPLICATIONS OF NANOMATERIALS **(9)**

Nanoelectronics, Nanosensors, environmental, biological, energy storage and fuel cells.

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1 Edelstein A. A. and Cammarata R .C., "Nanomaterials- Synthesis, Properties and Applications", Institute of Physics Publishing, 1998.
2 Nalwa H.S., "Handbook of Nanostructured Materials and Nanotechnology", Vols. 1- 5, Academic Press 2000.

REFERENCES:

1. Benedek et al G., "Nanostructured Carbon for Advanced Applications", Kluwer Academic Publishers 2001.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x											
2	x											
3					x							
4	x				x							
5	x											

15PYZ02- NUCLEAR PHYSICS AND REACTORS
(Common to All Branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To provide knowledge of building block of nature –Nuclei –and its interaction with light
- To provide knowledge about the various reactors and power generation
- To empower knowledge in core science of reactor designing.
- To provide the understanding of different types of reactors
- To provide understanding of effective methods to utilize the nuclear energy

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1 : Acquire knowledge regarding fundamentals of nuclear reactions
CO2 : Understand the interaction of light with matter
CO3 : Acquire the knowledge about power generation form nuclear reactions
CO4 : Understand the mechanisms involved in reactor designing
CO5 : Enhance knowledge of thermal energy generation and reactor safety

UNIT I - STRUCTURE OF NUCLEI AND REACTIONS **(9)**

Fundamental particles, structure of nuclei; Binding Energy – nuclear stability – radioactive decay-nuclear reactions

UNIT II – INTERACTION OF RADIATION WITH MATTER **(9)**

Neutron interactions- energy loss in scattering collisions. Nuclear fission reaction- gamma ray interaction with matter-charged particles.

UNIT III – NUCLEAR REACTOR AND NUCLEAR POWER **(9)**

Fission chain reaction – reactor fuels. Nuclear power resources- power plants –nuclear reactors

UNIT IV–NUCLEAR REACTOR THEROY **(9)**

One group reactor equation –slab reactor –thermal reactor –reflected reactor

UNIT V –HEAT REMOVAL FROM NUCLEAR REACTORS **(9)**

Heat generations in reactors – heat flow in reactors, heat transfer mechanism. Radiation shielding: Gamma ray shielding, nuclear reactor shielding.

TOTAL (L:45) : 45 PERIODS

TEXT BOOK:

1. Leroy Murray Raymond, :Nuclear Reactor Physics", Prentice Hall

REFERENCE:

1. R. Lamarsh John, J. Baratta Anthony, "Introduction to Nuclear Engineering".

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x											
2			x		x							
3			x				x					
4	x				x							
5	x											

Approved by Seventh Academic Council

15PYZ03- SPACE SCIENCE AND TECHNOLOGY
(Common to All Branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To provide basics of space technology
- To give a knowledge of Space transportation systems
- To provide the understanding of transportation and satellite communication
- To understand the various space programs undertaken by international organizations
- To provide knowledge of application of space technology and manned missions

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1 : Acquire knowledge about classical theory of satellite orbits.
CO2 : Understand the rocket transportation to space.
CO3 : Acquire the applications of satellite communication and navigation.
CO4 : Appreciate the applications of space technology changed human life.
CO5 : Understand the importance of manned mission.

UNIT I - EARTH AND ORBITING SATELLITES **(9)**

Basic principles -Keplerian orbits and Kepler equations. Orbital elements, from velocity and position information. Perturbation theory and applications, Data receiving and handling

UNIT II – ROCKETS AND ROCKET PROPULSION **(9)**

Rockets and rocket propulsion, liquid fuels, solid fuels, Electromagnetic propulsion, Ion propulsion, Important satellite launching stations –Facilities at !SRO, NASA and ESRO Russian and Chinese facilities.

UNIT III – SATELLITE COMMUNICATION AND GPS **(9)**

Earth to satellite communication, Laser communication, Satellite to satellite communication Global navigation satellite systems, Application of GPS systems.

UNIT IV – APPLICATIONS OF SPACE TECHNOLOGY **(9)**

Physics of the earth's space, Solar observations in infrared, visible and X-rays, Communication satellite and applications, Earth resource monitoring, Remote sensing and others, Hubble space telescope. Military, applications, Weather satellite and applications.

UNIT V – MANNED FLIGHTS **(9)**

Manned flights to moon, Manned orbiting space crafts, NASA Space shuttles, Immunology and infection in space, The ISS and application, Russian space crafts, Skylab.

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

2. Space Science and Technology by Hans Mark, John Wiley and Sons.
3. The Cambridge encyclopedia of Space, missions, applications and exploration by Verger et at, Cambridge University Press 2003

REFERENCE BOOKS :

1. Space environment and it's interaction with spacecraft by C. Uberoi and S.C. Chakravorty, IISc — ISRO Educational Program
2. Introduction to GPS the global positioning system by El-Rabbany, Ahmed, London: Artech house

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x											
2	x		x		x							
3	x				x							
4	x				x							
5	x											

15CYZ01-CHEMISTRY FOR ENGINEERS
(Common to all branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

- Basic information and applications of chemistry in daily life.
- Imparting knowledge on basic concepts and applications of thermodynamics
- To know about the chemistry of building materials.
- To understand the concepts of phase rule and alloys
- To understand the principles and applications of photochemistry and nuclear chemistry.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO6 : Identify the role and importance of chemistry in daily life.
CO7 : Understand the thermodynamic and predict the feasibility of chemical reactions.
CO8 : Use the modern engineering tools for building materials and their industrial applications
CO9 : Acquire the knowledge of industrial importance of phase rule and alloys.
CO10 : Outline the principles and applications of photochemistry and nuclear chemistry.

UNIT I : CHEMISTRY IN DAILY LIFE **(9)**

Introduction – role and importance of chemistry in day to day life - Food additives - Fruits - vegetables - milk and egg - constituents and benefits - chemistry of soft drinks – adulterants - simple tests for the identification of adulterants in food stuffs – Fats and Oils – difference – analysis of fats and oils – saponification number – iodine number – principle and applications of green chemistry – safer solvents and auxiliaries

UNIT II : THERMODYNAMICS **(9)**

Thermodynamic process (isothermic, isobaric, isochoric and adiabatic process) – Internal energy – First law of thermodynamics (Mathematical derivation and limitation) – Enthalpy – Second law of thermodynamics - Entropy – Entropy change of an ideal gas and problems - Free energy - work function – Gibbs Helmoltz equation (derivation - applications –Third law and zeroeth law (only statements) – Van't Hoff isotherm (derivation only)

UNIT III : CHEMISTRY OF BUILDING MATERIALS **(9)**

Lime – classification – manufacture - properties of lime – Cement – classification – Portland cement – chemical composition – manufacture – setting and hardening – analysis of cement – concretes – weathering of concrete - special cements - gypsum – plaster of Paris – Glass – manufacture - types - properties and uses .

UNIT IV : PHASE RULE AND ALLOYS **(9)**

Statement and explanation of terms involved – one component system – water system – condensed phase rule – construction of phase diagram by thermal analysis – simple eutectic systems (lead – silver system only).

Alloys: Introduction- Definition- Properties of alloys- significance of alloying, Functions and effect of alloying elements - ferrous alloys – nichrome and stainless steel – heat treatment of steel, non-ferrous alloys – brass and bronze.

UNIT V : PHOTOCHEMISTRY & NUCLEAR CHEMISTRY **(9)**

Photochemistry: Laws of photochemistry–Einstein law and Lambert- Beer Law. Quantum efficiency – determination - Photo processes – Fluorescence - Phosphorescence, Chemiluminescence and Photo-sensitization. Nuclear chemistry**:** Nuclear decay – Half life period – Nuclear fission and fusion – Nuclear reactors – light water nuclear power plant – Applications of radioactivity.

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co.,New Delhi , 2012.
2. Ravikrishnan A., "Engineering Chemistry", Sri Krishna Hi-tech Publishing Company Pvt. Ltd.,Chennai, 2015.

REFERENCES:

1. Dara S.S.Umare S.S, “Engineering Chemistry”, S. Chand& Company Ltd., New Delhi 2014.
2. Puri B.R., Sharma L.R. and Pathania M.S., Principles of physical chemistry, ShobanLal Nagin Chand & Co., New Delhi
3. K. Karunakaran et al., “Engineering Chemistry”, Sonaversity, Sona College of Technology,Salem, 2014.

Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x					x						
2	x						x					
3	x		x									
4	x		x			x						
5	x					x						

15CYZ02- SOIL CHEMISTRY
(Common to all branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To build fundamental knowledge and skills of the students within the different areas of soil chemistry.
- To familiarize the students with the origin of soil, properties of soil and soil forming processes.
- To identify and describe physical, chemical and biological properties of soil that affect agricultural and non-agricultural land.
- To impart basic knowledge on pesticides and fertilizers
- To understand the basic concepts of biomass energy production from wastes.

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1 : Gain the fundamental knowledge about soil chemistry
CO2 : Understand the properties of soil.
CO3 : Understand the impact of soil fertility in agricultural processes.
CO4 : Gain the knowledge about pesticides and fertilizers.
CO5 : Apply the knowledge to develop energy recovering technology from bio wastes.

UNIT I : SOIL INTRODUCTION **(9)**

Soil – definition – Composition of soil - classification of soils – Soil forming rocks and minerals – Soil forming factors and processes –Chemical weathering–hydration–oxidation–reduction–hydrolysis–solution method.

UNIT II : SOIL PROPERTIES **(9)**

Important physical properties of soil – Soil texture – bulk density – particle density and soil porosity– their importance – Ion exchange in soil – anion exchange capacity – cation exchange capacity – Soil colloids – definition – types – soil inorganic colloids –layer silicate clays – amorphous minerals

UNIT III : SOIL FERTILITY AND BIO FERTILIZERS **(9)**

Soil organic matter – its composition and decomposition – effect of soil organic matter on soil fertility – Humus – formation of humus – maintenance of humus – Bio fertilizers – Introduction – types – importance – Nitrogen fixer – rhizobium – algal bio fertilizers – cyanobacteria.

UNIT IV : PESTICIDES AND FERTILIZER CHEMISTRY **(9)**

Pesticides – classification – Chloro pesticides (Methoxychlor) – organophosphorus pesticides (Parathion) – carbamate pesticides (corbaryl) – Fertilizers – nitrogen fertilizers (urea, ammonium nitrate) – phosphorus fertilizers (single super phosphate, triple super phosphate) – potassium fertilizers (potassium sulphate) – NPK fertilizers (diammonium phosphate)

UNIT V : AGRICULTURAL WASTE AS A BIOMASS **(9)**

Bioenergy from wastes – Introduction – agricultural wastes – sources – utilization as a fuel – Bio chemical conversion of organic wastes – anaerobic digestion – methane production – thermal liquefaction –liquid fuel production – sludge treatment – activated sludge process

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. Brady, N.C and Weil, R.R 2012. The Nature and properties of Soils (13th Ed.). Pearson Education.
2. Clair N Sawyer, Perry I. Mc Carty, Gene F Parkin, Chemistry for Environmental engineering and science, Tata Mc graw – Hill Edition, 2014.

REFERENCES:

1. A text book of Bio technology by S.C.Bhatia, Atlantic publishers – 2015.
2. Samuel L. Disdale, Werner L. Nelson, James D. Beaton, Soil fertility and fertilizers, 8th Edition, Pearson Publishers, 2013.
3. Biofuels from agricultural wastes and Byproducts by Hans Blascheck, Thaddeus Ezeji, Jurgen Scheffran John Wiley & Sons, 2010.

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3	x		x									
4	x		x			x						
5	x					x						

15CYZ03 - ORGANIC CHEMISTRY
(Common to all branches)

L	T	P	C
3	0	0	3

OBJECTIVES

- To understand the basic concepts of organic chemistry.
- To study the type of components in which organic reaction take place.
- To know the preparation ofthe essential organic compounds.
- To impart knowledge on synthetic routes to many types of industrially important organic compounds and their characterization.
- To gain knowledge on carbohydrates, amino acids and proteins

COURSE OUTCOMES

At the end of this course, the students will be able to

CO1 : Apply knowledge of fundamental concepts of organic chemistry.
CO2 : Gain basic principles involved in different chemical synthesis and apply them in chemical industries.
CO3 : Outline the importance of pharmaceutical chemistry.
CO4 : Discuss carbohydrates, amino acids and proteins.
CO5 : Knowledge on various reaction mechanisms, preparation of organic compounds and their properties.

UNIT I : REACTIONS AND REAGENTS **(9)**

Organometallic compounds – Grignard reagent- synthesis of different types of compounds like - alchohol - aldehyde – acid- amine - Acetoacetic ester – tautomerism – base hydrolysis – acid hydrolysis- malonic ester - cyano acetic ester – synthesis of dicarboxylic acids – oxalic acid – succinic acid.

UNIT II : CARBOHYDRATES **(9)**

Monosaccharide - definition – classification - glucose – synthesis and chemical properties of glucose - Disaccharides - definition – classification - sucrose - synthesis and chemical properties of sucrose - Polysaccharides - definition – classification - cellulose - synthesis and chemical properties of cellulose - derivatives of cellulose.

UNIT III : AMINO ACIDS AND PROTEINS **(9)**

Proteins – definition – classification of amino acid - synthesis of alpha amino acid– chemical properties of alpha amino acid – Proteins – classification of proteins - chemical properties of proteins - structure of proteins - denaturation of proteins – colour test of proteins.

UNIT IV : HETEROCYCLIC COMPOUNDS **(9)**

Preparation, physical and chemical properties and uses of pyrrole –furan – thiophene- indole- pyridine – quinoline.

UNIT V : PHARMACEUTICAL CHEMISTRY **(9)**

Synthesis of malonylurea – phenacetin – isoniazid - p-amino benzoic acid (PABA)- chloroquine – sulphaniliamide.

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. Morrison.R.T, & Boyd R, “Organic Chemistry” Edn., Prentice Hall India Pvt. Ltd. New Delhi, 2014
2. I.L. Finar “Organic Chemistry” Volume. 1, Sixth Edition, 2012.

REFERENCES:

1. Tewari. K.S, Vishnoi.N.k, Malhotra S.N., A Text Book of Organic Chemistry, Vikas publishing House Pvt. Ltd., New Delhi, 1986
2. Lakshmi. S, Pharmaceutical Chemistry First Edition (1995), Sultan Chand and Sons,New Delhi
3. P.L.Soni, A Text Book of organic Chemistry, Sultan Chand and Sons publishing Pvt. Ltd., 18th edition(1985).

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5	x					x						