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 [R13]

(This Curriculum and Syllabi are applicable to Students admitted from the academic year [2013-2014] to [2014-2015] only)

JUNE 2016

Approved by Fourth Academic council

THE VISION AND MISSION OF B.E - CIVIL ENGINEERING DEPARTMENT IS

VISION

The Civil Engineering Department is committed to rendering our students with the latest technology and modern methods to acquire knowledge and skills in all sectors to make them nationally and globally competent Civil Engineers.

MISSION

Civil Engineering Department is committed

- To make highly competent and technologically capable professionals by augmenting their knowledge through interactions and camps.
- To impart education to transfer the knowledge and skills for challenging applications such as computer based analysis, design using relevant standards, execution and maintenance of life line Civil Engineering projects.
- To imbibe the leadership quality, professional ethics, environmental consciousness and social responsibilities to serve the society through co-curricular and extra-curricular activities.

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.

PEO 1: 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.

PEO 2: To exhibit good depth of knowledge in core areas of Civil and allied Engineering.

PEO 3: To communicate profound knowledge in fundamentals, techniques and design of Civil Engineering system that encourages them to develop innovative techniques in their professional practice.

PEO 4: 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.

PEO 5: To Engage in life-long continuous learning through independent study and participation in professional conferences, seminars and workshops.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: An ability to recognize the importance of Civil Engineering professional development by pursuing postgraduate studies

PSO2 : An ability to face competitive examinations that offer challenging and rewarding careers

PSO3: An ability to apply design, develop and execution of projects in the construction of various Civil Engineering disciplines

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

PROGRAM OUTCOMES (POs)

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 : 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 : 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.

NANDHA ENGINEERING COLLEGE

REGULATIONS 2013 (R13)

I -VIII SEMESTER CURRICULUM

B.E.Civil Engineering

SEMESTER I

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13GE101	English for Engineers - I	3	1	0	4
13GE102	Engineering Mathematics – I	3	1	0	4
13GE103	Engineering Physics	3	0	0	3
13GE104	Engineering Chemistry	3	0	0	3
13GE105	Engineering Graphics	3	1	0	4
13EE101	Basics of Electrical and Electronics Engineering	3	1	0	4

PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13GE111	Physics and Chemistry Laboratory – I	0	0	3	2
13GE112	Engineering Practices Laboratory	0	0	3	2
	TOTAL	**18**	**4**	**6**	**26**

SEMESTER II

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13GE201	English for Engineers – II	3	1	0	4
13GE202	Engineering Mathematics – II	3	1	0	4
13GE205	Material Science	3	0	0	3
13GE204	Environmental Science and Engineering	3	0	0	3
13ME201	Engineering Mechanics	3	1	0	4
13CS101	Problem Solving and C Programming	3	0	0	3

PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13GE211	Physics and Chemistry Laboratory – II	0	0	3	2
13CE211	Building Drawing – I	0	0	3	2
13CS111	Computer Programming Laboratory	0	0	3	2
	TOTAL	**18**	**3**	9	**27**

SEMESTER III

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13GE301	Transforms and Partial Differential Equations	3	1	0	4
13CE301	Engineering Geology	3	0	0	3
13CE302	Mechanics of Solids – I	3	1	0	4
13ME303	Fluid Mechanics	2	1	0	3
13CE303	Construction Materials and Technology	3	0	0	3
13CE304	Surveying	3	0	0	3

PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13CE311	Survey Laboratory	0	0	3	2
13CE312	Building Drawing – II	0	0	3	2
13PT311	Language Competency Development - I	0	0	2	0
	TOTAL	**17**	**3**	**8**	**24**

SEMESTER IV

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13GE401	Numerical Methods	3	1	0	4
13CE401	Mechanics of Solids – II	3	1	0	4
13CE402	Hydraulic Structures and Machinery	3	1	0	4
13CE403	Transportation Engineering	3	0	0	3
13CE404	Concrete Technology	3	0	0	3
13CE405	Highway Engineering	3	0	0	3

PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13CE411	Hydraulics Engineering Laboratory	0	0	2	1
13CE412	Strength of Materials Laboratory	0	0	2	1
13CE413	Survey Camp	0	0	2	1
13PT411	Language Competency Development - II	0	0	2	0
	TOTAL	**18**	**3**	**8**	**24**

SEMESTER V

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13CE501	Structural Analysis – I	3	1	0	4
13CE502	Design of Reinforced Concrete Elements	3	1	0	4
13CE503	Design of Steel Structures	3	1	0	4
13CE504	Environmental Engineering	3	0	0	3
13CE505	Water Resources and Irrigation Engineering	3	0	0	3
E-1	Elective - I (PE)	3	0	0	3

PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13CE511	Materials Testing and Practice Laboratory	0	0	3	2
13CE512	Environmental Engineering Laboratory	0	0	3	2
13PT511	Verbal, Aptitude and Reasoning – I	0	0	2	0
	TOTAL	**18**	**3**	**8**	**25**

SEMESTER VI

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13CE601	Structural Analysis – II	3	1	0	4
13CE602	Soil Mechanics	3	0	0	3
13CE603	Construction Techniques, Equipment and Practice	3	0	0	3
13CE604	Design of Reinforced Concrete and Brick Masonry Structures	3	1	0	4
13CE605	Earthquake Engineering	3	0	0	3
E-2	Elective - II (PE)	3	0	0	3

PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13CE611	Concrete and Highway Engineering Laboratory	0	0	3	2
13CE612	Soil Mechanics Laboratory	0	0	3	2
13GE611	Comprehension	0	0	2	1
13PT611	Verbal, Aptitude and Reasoning – II	0	0	2	0
	TOTAL	**18**	**2**	**10**	**25**

SEMESTER VII

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13CE701	Prestressed Concrete Structures	3	0	0	3
13CE702	Foundation Engineering	3	0	0	3
13CE703	Quantity Surveying and Estimation	3	0	0	3
E-3	Elective - III (PE)	3	0	0	3
E-4	Elective - IV(OE)	3	0	0	3
E-5	Elective - V (OE)	2	0	0	2

PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13CE731	Design Project	0	0	4	2
13CE712	Design and Drafting Laboratory	0	0	4	2
13GE711	Personality and Character Development	0	0	1	0
13CE713	Practical Training*	0	0	2	1
	TOTAL	**17**	**0**	**11**	**22**

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

SEMESTER VIII

Course Code	**Course Title**	**L**	**T**	**P**	**C**
THEORY					
E-6	Elective - VI (PE)	3	0	0	3
E-7	Elective - VII (OE)	2	0	0	2

PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13CE831	Project Work	0	0	20	10
	TOTAL	**5**	**0**	**20**	**15**

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LIST OF PROFESSIONAL ELECTIVES FOR E-1 & E-2

Course Code	Course Title	L	T	P	C
13CEX01	Housing Planning and Management	3	0	0	3
13CEX02	GIS and Remote Sensing	3	0	0	3
13CEX03	Environmental Impact Assessment	3	0	0	3
13CEX04	Transport Planning and Management	3	0	0	3
13CEX05	Construction Planning and Scheduling	3	0	0	3
13CEX06	Hydrology	3	0	0	3
13CEX07	Operation and Management of Irrigation Systems	3	0	0	3
13GEC04	Total Quality Management	3	0	0	3

LIST OF PROFESSIONAL ELECTIVES FOR E-3 & E-6

Course Code	Course Title	L	T	P	C
13CEX08	Construction Management	3	0	0	3
13CEX09	Natural Disaster Mitigation and Management	3	0	0	3
13CEX10	Architecture and Town Planning	3	0	0	3
13CEX11	Traffic Engineering	3	0	0	3
13CEX12	Construction Safety	3	0	0	3
13CEX13	Ground Water Engineering	3	0	0	3
13CEX14	Repair and Rehabilitation of Structures	3	0	0	3
13CEX15	Industrial Waste Treatment and Disposal	3	0	0	3
13CEX16	Municipal Solid Waste Management	3	0	0	3
13CEX17	Economics and Business Finance for Civil Engineers	3	0	0	3
13GEC01	Principles of Management	3	0	0	3
13GEC02	Ethics and Cyber Security	3	0	0	3

LIST OF OPEN ELECTIVES (OE)

GROUP – I

LIST OF THREE CREDIT OPEN ELECTIVES					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13CEZ01	Industrial Safety Engineering	3	0	0	3
13CEZ02	Human Behaviors at Work	3	0	0	3
13CEZ03	Air Pollution Management	3	0	0	3
13CEZ04	Building Services	3	0	0	3
13CSZ01	Computer Networks	3	0	0	3
13CSZ02	Software Engineering	3	0	0	3
13CSZ03	Data Structures	3	0	0	3
13CSZ04	Open Source Software	3	0	0	3
13CSZ05	Information Security	3	0	0	3
13ECZ01	Avionics	3	0	0	3
13ECZ02	Sensors And Transducers	3	0	0	3
13ECZ03	Modern Wireless Communication Systems	3	0	0	3
13ECZ04	Radar And Navigational Aids	3	0	0	3
13EEZ01	Renewable Energy Technology	3	0	0	3
13EEZ02	PLC and Automation	3	0	0	3
13EEZ03	Automotive Electronics	3	0	0	3
13EEZ04	Utilization and Conservation of Electrical Energy	3	0	0	3
13EIZ01	Autotronix	3	0	0	3
13EIZ02	Fiber Optic Sensors	3	0	0	3
13EIZ03	Industrial Automation	3	0	0	3
13EIZ04	Ultrasonic Instrumentation	3	0	0	3
13ITZ01	PC Hardware & Trouble Shooting	3	0	0	3
13ITZ02	Essentials of Information Technology	3	0	0	3
13ITZ03	Developing Mobile Apps	3	0	0	3
13ITZ04	Software Project Management	3	0	0	3
13MEZ01	Six Sigma	3	0	0	3
13MEZ02	Essentials of Radio Frequency Identification	3	0	0	3
13MEZ03	Electric Vehicle Technology	3	0	0	3
13MEZ04	Value Engineering	3	0	0	3

LIST OF OPEN ELECTIVES (OE)

GROUP – II

LIST OF TWO CREDIT OPEN ELECTIVES					
Course code	**Course Title**	**L**	**T**	**P**	**C**
13GEZ01	Sustainable Development	2	0	0	2
13GEZ02	Waste Management	2	0	0	2
13GEZ03	Design Thinking	2	0	0	2
13GEZ04	Big Data Analytics	2	0	0	2
13 GE Z05	Robo Design	2	0	0	2
13 GE Z06	Creativity Innovation And New Product Development	2	0	0	2
13GEZ07	Energy Auditing	2	0	0	2
13GEZ08	Energy Conservation	2	0	0	2
13GEZ09	Law for Engineers	2	0	0	2
13GEZ10	Advanced Mathematics for Engineers	2	0	0	2
13GEZ11	Disaster Management	2	0	0	2
13GEZ12	Industrial Psychology	2	0	0	2
13GEZ13	Project Management	2	0	0	2
13GEZ14	Quality Management and Economics	2	0	0	2

LANGUAGE ELECTIVES

LIST OF TWO CREDIT LANGUAGE ELECTIVES *					
Course code	**Course Title**	**L**	**T**	**P**	**C**
13GEY01	Hindi Language	2	0	0	2
13GEY02	German Language	2	0	0	2
13GEY03	Japanese Language	2	0	0	2

*** This courses are applicable from Third semester onwards**

13GE101 - ENGLISH FOR ENGINEERS - I
(Common to All B.E/B.Tech Programmes)

L	T	P	C
3	1	0	4

OBJECTIVES:

- To build a repertoire of functional vocabulary and to move from the lexical level to the syntactic level
- To sensitise students to the nuance of the basic Listening skills
- To explain effectively for active reading and increased comprehension and retention.
- To train students to summon words, phrases relevant to the immediate communication tasks
- To prepare students acquire the ability to write effectively in English in real life situations and work related situations

COURSE OUTCOMES:

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

CO1. Develop communicative competence by enunciating words and sentences clearly and effectively.
CO2. Interpret different accents and modulations through active listening.
CO3. Build the habit of reading thereby acquiring knowledge on vide range of vocabulary.
CO4. Improve the ability to speak effectively in English in real life situations and work related situations
CO5. Compose cohesively and coherently avoiding grammatical errors

UNIT I RECAP OF LANGUAGE SKILLS (9+3)

Prefixes and Suffixes- General Vocabulary – antonym, synonyms, Analogy – Different Grammatical Forms of the Same Word- Tenses- Active and Passive Voices- Troublesome Articles and Prepositions –Adverbs and Phrasal Verbs – Modal Verbs, Compound Nouns and Expanding Nominal Compounds, Framing Wh Questions, Discourse markers.

UNIT II LISTENING FOR EFFECTIVENESS (9+3)

Barriers to Listening -Listening to audio/video lectures- Listening to short conversations or monologues- Taking down phone messages- Listening and note- taking – Listening to role –plays – Listening for verbal and non-verbal communication- Listening to collect Data- Listening to Announcements- Listening to News on the Radio & Television

UNIT III READING AND LANGUAGE COMPREHENSION (9+3)

Active and Passive Reading- Intensive and Extensive Reading- Reading to understand the usage of Grammar- Skimming and Scanning the text- Interpreting Graphical representations- Reading scientific and Technical text- Reading with a purpose – Reading and note taking.

UNIT IV ACQUISITION OF ORAL AND AURAL SKILLS (9+3)

Basic in Phonetics- Phonetic Transcription- Consonant, Vowel sound- Pronunciation Guidelines related to Consonants and vowels- Stress and Intonation- Developing voice quality- Self Introduction- Welcome address, Vote of Thanks, Master of Ceremony, Short conversations, Dialogue and Debate.

UNIT V PROFESSIONAL WRITING (9+3)

Business Letters- letter writing skills, Parts of a letter- (Calling for Quotation, Placing Orders, Seeking Permission for Industrial Visit, Complaint Letters, Adjustment letters) - Email Writing- Free Writing on any given topic- Instructions and Recommendations.

TOTAL: 60 PERIODS

Approved by Fourth Academic council

Note

Listening and speaking activities will be done using Communication Lab and teaching materials will be elicited from various resources with required worksheets to be used in the class

Exercises to be completed in communication lab

1. Listening to role-plays and rewriting the script in reported speech.
2. Extensive listening to a passage to attend multiple choice questions.
3. Listening to the pre-recorded voice, the student can record his/her own voice and compare correctness of his/her pronunciation.
4. Listening to the list of words and marking Stress, Intonation and Phonetic transcription.
5. Listening to audio/video lectures and reproducing in own words.
6. Listening to a text and attending True or False questions
7. Vocabulary Puzzles

TEXT BOOKS:

1. Rizvi, M. Ashraf., "Effective Technical Communication", Tata McGRaw Hill Publishing Company Limited, New Delhi,2006.
2. Department of English, Anna University. Mindscapes: English for Technologists and Engineers, Orient Blackswan, Chennai, 2012.

REFERENCES:

1. Norman Whitby, Business Benchmark – Pre-Intermediate to Intermediate, Students Book, Cambridge University Press, 2006.
2. S.P. Dhanavel, "English and Communication Skills for Students of Science and Engineering", Orient Blackswan, Chennai, 2011.
3. Viswamohan and Aysha. "English for Technical Communication", Tata McGraw-Hill, New Delhi, 2008.
4. M. Hewings., "Advanced English Grammar", Cambridge University Press, Chennai, 2000.
5. M. Raman & Sangeetha Sharma, "Technical Communication", Oxford University Press, USA, 2005.

Extensive reading for internal evaluation

Students have to read the text "Selected Short Stories of the World", Maple Press, Noida and do a review presentation for Internal Assessment.

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

Approved by Fourth Academic council

13GE102 - ENGINEERING MATHEMATICS - I
(Common to All B.E/ B.Tech. Programmes)

L	T	P	C
3	1	0	4

OBJECTIVES:

- Identify, formulate and solve Engineering problems.
- Use the techniques, Skills and Engineering tools necessary for Engineering practice.
- Learn further topics of Mathematics in higher semesters in a graded manner.
- 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 solution in certain cases and to have acquired the technique of diagonalizing a matrix which would render the Eigen solution procedure very simple.

CO2. Have grasped the method of two and three dimensional analytical geometry to study the properties of lines and planes in space along with sphere as an illustrative a curved surface element, providing an elegant tool for enhanced understanding of two and three dimensional materials which is imperative for engineers.

CO3. Understand effectively the geometrical aspects of curvature, involutes and evolutes of plane curves, essential concepts for an engineer, as elegant applications of differential calculus.

CO4. Understand and handle function of more than one variable, from the points of views of their differentiation, expansions and extreme values, along with differentiation under integral sign which are encountered in engineering studies.

CO5. Have learnt methods of double and triple integration, which are needed in their studies in other areas and gained confidence to handle integrals of higher orders.

UNIT I MATRICES (9+3)

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- Nature of Quadratic form-Reduction of quadratic form to canonical form by Orthogonal transformation.

UNIT II SOLID GEOMETRY (9+3)

Equation of a Sphere-Tangent plane-Plane section of a sphere-Orthogonal sphere –Equation of a Cone – Right circular cone –Equation of a Cylinder – Right circular cylinder.

UNIT III GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS (9+3)

Curvature – Curvature in Cartesian and polar co-ordinates-Centre and Radius of curvature-Circle of curvature-Evolutes and Involutes-Envelopes-Properties of envelopes and evolutes-Evolute as envelope of normals.

UNIT IV FUNCTIONS OF SEVERAL VARIABLES (9+3)

Partial derivatives- Euler's theorem on homogeneous function- Total differential-Differentiation of implicit functions-Taylor's expansion-Maxima and Minima-Constrained Maxima and Minima by Lagrange's multiplier method-Jacobians.

UNIT V MULTIPLE INTEGRALS (9+3)

Double integration in Cartesian and polar co-ordinates-Change of order of integration-Area as double integral-Change of variables between Cartesian & Polar Co-ordinates- Triple integration in Cartesian co-ordinates-Volume as triple integrals- Beta and gamma function.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. N.P.Bali and Manish Goyal "A text book of Engineering Mathematics:Sem-I", 3rd ed., Laxmi Publications, 2011.
2. T. Veerarajan., "Engineering Mathematics for first year", 3rd ed., Tata McGraw Hill, 2011.
3. P.Kandasamy, K.Thilagavathy and Gunavathy .K , "Engineering Mathematics for first year", 7th Rev.ed., S.Chand & Co Ltd , 2010.

REFERENCES:

1. B.S.Grewal, "Higher Engineering Mathematics", 40th ed., Khanna publications, 2007.
2. Erwin Kreyszig, "Advanced Engineering Mathematics, 8th ed., John Wiley & Sons, 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	x	x			x				x		
2	x	x	x				x	x	x			
3	x		x		x			x				x
4	x	x		x			x		x	x		
5	x	x		x		x	x			x		

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13GE103 - ENGINEERING PHYSICS
(Common to All B.E/ B.Tech. Programmes)

L	T	P	C
3	0	0	3

OBJECTIVES:

- To develop the skills of the students in Physics under various topics.
- This will provide the basic ideas in large number of engineering subjects like civil construction with acoustical aids, ultrasonic techniques, laser technology, communication systems, and digital signal processing.

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

UNIT I ACOUSTICS & ULTRASONICS (9)

Introduction - Classification of sound – characteristics of musical sound – loudness – Weber – Fechner law – decibel – absorption coefficient – reverberation – reverberation time – Sabine's formula (growth & decay). Factors affecting acoustics of buildings and their remedies.
Ultrasonic Introduction - Properties of Ultrasonics- Production of Ultrasonics- magnetostriction - piezo electric methods. Medical application: Sonogram - Engineering Application: Ultrasonic A B C scanning methods

UNIT II OPTICS & LASER TECHNOLOGY (9)

Interference: Air wedge – theory – uses – testing of flat surfaces – 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 – Medical and Engineering Applications

UNIT III FIBER OPTICS AND SENSORS (9)

Fiber Optics: Principle of light transmission through fiber - expression for acceptance angle and numerical aperture – Fabrication of optical fibers- Double crucible method- types of optical fibers (refractive Index profile, mode) fiber optic communication system (block diagram only) . Splicing – Medical Endoscope – Applications of optical fiber - Sensors- Temperature- Pressure sensor and displacement sensor.

UNIT IV WAVE AND PARTICLE PHYSICS (9)

Quantum Physics: Development of quantum theory – de Broglie wavelength – Properties of matter waves- G.P Thomson experiment Schrödinger's wave equation – time dependent – time independent wave equations – physical significance – applications – particle in a one dimensional potential box- X-rays**:** Scattering of X-rays – Compton Effect – theory and experimental verification.

UNIT V CRYSTALOGRAPHY (9)

Crystal Physics: 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 (Bridgman and Czochralski) and vapour growth techniques(qualitative).

Approved by Fourth Academic council

TOTAL: 45 PERIODS

TEXT BOOKS:

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

REFERENCES:

1. P. K. Palanisami, "Physics for Engineer, Vol. 1", Scitech Pub. (India) Pvt. Ltd., Chennai, 2002.
2. M. N. Avadhanulu and P. G. Kshirsagar, "A Textbook 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

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			x	
4	x	x						x	X			
5	x	x					x					

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13GE104 - ENGINEERING CHEMISTRY

(Common to All B.E/ B.Tech. Programmes)

L	T	P	C
3	0	0	3

OBJECTIVES :

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

COURSE OUTCOMES:

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

CO1. Apply knowledge of fundamental principles of chemistry
CO2. Define and solve engineering problems, including the utilization of creative and innovative skills.
CO3. Gain practical experience with chemical process equipment as well as to analyze and interpret data
CO4. Understand the impact of engineering solutions in a global, economic, environmental and societal context.
CO5. Gain the knowledge about fuels and lubricants.

UNIT I WATER TECHNOLOGY (9)

Hardness-types and estimation by EDTA method (problems) - domestic water treatment –disinfection methods (chlorination, ozonation, and UV treatment) - boiler feed water (scale, sludge, priming, foaming and caustic embrittlement) - internal conditioning (carbonate, phosphate and calgon) -external conditioning – demineralization process-desalination – reverse osmosis method. Spectrophotometric determination of Fe in water, Flame emission spectroscopy – determination of sodium in water, Atomic absorption spectroscopy - determination of nickel -BOD and COD-definition, determination and significance.

UNIT II ELECTROCHEMISTRY AND BATTERIES (9)

Introduction – cell terminology - electrode potential -Nernst equation and problems-reference electrode - standard hydrogen electrode (SHE) and calomel electrode - emf series and its applications-measurement of emf – reversible and irreversible cells- potentiometric titration (redox & precipitation)- conductometric titration (acid-base).

Batteries -definition-characteristics and types-lead acid battery-nickel cadmium battery- fuel cells-flow battery.

UNIT III POLYMERS AND NANOMATERIALS (9)

Polymers-definition – polymerization – types - addition, condensation and co polymerization - plastics-thermoplastics and thermosetting plastics-preparation , properties and uses of PVC, PET,Bakelite,epoxy resins, Teflon and nylon. Compounding of plastics. Polymer processing by compression, injection and blow moulding techniques. Nanomaterials – carbon nanotubes – classification, synthesis and their applications.

UNIT IV CORROSION AND CORROSION CONTROL (9)

Chemical corrosion – Pilling – Bedworth rule – electrochemical corrosion – different types – galvanic corrosion – differential aeration corrosion – factors influencing corrosion – corrosion control – sacrificial anode and impressed cathodic current methods – corrosion inhibitors – protective coatings – paints – constituents and functions – metallic coatings – electroplating (Au) and electroless (Ni) plating.

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

Fuels - Calorific value–classification – Coal – proximate and ultimate analysis metallurgical coke – manufacture by Otto-Hoffmann method – Petroleum processing and fractions – knocking – octane number and cetane number – synthetic petrol – Fischer Tropsch and Bergius processes – Gaseous fuels- water gas, producer gas and LPG. Lubricants - properties– viscosity index, flash and fire points, cloud and pour points, oiliness) – solid lubricants– graphite and molybdenum sulphide.Flue gas analysis – Orsat apparatus – theoretical air for combustion(problems).

TOTAL: 45 PERIODS

TEXT BOOKS:

1. P.C.Jain and Monica Jain, "Engineering Chemistry", 15th ed.,Dhanpat Rai Pub.Co, New Delhi,2009.
2. S.S.Dara, "A Text book of Engineering Chemistry",S.Chand & Co.Ltd ., New Delhi,2005.
3. Dr.A.Ravikrishnan, "Engineering Chemistry", 13th ed., Sri Krishna Hitech publishing Co. Pvt.Ltd, Chennai, 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 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
2	x	x				x			X			x
3		x										
4			x				x		X			
5												

Approved by Fourth Academic council

13GE105 - ENGINEERING GRAPHICS
(Common to B.E- ECE, EEE, EIE, CSE, CIVIL & B.Tech. - IT Programmes)

L	T	P	C
3	1	0	4

OBJECTIVE:

- To develop graphic skill in students for communication of concepts, ideas and design of engineering products and expose them to standards related to technical drawing.

COURSE OUTCOMES:

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

CO1.Use the drawing instruments, and recall the drawing standards Identify and construct the conic curves

CO2. Visualize the projection of points and straight lines in the first quadrant. Demonstrate the projection of plane surfaces kept at different positions

CO3. Draw and demonstrate the projection of simple solid like prism, pyramid, cylinder and cone Sketch the section of solids like prism, pyramid, cylinder, cone and sphere in simple positions

CO4. Demonstrate the development of lateral surfaces of simple and sectioned solids. Distinguish and draw the isometric projections and isometric views of simple and truncated solids

CO5. Construct the isometric projection of combination of two or more solid objects in simple vertical position. Illustrate the perspective projection of prisms by visual ray and vanishing point method.

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 (9+3)

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 (9+3)

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 (9+3)

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 (9+3)

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 & BUILDING DRAWING (9+3)

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.

Plan, elevation and section of single storied residential building with flat RCC roof and brick masonry walls having not more than 2 rooms. Free hand sketching in isometric projection.

TOTAL: 60 PERIODS

Approved by Fourth Academic council

REFERENCES:

1. K. Venugopal., V.Prabhu Raja, "Engineering Drawing + AutoCAD", 5th ed., Reprint, New Age International,2011.
2. Basant Agarwal and C.M. Agarwal , "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi,2008.
3. K.V. Natrajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2006.
4. M.S. Kumar, "Engineering Graphics", D.D. Publications, 2007.
5. N.D. Bhatt, "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
2	x	x			x		x				x	
3	x	x		x					x		x	x
4	x		x							x	x	x
5	x	x		x			x				x	

(For Non -Circuit Branches BE-Mechanical & Civil Engineering)

L	T	P	C
3	1	0	4

OBJECTIVES:

- To understand the basics of Electrical circuits.
- To Study the Operation & Principles of Electrical machines.
- To understand the concepts of Semiconductor devices and applications.
- To develop the knowledge in the area of Digital electronics.
- To learn the basics of Communication system.

COURSE OUTCOMES:

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

CO1.To understands the basics of Electrical circuits.

CO2.To Study the Operation & Principles of Electrical machines.

CO3.To understands the concepts of Semiconductor devices and applications.

CO4.To develop the knowledge in the area of Digital electronics

CO5.To learn the basics of Communication system

UNIT I ELECTRICAL CIRCUITS & MEASURMENTS (9+3)

Ohm's Law – Kirchoff's Laws – Steady State Solution of DC Circuits – Introduction to AC Circuits – Waveforms and RMS Value – Power and Power factor – Single Phase and Three Phase Balanced Circuits. Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters),Dynamometer type Watt meters and Energy meters.

UNIT II ELECTRICAL MACHINES (9+3)

Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, single phase induction Motor.

UNIT III SEMICONDUCTOR DEVICES AND APPLICATIONS (9+3)

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

UNIT IV DIGITAL ELECTRONICS: (9+3)

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

UNIT V FUNDAMENTALS OF COMMUNICATION ENGINEERING: (9+3)

Types of Signals: Analog and Digital Signals – Modulation and Demodulation: Principles of Amplitude and Frequency Modulations. Communication Systems: Radio, TV, Fax, Microwave, Satellite and Optical Fibre (Block Diagram Approach only).

TOTAL: 60 PERIODS

TEXT BOOKS:

1. R. Muthusubramanian, S.Salivahanan and K A Muraleedharan, "Basic Electrical, Electronics and Computer Engineering", 2nd ed., Tata McGraw Hill, 2006.
2. R.S Sedha, "Applied Electronics", S. Chand & Co., 2006.

Approved by Fourth Academic council

REFERENCES:

1. N. Mittle, "Basic Electrical Engineering", Tata McGraw Hill Edition, New Delhi, 1990.
2. T K Nagsarkar and M S Sukhija, "Basics of Electrical Engineering", Oxford press 2005.
3. V K Mehta, "Principles of Electronics", S.Chand & Company Ltd, 1994.
4. Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, 2002.
5. N. Premkumar, "Basic Electrical Engineering", Anuradha Publishers, 2003.

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	x		x
4	x	x	X		x	x	x	x	x			
5	x	x	X	x	x	x	x	x	x	x	x	x

13GE111 PHYSICS AND CHEMISTRY LABORATORY- I

Approved by Fourth Academic council

(Common to All B.E/ B.Tech. Programmes)

L	T	P	C
0	0	3	2

PHYSICS LABORATORY- I

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

1. (a) Determination of wavelength , particle size using Laser

   (b) Determination acceptance angle in an optical fiber.

2. Determination of thickness of a thin wire – Air wedge method
3. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
4. Determination of wavelength of mercury spectrum – spectrometer grating.
5. Determination of thermal conductivity of a bad conductor – Lee's Disc method.
6. Determination of Hysteresis loss in a ferromagnetic material

CHEMISTRY LABORATORY – I

LIST OF EXPERIMENTS

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

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										
3		x						x				
4	x											
5											x	

13GE112- ENGINEERING PRACTICES LABORATORY

Approved by Fourth Academic council

(Common to All B.E/ B.Tech. Programmes)

L	T	P	C
0	0	3	2

GROUP-A (MECHANICAL AND CIVIL ENGINEERING)

OBJECTIVE:

- To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

COURSE OUTCOMES:

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

CO1: Apply civil engineering practices like plumping, carpentry and relevant tools to fabricate simple parts

CO2: Make use of manufacturing practices like welding, metal removing, sheet metal works to fabricate the given component

I - CIVIL ENGINEERING PRACTICE (9)

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: Wood work, joints by sawing, planing and cutting.

II- MECHANICAL ENGINEERING PRACTICE (13)

Welding:

(a) Preparation of arc welding of butt joints, lap joints and tee joints.

(b) Gas welding practice

Basic Machining:

(a) Simple Turning and Taper turning

(b) Drilling Practice

Sheet Metal Work:

(a) Forming & Bending:

(b) Model making – Trays, funnels, etc.

(c) Different type of joints.

Machine assembly practice:

(a) Study of centrifugal pump

(b) Study of air conditioner

Demonstration on:

(a) Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.
(b) Foundry operations like mould preparation for gear and step cone pulley.
(c) Fitting – Exercises – Preparation of square fitting and vee – fitting models.

GROUP-B (ELECTRICAL AND ELECTRONICS)

OBJECTIVES:

- To understand the basic working principle of electric devices and electronic components.
- To understand and operate multimeter for current, voltage and resistance measurements.
- Have the knowledge and technical skills required to be and to remain productive in the field of Electrical Engineering

COURSE OUTCOMES:

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

CO3:Demonstrate the knowledge on the working principles of instruments such as CRO, Function generator, single and dual power supply, multimeter, bread board, IC's and components such as diodes, transistors, resistors, capacitors, inductors, etc.

CO4: Elaborate the testing of capacitors, diodes, transistors with Analog multimeter or Digital multimeter

CO5:Explain the principles of electrical circuits and electronics, and analysis, synthesis, and experimental techniques for both analog and digital electronic circuits

ELECTRICAL ENGINEERING PRACTICE

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

ELECTRONICS ENGINEERING PRACTICE

(a). Study of Electronic components and equipments – 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: 45 PERIODS

REFERENCES:

1. K Jeyachandran, Natarajan S. & Balasubramanian S, "A Primer on Engineering Practices Laboratory", Anuradha Publications,2007.
2. T. Jeyapoovan, M. Saravanapandian. & S. Pranitha, "Engineering Practices Lab Manual", Vikas Publishing House Pvt.Ltd,2006.
3. H.S.Bawa., "Workshop Practice", Tata McGraw – Hill Publishing Company Limited, 2007.
4. A. Rajendra Prasad. & P.M.M.S Sarma, "Workshop Practice", Sree Sai Publication,2002.
5. P.Kannaiah. & K.L.Narayana, "Manual on Workshop Practice", Scitech Publications,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
2			x		x				x			
3							x		x			
4							x				x	
5							x		x		x	

Approved by Fourth Academic council

13GE201 ENGLISH FOR ENGINEERS - II
(Common to All B.E/B.Tech Programmes)

L	T	P	C
3	1	0	4

OBJECTIVES :

- To enable students to convert the conceptual understanding of communication into everyday practice
- To sensitise students to the nuance of the basic listening skills and to explain effectively for active reading
- To train students to summon words, phrases relevant to the immediate communication tasks
- To prepare students acquire the ability to write effectively in English in real life situations and work related situations
- To make students reflect and improve their use of body language – posture, gesture, facial expression, tone

COURSE OUTCOMES:

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

CO1. Develop communicative proficiency by articulating words and sentences undoubtedly.
CO2. Interpret different accents and modulations through active listening and effective reading.
CO3. Prepare, organize, and deliver an engaging oral presentation and articulate their own ideas in relation to other voices and ideas.
CO4. Write effectively for a variety of professional and social settings.
CO5. Understood the significance of soft skills in the working environment

UNIT I LANGUAGE SKILLS (9+3)

General Vocabulary –Vocabulary building activities- Subject – Verb Agreement- Error correction-Common Errors in English - If conditionals - Cause and Effect Expressions - Idioms and Phrases - Style- One Word Substitution, Purpose and means, Homophones and Homonyms

UNIT II PROFESSIONAL LISTENING AND READING (9+3)

Listening to interviews - Intensive listening to fill up gapped text-Listening to criticize information -Drawing inferences and conclusions- Statement and assumption, statement and conclusion-Reading advertisements, newspapers and interpreting

UNIT III COMMUNICATION BOOSTERS (9+3)

Conversation and oral skills- Improving fluency an self-expression- Body Language - Situational role plays- Impromptu speeches - Planning, Preparing and organizing presentation-Group Discussion –advertising and persuading.

UNIT IV PROFESSIONAL WRITING (9+3)

Resumes and Job Applications-Report Writing-Memo, Agenda and minutes-Checklist-Letters inviting dignitaries, accepting and declining invitation.

UNIT V SOFT SKILLS (9+3)

Leadership and interpersonal skills – Time Management – Intercultural Communication – Telephone Etiquettes – Assertive skills – Adaptability skills – Team work-Etiquette in LSRW - Public speaking skills

TOTAL: 60 PERIODS

Note

Listening and speaking activities will be done using Communication Lab and teaching materials will be elicited from various resources with required worksheets to be used in the class

Approved by Fourth Academic council

Exercises to be completed in communication lab

1. Listen to a Noble Lecture for non-verbal communication and make a record of observation.
2. Listening to Interview and taking part in Mock Interview
3. Listening to GD and taking part in Mock GD
4. Listening to News on the Radio & Television
5. Reading Newspaper and Interpreting
6. Intensive listening to fill up gapped text.
7. Listen and complete the conversation

TEXT BOOKS:

1. M.A. Rizvi, "Effective Technical Communication", Tata McGRaw Hill Publishing Company Limited, New Delhi, 2006.
2. Department of English, Anna University, "Mindscapes: English for Technologists and Engineers", Orient Blackswan, Chennai. 2012

REFERENCES:

1. M. Raman & Sangeetha Sharma, "Technical Communication", Oxford University Press, USA, 2005.
2. S.P. Dhanavel," English and Communication Skills for Students of Science and Engineering", Orient Blackswan, Chennai. 2011
3. S.P. Dhanavel, "English and Soft skill", Orient Blackswan Pvt. Ltd., 2010
4. J. Gerson, Sharon and Steven M.Gerson, "Technical Writing –Process and Product", Pearson Education, 2001
5. Aeda Abidi & Ritu Chowdary, "English For Engineers Made Easy", Cengage India Learning Limited, New Delhi, 2010

Extensive reading for Internal evaluation

Students have to read the text "You can win" by Shiv Kera and do a review presentation for Internal Assessment.

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

Approved by Fourth Academic council

13GE202 ENGINEERING MATHEMATICS - II
(Common to All B.E/ B.Tech. Programmes)

L	T	P	C
3	1	0	4

OBJECTIVES:

- Apply knowledge of Mathematics in Engineering.
- Communicate problem solutions using correct Mathematical terminology.
- Apply rigorous and analytic approach to analyze 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 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 introduced to the host of conformal mappings with a few standard examples that have direct application.

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

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 application in other subjects of the current and higher semesters.

UNIT I ORDINARY DIFFERENTIAL EQUATIONS AND APPLICATIONS (9 + 3)

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Homogeneous equation of Euler's and Legendre's type – System of first order Simultaneous equations- Simple Harmonic Motion – Electric Circuits – Resisting medium.

UNIT II VECTOR CALCULUS (9+ 3)

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 and Stokes theorem(excluding proofs) – Verification and application in evaluating line, surface and volume integrals

UNIT III ANALYTIC FUNCTIONS (9 + 3)

Functions of a complex variable - Analytic functions – Necessary and sufficient conditions for analyticity(excluding proofs) – Properties – Harmonic conjugate – Construction of analytic function – Conformal mapping –Mapping by functions: $w = z + c$, cz , $1/z$, z^2 and bilinear transformation.

UNIT IV COMPLEX INTEGRATION (9+ 3)

Line integrals-Cauchy's integral theorem and integral formula – Taylor's and Laurent's series - Singularities - Classification – Residues – Residue theorem – Application of residue theorem to evaluate real integrals – Use of circular contour and semi-contour with no pole on real axis.

UNIT V LAPLACE TRANSFORM (9 + 3)

Laplace transform – Conditions for existence – Transform of elementary functions – Basic properties – Initial and Final value theorems – Transform of periodic functions and its application.

Inverse Laplace transforms -Convolution theorem (excluding proof)– Applications of Laplace transform for differential equations for 2^{nd} order with constant co-efficients.

TOTAL: 60 PERIODS

Approved by Fourth Academic council

TEXT BOOKS:

1. N. P.Balaji and Manish Goyal, "A text book of, Engineering Mathematics: Sem-II", 5th ed., Laxmi Publications.2011.
2. T. Veerarajan., "Engineering Mathematics for first year", 3rd ed., Tata McGraw Hill , 2011.
3. P. Kandasamy, K. Thilagavathy and K. Gunavathy, "Engineering Mathematics for first year", 7th revision ed., S.Chand & Co Ltd , 2010.

REFERENCES:

1. B.S.Grewal, "Higher Engineering Mathematics", 40th ed., Khanna publications, 2007.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th ed., John Wiley & sons, 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	x	x			x				x		x
2	x	x		x		x	x	x	x			x
3	x		x			x				x	x	
4	x	x		x		x	x	x				
5	x	x				x						x

Approved by Fourth Academic council

13GE205 - MATERIAL SCIENCE
(For Non -Circuit Branches BE-Mechanical & Civil Engineering)

L	T	P	C
3	0	0	3

OBJECTIVES:

- To develop the skills of the students in Material science under various topics.
- Provide the basic ideas in large number of engineering subjects like Electrical conductions, Semiconductors and Devices, Thermal Physics, Non-destructive testing etc.

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)

Introduction- Derivation of microscopic form of Ohm's law- postulates of classical free electron theory-derivation of electrical conductivity of metals (Drude- Lorentz theory)- merits and demerits. Derivation of thermal conductivity – Wiedemann-Franz law- verification. Electron energies in metal and Fermi energy-Fermi-Dirac distribution function and its variation with temperature- density of energy states- calculation of density of electron and fermi energy at 0K- average energy of free electron at 0K- Importance of fermi energy-problems

UNIT II SEMICONDUCTING MATERIALS & DEVICES (9)

Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – extrinsic semiconductors – carrier concentration derivation in n-type and p-type semiconductor – variation of Fermi level with temperature and impurity concentration – compound semiconductors – Hall effect –Determination of Hall coefficient – Applications.

UNIT III DIELECTRIC MATERIALS (9)

Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge polarization – frequency and temperature dependence of polarisation – internal field – Claussius – Mosotti relation (derivation) – dielectric loss – dielectric breakdown – uses of dielectric materials (capacitor and transformer) – ferroelectricity and applications.

UNIT IV THERMAL PHYSICS (9)

Mode of heat transfer-thermal conductivity-Newton law of cooling -thermal conduction through compound media (bodies in series and parallel) - thermal conductivity of 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-problems.

UNIT V NON – DESTRUCTIVE TESTING (9)

Introduction - 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 –ultrasonic flaw detector - block diagram - construction and working - merits and demerits. Thermography: types-block diagram - recording of thermal images - merits, demerits and applications.

TOTAL: 45 PERIIODS

Approved by Fourth Academic council

TEXT BOOKS:

1. V.Rajendran,"Engineering Physics". Tata McGraw-Hill.New Delhi.2011
2. P.K.Palanisami, "Physics for Engineers-Volume I", Scitech publications (India) Pvt.Ltd, Chennai, 2002

REFERENCES:

1. K. Tamilarasan and K. Prabu, "Engineering Physics II", 2nd ed., Tata McGraw-Hill. New Delhi. 2011
2. S.O. Pillai, "Solid State Physics", New Age International Publications, New Delhi, 2006.
3. G. Senthilukumar," Engineering Physics- II", VRB Publications, 2011
4. P.K Palanisamy, "Materials science", 2nd ed., Scitech publications India Pvt. Ltd., 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						
3	x	x	x			x			x			
4	x	x	x			x						
5	x	x	x	x								

Approved by Fourth Academic council

13GE204 - ENVIRONMENTAL SCIENCE AND ENGINEERING
(Common to All B.E/ B.Tech. Programmes)

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

CO1. Design a system, component, or process to meet desired needs.
CO2. Identify, formulate, and solve environmental engineering problems.
CO3. Understand the professional and ethical responsibility as related to the practice of environmental engineering and the impact of engineering solutions in a global context.
CO4. Use the techniques, skills, and modern engineering tools necessary for environmental engineering practice.
CO5. Acquire the knowledge of information technology in environmental science.

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

Environment: definition-scope-importance-need for public awareness. Forest resources: Use-over exploitation-deforestation-mining-effects on forests and tribal people. Water resources: Use-over utilization of surface and ground water –floods-drought- conflicts over water. Mineral resources: Use-exploitation-environmental effects of extracting and using mineral resources-Food resources: World food problems changes caused by agriculture and overgrazing –effects of modern agriculture-fertilizer-pesticide problems-water logging-salinity-Energy resources: Growing energy needs-renewable energy sources-use of alternate energy sources. Land resources: Land as a resource-land degradation-man induced landslides-soil erosion and desertification. Role of an individual in conservation of natural resources.

UNIT II ECOSYSTEMS AND BIODIVERSITY (9)

Concept of an ecosystem: structure and function of an ecosystem-Producers-decomposers-Energy flow in the ecosystem-Ecological succession Food chains-food webs and ecological pyramids. Types of ecosystem: Introduction-characteristic features-Forest ecosystem-Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) Biodiversity: Introduction-definition (genetic-species-ecosystem) diversity. Value of biodiversity: consumptive use-productive use-social values-ethical values-aesthetic values. Biodiversity level: global-National-local levels. India as a mega diversity nation. Hotspots of biodiversity .Threats to biodiversity: habitat loss-poaching of wildlife –man wildlife conflicts- Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT III ENVIRONMENTAL POLLUTION (9)

Pollution: Definition-Air pollution-Water pollution-Soil pollution-Noise pollution-Thermal pollution-Nuclear hazards. Soil waste management: Causes-effects-control measures of urban and industrial wastes. Role of an individual in prevention of pollution - Pollution case studies. Disaster managements: floods-earthquake-cyclone-landslides.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT (9)

Sustainable development-form unsustainable development-Urban problems related to energy. Water conservation-rain water harvesting-watershed management. Resettlement and rehabilitation of people: its problems-concerns. Environmental ethics: Issues-possible solutions-Climate change-global warming-acid rain-ozone layer depletion-nuclear accidents-nuclear holocaust. Wasteland reclamation, Consumerism and waste products. Environment production act: Air (Prevention and control of pollution) act-Water (prevention and control of pollution) act-Wildlife protection act –Forest conservation act-Issues involved in enforcement of environmental legislation-public awareness.

Approved by Fourth Academic council

UNIT V HUMAN POPULATION AND THE ENVIRONMENT **(9)**

Population growth - variation among nation- Population explosion-Family welfare programme-Environment and human health -Human rights-Value education-HIV/AIDS-Women and child welfare-Role of information technology in environment and human health-Case studies

TOTAL: 45 PERIIODS

TEXTBOOKS:

1. Anubha Kaushik and C.P. Kaushik, "Environmental Science and Engineering", New Age International Publishers, New Delhi. 2006.
2. Raman Sivakumar, "Introduction to Environmental Science and Engineering", Tata McGraw Hill Education Private Limited, New Delhi, 2011.
3. Dr.A Ravikrishnan,"Environmental Science and Engineering", 8 th ed., Sri Krishna Hitech publishing Co.Pvt .Ltd. 2012.

REFERENCES:

1. Masters and M Gilbert, "Introduction to Environmental Engineering and Science", 2nd ed., Pearson Education, New Delhi, 2004.
2. Santosh Kumar Garg, Rajeshwari garg and Ranjni Garg "Ecological and Environmental Studies",Khanna Publishers, Nai Sarak, Delhi 2006.
3. Jr. T.G. Miller, "Environmental Science", 10th ed., 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											
2	x	x							x			x
3					x	x	x					
4		x							x	x		
5									x			

Approved by Fourth Academic council

13ME201 ENGINEERING MECHANICS
(For Non -Circuit Branches BE- Mechanical & Civil Engineering)

L	T	P	C
3	1	0	4

OBJECTIVES:

- To understand the basic engineering mechanics concepts required for analyzing static structures
- Model the problem using free-body diagrams and accurate equilibrium equations
- Understand the meaning of centers of gravity (mass)/centroids and moments of Inertia
- 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.

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. Analyse 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+3)

Introduction - Units and Dimensions - Laws of Mechanics - Lame's theorem, Parallelogram and triangular Law of forces - Vectorial representation of forces and moments - Coplanar Forces - Resolution and Composition of forces - Equilibrium of a particle - Forces in space - Equilibrium of a particle in space - Equivalent systems of forces - Principle of transmissibility - Single equivalent force.

UNIT II EQUILIBRIUM OF RIGID BODIES (9+3)

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 - Vectorial representation of moments and couples – Scalar components of a moment - Varignon's theorem - Equilibrium of Rigid bodies in two dimensions.

UNIT III PROPERTIES OF SURFACES AND SOLIDS (9+3)

Determination of Areas and Volumes - 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+3)

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

UNIT V FRICTION (9+3)

Frictional force - Laws of Coulomb friction - Angle of friction - cone of friction - Simple contact friction - Ladder friction - Belt friction - Transmission of power through belts - Wedge Friction - Screw Jack - Self locking - Rolling Resistance - Problems involving the equilibrium of a rigid bodies with frictional forces.

TOTAL: 60 PERIODS

Approved by Fourth Academic council

TEXT BOOK:

1. Koteeswaran, "Engineering Mechanics", 2nd ed., Sri Balaji Publications, Coimbatore 2008.

REFERENCES:

1. M.S. Palanichamy and S. Nagam, "Engineering Mechanics – Statics & Dynamics", 3rd ed., Tata McGraw-Hill, 2004.
2. S. Rajasekaran, G. Sankarasubramanian, "Fundamentals of Engineering Mechanics", 3rd ed., Vikas Publishing House Pvt. Ltd, 2009.
3. R.C. Hibbeller, "Engineering Mechanics – Statics and Dynamics", 11th ed., Pearson Education Asia Pvt. Ltd., 2009.
4. Irving H. Shames, "Engineering Mechanics – Statics and Dynamics", 4th ed., – 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	
2	x	x			x	x		x				x
3	x			x	x		x	x				
4	x							x	x	x		
5	x	x						x	x		x	x

Approved by Fourth Academic council

13CS101 *PROBLEM* SOLVING AND C PROGRAMMING
(Common to All B.E/ B.Tech. Programmes)

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. Acquire the basic knowledge of computer hardware and software.
CO2. Implement software development tools like algorithms, flowcharts, etc.
CO3. Design programs involving decision structures, loops and functions.
CO4. Solution for various problems using the features of C language.
CO5. Study the simple structures, pointers, memory allocation and file handling.

UNIT I INTRODUCTION TO COMPUTERS (9)

Computer Basics - Applications of Computer - Computer organization - Number systems - Computer Software- Types of software - Software Development steps - Basic Internet terminologies- Introduction to Office packages.

UNIT II PROBLEM SOLVING & PROGRAMMING (9)

Creative Thinking & Problem solving skills - Problem solving concepts for Computers, Algorithms & Flowchart - Programming languages - Writing the first C Program, IDE, Compiler error, Linker error - Overview of C - Constants, Variables, Data Types and Storage Class- Operators and Expressions.

UNIT III LOOP & CASE LOGIC STRUCTURES AND FUNCTIONS (9)

Managing Input and Output operations - Control structures - Selection structures, Iteration Structures - Nested Loop structures - Control Transfer Statements- Functions - Elements of User defined Functions, Function Prototypes, Parameter Passing Techniques, Passing Array to Functions, Recursive Functions.

UNIT IV POINTERS & ARRAYS (9)

Pointer concepts- Pointers & Arrays - Pointers to Functions - Array concepts - 1-D , 2-D, 3-D & Dynamic Array - Strings - The Preprocessor.

UNIT V STRUCTURES, UNIONS AND FILES (9)

Structure concepts - Defining, Declaring, Accessing Member Variables, Structures using Pointers, Passing Structures to Functions, Structure within Structure - Union - File Management in C - Dynamic Memory Allocation.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Yashavant Kanetkar, "Let us C", 3rd ed., BPB publications, New Delhi, 2011.
2. E.Balagurusamy, "Fundamentals of computing and programming", 2nd ed., Tata McGraw-Hill Publishing Company Limited, 2012.

Approved by Fourth Academic council

REFERENCES:

1. Ashok.N.Kamthane, "Computer Programming", 2nd ed., Pearson Education (India), 2012.
2. Byron S Gottfried, "Programming with C", Schaum's Outlines, 2nd ed., Tata McGraw-Hill, 2006.
3. R.G. Dromey "How to Solve it by Computer", 4th Reprint, Pearson Education, 2007.
4. B.W.Kernighan and D.M.Ritchie, "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										
2	x	x			x							
3	x	x			x							
4	x	x			x							
5	x	x			x							

Approved by Fourth Academic council

13GE211 PHYSICS AND CHEMISTRY LABORATORY- II
(Common to All B.E/ B.Tech. Programmes)

L	T	P	C
0	0	3	2

PHYSICS LABORATORY- II

OBJECTIVE:

- To provide the basic practical exposure to all the engineering and technological streams in the field of physics

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 understand 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

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. Tensional pendulum – Determination of rigidity modulus.

CHEMISTRY LABORATORY – II

LIST OF EXPERIMENTS

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 iron by spectrophotometry.
7. Determination of water for crystallization of copper sulphate.

TOTAL: 45 PERIODS

Approved by Fourth 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										
2												
3								x				
4		x										
5	x				x		x	x				

Approved by Fourth Academic council

13CE211 BUILDING DRAWING - I
(For B.E Civil Engineering Branch only)

OBJECTIVES:

L	T	P	C
0	0	3	2

- To understand the drawing details of buildings.
- To understand the components of building.

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 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. **BONDS:** English Bond and Flemish Bond – Corner wall and Cross walls - One and one half wall.
4. **BUILDINGS WITH LOAD BEARING WALLS** - Flat roof & Pitched roof – Including details of Doors and Windows
5. **JOINERY DETAILS**: DOORS – Flush and Partially Glazed Door.
6. **WINDOWS** – Windows with & without mullion and ventilators
7. **PLANNING OF BUILDINGS** – Residential Building with one and two bed rooms.
8. **INDUSTRIAL BUILDINGS** – Types of Trusses.
9. **PERSPECTIVE VIEW** - One And Two Storey Buildings
10. **STAIRCASES** – Types and its details.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Subhash C Sharma & Gurucharan Singh, “Civil Engineering Drawing”, Standard Publishers, 2004.
2. B.P. Varma, “Civil Engineering Drawing & House Planning”, Khanna Publishers, New Delhi, 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		x		x
2	x	x						x				x
3	x	x		x					x	x		x
4	x		x	x			x	x	x	x	x	x
5	x	x			x			x		x		x

Approved by Fourth Academic council

13CS111 COMPUTER PROGRAMMING LABORATORY
(Common to All B.E/ B.Tech. Programmes)

L	T	P	C
0	0	3	2

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 documentation and comparison tools effectively.

CO2. Effectively choose programming components that efficiently solve computing problems in real-world.

CO3. Apply and practice logical ability to solve the problems.

CO4. Understand C programming development environment, compiling, debugging, linking and executing a program using the development environment.

CO5. Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.

a) Word Processing:

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

.

b) Spread Sheet:

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

c) RAPTOR –Tool:

6. Drawing - flow Chart

d) 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 Structures and Unions
12. Program Using Pointers and 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
- Compiler – C

TOTAL: 45 PERIODS

Approved by Fourth 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												
2	x				x							x
3	x	x			x							x
4												
5	x	x			x							x

Approved by Fourth Academic council

13GE301 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS
(Common to all B.E/B.Tech programmes)

L	T	P	C
3	1	0	4

OBJECTIVE:

- The course aims to impact analytical skills to the students in the areas of boundary value problems and transforms techniques.

COURSE OUTCOMES:

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

CO1. Have gained a well founded knowledge of Fourier series, their different possible forms and the frequently needed practical harmonic analysis that an engineer may have to make from discrete data.

CO2. Have obtained capacity to formulate and identify certain boundary value problems encountered in engineering practices, decide on applicability of the Fourier series method of solution, solve them and interpret the results.

CO3. Have grasped the concept of expression of a function, under certain conditions, as a double integral leading to identification of transform pair and specialization on Fourier transform pair, their properties.

CO4. Be capable of mathematically formulating certain practical problems in terms of partial differential equations, solve them and physically interpret the results.

CO5. Have learnt the basics of Z – transform in its applicability to discretely varying functions, gained the skill to formulate certain problems in terms of difference equations and solve them using the Z – transform technique bringing out the elegance of the procedure involved

UNIT I FOURIER SERIES **(9+3)**

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

UNIT II PARTIAL DIFFERENTIAL EQUATIONS **(9+3)**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

UNIT III BOUNDARY VALUE PROBLEMS **(9+3)**

Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

UNIT IV FOURIER TRANSFORM **(9+3)**

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem - Parseval's identity- Finite Fourier Transform.

UNIT V Z -TRANSFORM AND DIFFERENCE EQUATIONS **(9+3)**

Z transform -Elementary properties – Inverse Z transform (Partial fraction method and Residue method) – Convolution theorem -Formation of difference equations – Solution of difference equations using Z transforms.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. T.Veerarajan, "Engineering Mathematics", 3rd ed., Tata Mc Graw Hill,New Delhi, 2005.
2. P.Kandasamy , K. Thilagavathy and K. Gunavathy, "Engineering Mathematics- Volume III", S. Chand & Co Ltd., 2006.

REFERENCES:

1. Goyal. Manish and N.P Bali, "A Textbook of Engineering mathematics", 6th ed., Laxmi Publication (P) Ltd. New Delhi, 2012.
2. B.S Grewal, "Higher Engineering Mathematics", 42nd ed., Khanna publishers, New Delhi, 2012.
3. Kreyszig. Erwin, "Advanced Engineering Mathematics", 9th ed., Wiley Publications, New Delhi, 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	x			x						x
4	x	x		x			x			x		x
5	x	x		x								x

Approved by Fourth Academic council

13CE301 ENGINEERING GEOLOGY

L	T	P	C
3	0	0	3

OBJECTIVES:

- To demonstrate the importance of Geology in making engineering decisions.
- Introduce the fundamentals of the engineering properties of earth materials for the use of Civil Engineering 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

CO1. Characterize of the engineering properties of rocks and soils.
CO2. Assess the geological hazards.
CO3. Use seismic and electrical methods to investigate the subsurface.
CO4. Develop a native construction plan incorporating all relevant aspects of geology.
CO5. 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: 45 PERIODS

TEXT BOOKS:

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

REFERENCES:

1. S.K. Garg, "Physical and Engineering Geology", Khanna Publishers. – Delhi , 2004
2. Blyth – F.G.H.Edward Arnold), "A Geology for Engineers", 7th ed., Great Britain by Biddies Ltd, King's Lynn, Norfolk, ,1998
3. K.David, Todd John Wily & Sons Inc, "Ground Water Hydrology" 3rd ed.,, New York, 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
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

Approved by Fourth Academic council

13CE302 MECHANICS OF SOLIDS - I

L	T	P	C
3	1	0	4

OBJECTIVES:

- Understand the concepts of Simple Stress and Strain.
- Study the behaviour of statically determinacy of beams subjected to various types of forces.

COURSE OUTCOMES:

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

CO1. Understand the different types of stress and strains
CO2. Analyze the members subjected to various types of forces.
CO3. Understand the concepts of shear force and bending moment in beams
CO4. Analyze the slope and deflection of beams by various methods.
CO5. Analyze the theory of torsion and deformation of spring.

UNIT I SIMPLE STRESSES AND STRAINS (9+3)

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+3)

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+3)

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+3)

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 AND SPRINGS (9+3)

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 – Leaf Springs.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. R.K.Bansal, "Strength of Materials", Laxmi Publications, New Delhi, 2010
2. R.K.Rajput , "Strength of Materials", S. Chand Publications, New Delhi, 2012.

REFERENCES:

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

Approved by Fourth Academic council

13ME303 FLUID MECHANICS

L	T	P	C
2	1	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. Also to learn fluid properties and hydrostatic law – to understand the importance of flow measurement and its applications in Industries and to obtain the loss of flow in a flow system.
- The development of boundary layers and advancement of practical hydraulics and understanding the concept of advanced fluid mechanics.

COURSE OUTCOMES:

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

CO1. Find properties of fluids and hydrostatic law.
CO2. Understand the importance of flow measurement.
CO3. Find the losses in a pipe when there is a flow between two places.
CO4. Analyze the model and the prototype.
CO5. Study the various methods available for the boundary layer separation.

UNIT I FLUID PROPERTIES AND HYDROSTATICS (6+3)

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

UNIT II FLUID DYNAMICS (6+3)

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 (6+3)

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. – Measurement of pressure – flow – velocity through pipes and open channels.

UNIT IV DIMENSIONAL ANALYSIS (6+3)

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

UNIT V BOUNDARY LAYERS (6+3)

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: 30 + 15 PERIODS

TEXT BOOK:

1. R.K.Bansal, "Fluid Mechanics and Hydraulic Machines", 9th Revised ed., Laxmi Publications, 2011.

REFERENCES:

1. P.N.Modi, "Hydraulics and Fluid Mechanics including Hydraulic Machines", 19th Revised and Enlarged ed., Standard Publishers Distributors, 2013
2. Vijay Gupta and Santosh Kumar Gupta,"Fluid Mechanics and Applications", 2nd ed., New Age International, Reprint 2011
3. D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering", S K Kataria & Sons, New Delhi, 2013
4. Victor Streeter, E. Benjamin Wylie and K.W. Bedford, "Fluid Mechanics", 9th ed., Tata McGraw - Hill Education,2010

Approved by Fourth 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	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

Approved by Fourth Academic council

13CE303 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

CO1. Learn and identify the relevant physical and mechanical properties and BIS testing procedure pertaining to the construction industry.
CO2. Study of modern construction materials.
CO3. Ability to supervise the techniques to be followed in building construction
CO4. Learn about the prefabricated structures.
CO5. 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: 45 PERIODS

TEXT BOOK:

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

13CE304 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

CO1. Get knowledge about traditional methods of surveying.
CO2. Understand the leveling by leveling instruments.
CO3. Analyze the survey parameter using theodolite.
CO4. Get exposure to astronomical and route surveying.
CO5. 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 STUDY OF CONTOURS (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 SURVEY ADJUSTMENTS AND ASTRONOMICAL SURVEYING (9)

Astronomical terms and definitions - Celestial sphere - Motion of sun and stars - Celestial co-ordinate systems - use of Nautical almanac - Star constellations - calculations for azimuth of a line.

UNIT V ADVANCES IN ENGINEERING SURVEY (9)

Reconnaissance, preliminary and location surveys for engineering projects - Lay out – Setting out works - Route Surveys for waterways - Types of Curves - 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: 45 PERIODS

TEXT BOOKS:

1. A Bannister and S.Raymond "Surveying", 7th ed., Dorling Kindersley India Pvt ltd, 2009.
2. B.C Punmia Ashok K. Jain and Arun K. Jain, "Surveying, Vols. I, II and III", Laxmi Publications, 2005

REFERENCES:

1. D. Clark, "Plane and Geodetic Surveying", 6th ed., Vols. I and II, C.B.S. Publishers and Distributors, Delhi,1971.
2. James M.Anderson and Edward M.Mikhail, "Introduction to Surveying", McGraw-Hill Book Company, 1985.
3. T.P. Kanetkar "Surveying and Levelling", Vols. I and II, United Book Corporation, Pune, 1994.

Approved by Fourth 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	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

Approved by Fourth Academic council

13CE311 SURVEY LABORATORY

L	T	P	C
0	0	3	2

OBJECTIVE:

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

COURSE OUTCOMES:

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

CO1. Acquire knowledge about chain and its accessories.
CO2. Understand the traversing, leveling & Plane table concepts.
CO3. Synthesize the boundary of an area by contouring and tacheometry.
CO4. Analyze the elevation and distance by single plane and double plane method.
CO5. Create a topographical map using total station and GPS.

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 Tacheometry
7. Tangential Tacheometry
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: 45 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

Approved by Fourth Academic council

13CE312 BUILDING DRAWING - II

L	T	P	C
0	0	3	2

OBJECTIVES:

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

COURSE OUTCOMES:

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

CO1. Draft drawings by using software.
CO2. Understand different type of structures in a building
CO3. Draw plan, section & elevation of different types of buildings & structures
CO4. Learn the drawing as per National Building code.
CO5. Describe knowledge about building components

LIST OF EXPERIMENTS /EXERCISES

1. Functional planning of buildings (Residential)
2. Buildings with load bearing walls - Flat roof & Pitched roof – Including details of doors and windows
3. RCC framed structures (Institutional and Hospital Buildings)
4. Industrial buildings – two types of Trusses
5. Perspective view of one and two storey buildings
6. Rainwater harvesting methods for residential buildings

TOTAL: 45 PERIODS

REFERENCES / MANUALS / SOFTWARES:

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

Approved by Fourth Academic council

13PT311 LANGUAGE COMPETENCY DEVELOPMENT – I
(Common to All B.E/B.Tech Programmes)

L	T	P	C
0	0	2	0

OBJECTIVES:

- To make students speak English fluently with emphasis on:
  - Articulation
  - Vocabulary
  - Content
- To develop the habit of self research for learning among students.
- To develop behavioral skills among students across all levels.
- To develop reading habits.
- To develop persuasion and negotiation skills.

COURSE OUTCOMES:

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

CO1. Articulate fluently in English on the day to day affairs.
CO2. Know the areas from where they can research and learn English.
CO3. Exhibit professionalism.
CO4. Exhibit expertise on world affairs.
CO5. Exhibit persuasion skills.

UNIT I AUXILIARIES **(7)**

am, is, are (statement and questions) - I am doing - are you doing? - I do/work/like - I don't - Do you - I am doing and I do - I have / I've got

UNIT II TENSE **(10)**

was/were - worked/got/went - I didn't…did you…? - I was doing - I was doing and I did - I have done - I've just…I've already…I haven't…yet - Have you ever…? - How long have you…? - for since ago - I have done and I did - is done was done - is being done has been done - be/have/do

UNIT III MODALS **(7)**

Regular and irregular verbs - I used to… - What are you doing tomorrow? - I'm going to… - will/shall - will/shall - might - can and could - must - should

TOTAL: 24 PERIODS

TEXT BOOK:

1. English Spoken Course materials from the Speak Easy academy.

REFERENCE BOOK:

1. Wren, Martin, "High School English Grammar and Composition", 1st ed., S.Chand & Company Ltd, 2011
2. Dr.B.B.Jain , "UPKAR's Correct English – How to Write it", Upkar Prakashan Publishers, 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												
5												

Approved by Fourth Academic council

13GE401 NUMERICAL METHODS
(Common to EEE/CIVIL/EIE programmes)

L	T	P	C
3	1	0	4

OBJECTIVE:

- The course is aimed at developing the skills of engineering students in the basis of complete procedure for solving different kinds of problems occur in engineering numerically.

COURSE OUTOMES:

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. The methods introduced in the solution of ordinary differential equations and partial differential equations will be useful in attempting any engineering problem.

CO3. 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

CO4. Quantify absolute and relative errors

CO5. Derive difference equations for first and second order derivatives.

UNIT I SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS (9+3)

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 method – Gauss-Seidel method – Inverse of a matrix by Gauss Jordon method – Eigen value of a matrix by power method and by Jacobi method for symmetric matrix.

UNIT II INTERPOLATION AND APPROXIMATION (9+3)

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+3)

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+3)

Single step methods: Taylor series method – Modified Euler method for first order equation – Fourth order Runge – Kutta method for solving first and second 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+3)

Finite difference solution of second order ordinary differential equation – Finite difference solution of one dimensional heat equation by explicit and implicit methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.

TOTAL: 60 PERIODS

TEXT BOOKS:

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

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.
3. E. Balagurusamy, "Numerical Methods", Tata McGraw-Hill, New Delhi, 1999.
4. M.K Venkatraman, "Numerical Methods" National Publication, New Delhi, 2000.

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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		x

Approved by Fourth Academic council

13CE401 MECHANICS OF SOLIDS- II

L	T	P	C
3	1	0	4

OBJECTIVES:

- Have a detailed study of forces and their effects along with some suitable protective measures for the safe working condition.
- Understand the designing of types of structures and machines.

COURSE OUTOMES:

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

CO1. Find out the strain energy, deflection of beam and trusses by using various theorems.
CO2. Analyze the indeterminate beams
CO3. Calculate the critical loads for columns and stresses for cylinders.
CO4. Determine the principal stresses and principal planes in 3D
CO5. Understand the concept of unsymmetrical bending of beams.

UNIT I ENERGY PRINCIPLES (9+3)

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+3)

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 & CYLINDERS (9+3)

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+3)

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+3)

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

TOTAL: 60 PERIODS

TEXT BOOKS:

1. R.K. Bansal, "Strength of Materials", Laxmi Publications, New Delhi, 2010.
2. R.K. Rajput, "Strength of Materials", S. Chand Publications, New Delhi, 2012.

REFERENCES:

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

Approved by Fourth Academic council

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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			x				x
5	x	x	x	x	x	x				x		

Approved by Fourth Academic council

13CE402 HYDRAULIC STRUCTURES AND MACHINERY

L	T	P	C
3	1	0	4

OBJECTIVES:

- To understand the working principles of hydraulic machinery.
- To know the design of 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 OUTOMES:

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

CO1. Identify the pump required for different purposes.
CO2. Classify the turbines and design based on water availability.
CO3. Design the head work for irrigation system.
CO4. Design the drops and outlet for the channel system.
CO5. Understand the operation of hydropower structures.

UNIT I IMPACT OF JET ON VANES AND PUMPS (9+3)

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+3)

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

UNIT III IRRIGATION STRUCTURES (9+3)

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+3)

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+3)

Components – penstock - pumping storage – pipe line engineering – cavitation – water hammer – remedies.

TOTAL: 60 PERIODS

TEXT BOOK:

1. S.K. Garg, "Irrigation Engineering & Hydraulic Structures", 23th ed., Khanna Publishers, 2009.

REFERENCES:

1. V.T.Chow, "Open Channel Hydraulics", Blackburn press, 2009.
2. Modi & Seth, "Hydraulics & Fluid Mechanics including Hydraulic Machines", Standard Publications, 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
2	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	x	x
5	x	x	x	x	x		x	x		x	x	x

Approved by Fourth Academic council

13CE403 TRANSPORTATION ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand various transportation modes
- To know the various components involved in their respective modes and their basic design concepts.
- To understand the techniques involved in harbour layout.

COURSE OUTOMES:

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

CO1. Collect about various highway elements
CO2. Test the material used for road and pavement
CO3. Assess about various railway alignments and components
CO4. Study the airport principles and components
CO5. Classify the components for harbours and docks

UNIT I HIGHWAY GEOMETRIC DESIGN (9)

Introduction to Transportation Systems, Highway Engineering – Classification of Roads, Highway Planning - Road cross section - camber, gradient, Super elevation - Sight distance - Horizontal and Vertical curve.

UNIT II MATERIALS AND CONSTRUCTIONS (9)

Bitumen and bituminous mixes – sources, composition, characterization, various forms - Tests on bitumen- Aggregate test, mix design - Types of pavement - pavement construction and maintenance.

UNIT III RAILWAY ENGINEERING (9)

Requirements of railway alignments – Survey - Typical cross section of a railway track – Components and their functions – Points & Crossings – Stations – Selection of site – Station yard and layout.

UNIT IV AIRPORT ENGINEERING (9)

Typical layout of Airports – Component parts – Objectives of components – Runways – Taxiways – Aprons – Landing aids – Requirement of airport site – General principles of layout.

UNIT V HARBOUR ENGINEERING (9)

Classification of Harbour basin, general layout of harbours – Docks – Different components of docks.

TOTAL: 45 PERIODS

TEXT BOOK:

1. V.N Vazirani. & S.P Chandola, "Transportation Engineering Vol. I & II", Khanna Publishers, New Delhi, 2005.

REFERENCES:

1. G.V Rao, "Principles of Transportation and Highway Engineering", Tata McGraw Hill Co, 2004.
2. S.K Khanna, M.G & S.S Jain, "Airport Planning and Design", New Chand & Bros, Roorkee 2000.
3. S.C Rangwala, "Principles of Railway Engineering", Charotar Publishing house, 2008.
4. Partha Chakroborthy, Animesh Das, "Principles of Transportation Engineering", Prentice-Hall of India, 2005

Approved by Fourth 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	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		
5	x	x	x	x	x							

Approved by Fourth Academic council

13CE404 CONCRETE TECHNOLOGY

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 OUTOMES:

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

CO1. To know the various field and laboratory test on cement
CO2. Understand the mineral and chemical admixtures.
CO3. Understand the IS mix design and quality control of concrete
CO4. Identify the strength of concrete using various testing methods.
CO5. Implement the special concreting methods required for cold weather and hot weather regions

UNIT I PROPERTIES OF CEMENT (9)

Cement - Manufacturing, Types of cement – Properties of Cement - Testing of Cement – Field Testing – Laboratory Testing methods – Setting properties of cement – soundness of cement – fineness and compressive strength of cement – cement mortar tests - Heat of Hydration.

UNIT II AGGREGATES (9)

Fine aggregate and coarse aggregate– Properties and testing methods – Bulking of Sand – sieve analysis – fineness modulus - properties and uses.

UNIT III CONCRETE PRODUCTION (9)

Selection of materials for concrete - water cement ratio - Properties of fresh concrete - workability – measurement of workability – process of manufacture of concrete –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 – Introduction to NDT Techniques – Stress and Strain characteristics.

UNIT V MIX DESIGN & DIFFERENT TYPES OF CONCRETE (9)

Concrete mix design – concepts variables in proportioning – methods of mix design — Indian Standard method, Factor affecting the test results, Introduction to high performance concrete, high strength concrete, light weight concrete, Fibre reinforced concrete.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. M.S Shetty, "Concrete Technology", S. Chand & Company Ltd., 2010.
2. P.K.Metha," Concrete: Microstructure, properties and Materials", McGraw-Hill, 2005.

REFERENCE BOOKS:

1. A.M Neville, "Properties of Concrete", 5th ed.,Prentice-Hall of India, 2012.
2. P.C Varghese," Limit State Design & Reinforced Concrete", Prentice-Hall of India, 2008.
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

Approved by Fourth 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	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		
5	x		x	x	x	x				x		

Approved by Fourth Academic council

13CE405 HIGHWAY ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVE:

- To impart the knowledge in Traffic Engineering, Highway geometrics, materials, construction and design.

COURSE OUTOMES:

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

CO1. Study the highway planning
CO2. Understand the procedure to collect the traffic data for design and traffic management
CO3. Test the highway materials as per recommendation
CO4. Do structural design flexible and rigid pavements
CO5. Understand the strengthening of pavements

UNIT I HIGHWAY AND TRAFFIC PLANNING (9)

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

UNIT II HIGH GEOMETRICS (9)

Highway classification (Rural and Urban roads), 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 TRAFFIC ENGINEERING (9)

Characteristics of traffic elements – Design of Intersections, Interchanges, Parking Layout & Road signs – Urban traffic management - Traffic regulation and control, Accidents, Causes and Preventions.

UNIT IV 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 – Concrete Mix Design, construction of bituminous and rigid pavements, Highway Maintenance – Material recycling.

UNIT V HIGHWAY DESIGN (9)

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.

TOTAL: 45 PERIODS

TEXT BOOK:

1. S.K.Khanna, C.E.G.Justo, "Highway Engineering", New Chand & Bros, Roorkee, 2001.

REFERENCE BOOKS:

1. G.V Rao, "Principles of Transportation and Highway Engineering", Tata McGraw Hill Co, 2005.
2. L.R.Kadiyali& N.B Lal, "Principles and Practice of Highway Engineering (including express ways & Airport Engineering)", Khanna Publishers, 2005
3. Partha Chakroborthy, Animesh Das, "Principles of Transportation Engineering", Prentice-Hall of India, 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					
3	x	x	x		x		x	x				x
4	x	x	x					x				x
5	x	x	x					x				

Approved by Fourth Academic council

13CE411 HYDRAULIC ENGINEERING LAB

L	T	P	C
0	0	2	1

OBJECTIVES:

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

COURSE OUTOMES:

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

CO1. Understand the flow measurement in a pipe flow.
CO2. Compute the co-efficient of discharge for notch
CO3. Study the characteristics of pumps
CO4. Students will be able to calculate the discharge of flowing water
CO5. Study the characteristics of turbine,

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. Study of minor losses in pipes
7. Study on performance characteristics of Pelton turbine.
8. Study on performance characteristics of Francis turbine
9. Study on performance characteristics of Kaplan turbine
10. Study on performance characteristics of Centrifugal pumps (Constant speed / variable Speed)
11. Study on performance characteristics of reciprocating pump.

TOTAL: 45 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		
3	x	x		x	x				x	x		
4	x	x	x	x	x			x	x			x
5	x	x			x			x	x	x		

Approved by Fourth Academic council

13CE412 STRENGTH OF MATERIALS LABORATORY

L	T	P	C
0	0	2	1

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.
- Relating these quantities, the student should be able to obtain the strength of the material and stiffness properties of structural elements.

COURSE OUTOMES:

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

CO1. The students will able to draw the stress- strain curve for building materials.
CO2. The students will be able to test the characteristics of building materials
CO3. The students will identify the various types of material and its properties
CO4. The students will able to test the hard materials
CO5. Assure the quality of materials used in construction works

LIST OF EXPERIMENTS

1. Tension Test.
2. Torsion Test.
3. Deflection Test (Wood, Steel).
4. Tests on springs
5. Hardness tests
6. Shear test
7. Impact Test (Izod & Charpy).
8. Test on Bricks
9. Test on stones
10. Test on timber

TOTAL: 45 PERIODS

Note: The student should learn the use of deflectometer, extensometer and strain gauges.

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		x		
5	x	x		x	x					x		x

Approved by Fourth Academic council

13CE413 SURVEY CAMP

L	T	P	C
0	0	2	1

(One week Survey Camp will be conducted during vacation in the following activities)

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 OUTOMES:

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

CO1. Conduct various types of surveys in the field as per the requirements
CO2. Conduct survey by triangulation method
CO3. Conduct survey using theodolite
CO4. To conduct survey using total station
CO5. Prepare contour map for the given area.

One week survey camp using Theodolite, cross staff, leveling staff, tapes, plane table and total station. At the end of the camp, each student shall have mapped and contoured the area. The camp record shall include all original field observations, calculations and plots.

1. **Triangulation**
2. **Trilateration**
3. **Rectangulation**
4. **Contouring**

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

13PT411 LANGUAGE COMPETENCY DEVELOPMENT – II
(COMMON TO ALL B.E/B.TECH PROGRAMMES)

L	T	P	C
0	0	2	0

OBJECTIVES:

- To make students speak English fluently with emphasis on:
  - Articulation
  - Vocabulary
  - Content
- To develop the habit of self research for learning among students.
- To develop behavioral skills among students across all levels.
- To develop reading habits.
- To develop persuasion and negotiation skills.

COURSE OUTOMES:

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

CO1. Articulate fluently in English on the day to day affairs.

CO2. Know the areas from where they can research and learn English.

CO3. Exhibit professionalism.

CO4. Exhibit expertise on world affairs.

CO5. Exhibit persuasion skills.

UNIT I QUESTIONS PATTERNS AND TAGS (10)

I have to… - Would you like …? I'd like… - there is there are - there was/were there has/have been there will be - It… - I am I don't etc - Have you? Are you? Don't you? Etc. - too/either so am I / neither do I etc. - isn't haven't don't etc. - Is it? Have you…? Do they…? Etc. - Who saw you? Who did you see? - Who is she talking do? What is it like? - What…? Which…? How…? - How long does it take…? - Do you know where…? I don't know what…etc.

UNIT II REPORTED SPEECH - SAID, TOLD, WANT SERIES (10)

She said that… He told me that… Work/working go/going do/doing - to…(I want to do) and ing (I enjoy doing) - I want you to… I told you to… - I went to the shop to… go to… go on… go for… going - get - do and make - have.

UNIT III SELF DESCRIPTIONS (4)

I/me he/him they/them etc. - My/his/their etc. - Whose is this? It's mine/yours/hers etc. - I/me/my/mine.

TOTAL: 24 PERIODS

TEXT BOOK:

1. English Spoken Course materials from the Speak Easy academy.

REFERENCE BOOK:

1. Wren, Martin, "High School English Grammar and Composition", 1st ed., 2011, S.Chand & Company Ltd
2. Dr.B.B.Jain, "UPKAR's Correct English – How to Write it", Upkar Prakashan Publishers, 2005.

Approved by Fourth 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	z	x	x

Approved by Fourth Academic council

13CE501 STRUCTURAL ANALYSIS - I

L	T	P	C
3	1	0	4

OBJECTIVES:

- To understand the methodology of analysis.
- To know the different techniques available for the analysis of structures and arches.
- To identify the best suitable method of analysis of different structures.

COURSE OUTCOMES:

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

CO1: Analysis the indeterminate structures by classical methods
CO2: Analysis and solve arch profiled structures.
CO3: Analysis the indeterminate structures by slope deflection method.
CO4: Analysis the indeterminate structures by Moment distribution method.
CO5: Use the influence line diagram to solve determinate and indeterminate structures.

UNIT I DETERMINATE AND INDETERMINATE FRAMES (9+3)

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

UNIT II ARCHES (9+3)

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+3)

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

UNIT IV MOMENT DISTRIBUTION METHOD (9+3)

Moment distribution method - analysis of continuous beams and portals - bending moment and shear force diagram.

UNIT V INFLUENCE LINE (9+3)

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

TOTAL: 60 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. Roy, Sujit Kumar., "Fundamentals of Structural Analysis", S.Chand & Company Ltd, New Delhi, 2003.
3. S.S.Bhavikatti, "Structural Analysis" – Vol.I & II, Vikas Publishing Pvt Ltd., New Delhi, Fourth Edition 2013.

REFERENCES:

1. Punmia, B.C., Jain, Asok Kumar and Jain, Arun Kumar., "Theory of Structures", Laxmi Publications, New Delhi, 2014.
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, 2003.

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	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		x	x
5	x	x	x	x	x	x	X		x		x	x

Approved by Fourth Academic council

13CE502 DESIGN OF REINFORCED CONCRETE ELEMENTS

L	T	P	C
3	1	0	4

OBJECTIVES:

- To understand the concepts of limit state method
- To have an idea about flexural members and compression members
- To know the design concepts of bond, anchorage, shear and torsion

COURSE OUTCOMES:

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

CO1: Know the basic concepts and steps in the design of beams and slabs mainly in accordance with Limit state method.
CO2: Understand the design of flexural members and slabs.
CO3: Know the behaviour of RC beams in shear and torsion
CO4: Know the concept of design of columns
CO5: Understand the design of RC footing with different cross section under various site conditions

UNIT I METHODS OF DESIGN OF CONCRETE STRUCTURES (9+3)

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 (9+3)

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

UNIT III DESIGN FOR BOND, ANCHORAGE SHEAR & TORSION (9+3)

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+3)

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+3)

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: 60 PERIODS

TEXTBOOKS:

1. Varghese, P.C., “Limit State Design of Reinforced Concrete”, Prentice Hall of India, Pvt. Ltd., New Delhi, Second Edition 2008
2. Gambhir.M.L., "Fundamentals of Reinforced Concrete Design", Prentice Hall of India Private Limited, New Delhi, 2006.
3. Subramanian, N, “Design of Reinforced Concrete Structures”, Oxford University Press, New Delhi, 2014.

REFERENCES:

1. Jain, A.K., “Limit State Design of RC Structures”, Nemchand Publications, Roorkee, 1998
2. Sinha, S.N., “Reinforced Concrete Design”, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2014
3. Unnikrishna Pillai, S., Devdas Menon, “Reinforced Concrete Design”, Tata McGraw Hill Publishing Company Ltd., Third Edition 2009
4. Punmia.B.C., Ashok Kumar Jain, Arun Kumar Jain, “Limit State Design of Reinforced Concrete”,Laxmi Publication Pvt. Ltd., New Delhi, 2007.
5. Bandyopadhyay. J.N., "Design of Concrete Structures"., Prentice Hall of India Pvt. Ltd., New Delhi, 2008.
6. IS456:2000, Code of practice for Plain and Reinforced Concrete, Bureau of Indian Standards, New Delhi, 2000
7. SP16, IS456:1978 “Design Aids for Reinforced Concrete to Bureau of Indian Standards, New Delhi, 1999
8. Shah V L Karve S R., "Limit State Theory and Design of Reinforced Concrete", Structures Publilcations, Pune, 2013
9. N. Krishna Raju, “Design of Reinforced Concrete Structures (IS: 456-2000)”, Third Edition 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
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

Approved by Fourth Academic council

13CE503 DESIGN OF STEEL STRUCTURES

L	T	P	C
3	1	0	4

OBJECTIVES:

- To know the basic concept of steel structural design
- To understand the usage of IS codes
- To gain knowledge on design of industrial structures.

COURSE OUTCOMES:

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

CO1: Identify and calculate the different types of loadings
CO2: Know the concept of design of tension members
CO3: Understand the design of compression members
CO4: Know the design of beams and plate girders.
CO5: Understand the design components of steel trusses such as purlins and gantry girders.

UNIT I INTRODUCTION (9+3)

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+3)

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+3)

Types of compression members – Theory of columns – Basis of current codal provision for compression member design – Slenderness ratio – Design of single section and compound section compression members – Design of laced and battened type columns – Design of column bases – Gusseted base

UNIT IV BEAMS (9+3)

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+3)

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

TOTAL: 60 PERIODS

TEXTBOOKS:

1. Gambhir. M.L., "Fundamentals of Structural Steel Design", McGraw Hill Education India Pvt. Ltd., 2013
2. Shiyekar. M.R., "Limit State Design in Structural Steel", Prentice Hall of India Pvt. Ltd, Learning Pvt. Ltd., 2nd Edition, 2013.
3. Subramanian.N, "Design of Steel Structures", Oxford University Press, New Delhi, 2013.

REFERENCES:

1. Dr. L. S. Jayagopal, Dr. D. Tensing, “Design of Steel Structures”, Vikas Publishing House Pvt. Ltd., 2015
2. Narayanan.R.et.al. "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. Bhavikatti.S.S, “Design of Steel Structures”, By Limit State Method as per IS:800–2007, IK International Publishing House Pvt. Ltd., 2010
5. Shah.V.L. and Veena Gore, “Limit State Design of Steel Structures”, IS 800–2007 Structures Publications, 2012.
6. 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										
2		x			x					x		x
3					x					x		x
4	x			x	x			x		x		
5	x			x	x			x		x		x

Approved by Fourth Academic council

13CE504 ENVIRONMENTAL ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To realize the different water treatment techniques
- To recognize the different wastewater primary treatment and secondary treatment techniques of wastewater.
- To expert in the sludge management and disposal of wastewater

COURSE OUTCOMES:

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

CO1: Select and design the treatment units for various sources of water
CO2: Design and prefer the various wastewater primary treatment units
CO3: Design and choose the various wastewater secondary treatment units.
CO4: Plan and select the sludge disposal methods
CO5: Plan the wastewater disposal methods

UNIT I WATER TREATMENT (12)

Population forecast and water demand – 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 II 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 III SECONDARY WASTE WATER TREATMENT (8)

Trickling filter (no design); Other treatment methods - oxidation ditches, UASB - Waste Stabilisation Ponds - Anaerobic Stabilisation units - Septic tanks, Advances in sewage treatment - waste water reuse and recycling.

UNIT IV SLUDGE DISPOSAL (9)

Sources and characteristics of Sludge -Thickening – Sludge digestion – Biogas recovery - Sludge disposal - Drying beds – Conditioning and Dewatering

UNIT V WASTE WATER DISPOSAL METHODS (8)

Dilution – Self purification of surface water bodies – Oxygen sag curve – disposal to lakes and sea, Land disposal – Sewage farming – Deep well injection – Soil dispersion system.

TOTAL: 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, 2003.
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, Fourth edition, New Delhi, 2003.

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

Approved by Fourth Academic council

13CE505 WATER RESOURCES AND IRRIGATION ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To expose the different phases in Water Resources Management and National Water Policy.
- To impart required knowledge on Reservoir planning, management and economic analysis including Irrigation and Irrigation management practices.

COURSE OUTCOMES:

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

CO1: Get exposure about the developments of water resources for the purpose of controlling & utilizing water for a variety of purposes.
CO2: Know the use of water and its quality.
CO3: Understand the concepts of irrigation, supply of H2O, flood control and navigational improvement.
CO4: Study about different types of structures for irrigation.
CO5: Identify the different types & methods of irrigation for better water management.

UNIT I WATER RESOURCES (9)

Water resources survey – Water resources of India and Tamilnadu – Description of water resources planning – Estimation of water requirements for irrigation and drinking- Single and multipurpose reservoir – Multi objective - Fixation of Storage capacity - Strategies for reservoir operation - Design flood - levees and flood walls.

UNIT II WATER RESOURCE MANAGEMENT (9)

Economics of water resources planning; – National Water Policy – Consumptive and non-consumptive water use - Water quality – Scope and aims of master plan - Concept of basin as a unit for development - Water budget - Conjunctive use of surface and ground water

UNIT III IRRIGATION ENGINEERING (9)

Need – Merits and Demerits – Duty, Delta and Base period – Irrigation efficiencies – Crops and Seasons - Crop water Requirement – Estimation of Consumptive use of water.

UNIT IV CANAL IRRIGATION (9)

Types of Impounding structures: Gravity dam – Diversion Head works - Canal drop – Cross drainage works – Canal regulations – Canal outlets – Canal lining – Kennady's and Lacey's Regime theory.

UNIT V IRRIGATION METHODS AND MANAGEMENT (9)

Lift irrigation – Tank irrigation – Well irrigation – Irrigation methods: Surface and Sub-Surface and Micro Irrigation - Merits and demerits – Irrigation scheduling – Water distribution – Participatory irrigation management with a case study

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Linsley R.K. and Franzini J.B, "Water Resources Engineering", McGraw-Hill Inc, 2000.
2. Punmia B.C., Irrigation and water power Engineering, Laxmi Publications, 16th Edition, New Delhi, 2009
3. Garg S. K., "Irrigation Engineering and Hydraulic structures", Khanna Publishers, 23rd Revised Edition, New Delhi, 2009

REFERENCES:

1. Duggal, K.N. and Soni, J.P., "Elements of Water Resources Engineering", New Age International Publishers, 2005
2. Chaturvedi M.C., "Water Resources Systems Planning and Management", Tata McGraw- Hill Inc., New Delhi, 1997.
3. Michael A.M., Irrigation Theory and Practice, 2nd Edition, Vikas Publishing House Pvt. Ltd., Noida, Up, 2008
4. Dilip Kumar Majumdar, "Irrigation Water Management", Prentice-Hall of India, New Delhi, 2008.
5. Asawa, G.L., "Irrigation Engineering", New Age International Publishers, New Delhi, 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	x		x	x
2		x	x	x	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		x

Approved by Fourth Academic council

13CE511 MATERIALS TESTING AND PRACTICE LABORATORY

L	T	P	C
0	0	3	2

OBJECTIVES:

- To gain experience regarding the determination of properties of different building materials
- To provide an opportunity to learn how to measure the parameters which governs the quality of the materials
- To impart knowledge in the area of Marking and Setting out of foundation

COURSE OUTCOMES:

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

CO1: Have hands on practice on various tests on cements.
CO2: Identify the quality of fine aggregate used in concrete.
CO3: Familiarize about various workability tests on coarse aggregate
CO4: Gain sufficient idea on practice of construction of brick masonry.
CO5: Assure the quality of materials used in construction works

LIST OF EXPERIMENTS

TESTS ON CEMENT

1. Specific Gravity
2. Fineness
3. Consistency
4. a. Initial Setting Time
   b. Final Setting Time (Study Experiment)
5. Compressive Strength on Mortar
6. Soundness Test

TEST ON FINE AGGREGATE

1. Sieve Analysis
2. Specific Gravity
3. Bulking of Sand

TEST ON COARSE AGGREGATE

1. Sieve Analysis
2. Specific Gravity
3. Water Absorption Test
4. Flakiness and Elongation index
5. Abrasion Test

CONSTRUCTION PRACTICES

1. Construction of Brick Masonry using various bonds
2. Marking and Setting out of foundation

TOTAL: 45 PERIODS

REFERENCE BOOKS:

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.

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

Approved by Fourth Academic council

13CE512 ENVIRONMENTAL ENGINEERING LABORATORY

L	T	P	C
0	0	3	2

OBJECTIVES:

- To understand the concepts of estimating different parameters of the water quality
- To identify the ill effects of environmental pollution
- To understand different parameters governing the sanitary and drainage system

COURSE OUTCOMES:

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

CO1: Estimate the parameters of the water quality
CO2: Test the water and wastewater.
CO3: Test bleaching powder and find the disinfectant percentage in chlorinated water.
CO4: Do the water and wastewater analysis.
CO5: Conduct various quality tests on water and will be able to decide the suitability of water for drinking and other purposes

LIST OF EXPERIMENTS:

1. Determination of pH, Turbidity and conductivity (IS 3025 Part 11, 10 and 14)
2. Determination of Hardness (IS 3025 Part 21)
3. Determination of Alkalinity (IS 3025 Part 23)
4. Determination of Acidity in water and waste water
5. Determination of Chlorides (IS 3025 Part 32)
6. Determination of Sulfates (IS 3025 Part 24)
7. Determination of Fluorides
8. Determination of Optimum Coagulant
9. Determination of residual chlorine and available chlorine in bleaching powder (IS 3025 Part 25 and 26)
10. Determination of Total, Suspended and Dissolved solids (IS 3025 Part 15, 17, 18, and 19)
11. Determination Dissolved Oxygen and BOD for the given sample (IS 3025 Part 38 and 44)
12. Determination of COD for given sample (IS 3025 Part 58)

TOTAL: 45 PERIODS

REFERENCES:

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

Approved by Fourth Academic council

13PT511 VERBAL APTITUDE AND REASONING - I

L	T	P	C
0	0	2	0

OBJECTIVES :

- To develop students to workout solution for problems that involves mathematics aptitude.
- To develop students to workout solutions for problems that involving general reasoning.
- To develop students to become sharp in usage of English grammar.

COURSE OUTCOMES:

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

CO1: Solve aptitude problems with ease.
CO2: Solve reasoning problems with ease.
CO3: Improve written communication skills in English.

UNIT I VERBAL **(10)**

Tense - Articles- Preposition - Subject Verb agreement- Sentences completion-Sentence Improvement-Incorrect sentences-Jumble sentence – Basic sentence structures – Voices – Auxiliary verb – Modal Auxiliaries – One word substitution.

UNIT II REASONING **(10)**

Odd man out - Number series-Diagrammatic question-Non verbal reasoning-Venn Diagram - Syllogism-Coding &decoding-Seating arrangement, Height arrangement.

UNIT III APTITUDE **(10)**

Number system-Matrix-Average-Percentage-Age-Ratio & Proportion-Partnership-Profit & loss-Mixture & Allegation.

TOTAL:30 PERIODS

TEXT BOOKS:

1. Verbal Book by Kaushal.B.Shah.
2. Reasoning & Aptitude Book by Vignesh.D.

REFERENCES:

1. Quantitative Aptitude by Dinesh Khattar, Pearson Education India, 2008.
2. Objective English by Hari Mohan Prasad & Uma Rani Sinha 5th Edition, Mc- Graw hill Education India P Ltd.2009.
3. A Modern approach to verbal & non verbal reasoning by R.S.Aggarwal. S.Chand Publication, 2012.
4. High school English Grammar & Composition by Wren & Martin S.Chand Publication 1st Edition, 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												
2												
3									x	x	x	x

Approved by Fourth Academic council

13CE601 STRUCTURAL ANALYSIS - II

L	T	P	C
3	1	0	4

OBJECTIVES:

- To understand the behavior of indeterminate structures
- To know the concepts of elastic analysis and plastic analysis
- To understand the concepts of matrix analysis of structures.

COURSE OUTCOMES:

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

CO1: Apply the concept of finite element method to structural analysis.
CO2: Employ plastic analysis to calculate the collapse loads for beams and frames.
CO3: Analyze statically indeterminate structures by imposing boundary conditions on flexibility matrix.
CO4: Form the element stiffness matrices and assemble the structure stiffness matrix for solving indeterminate problems.
CO5: Determine the member forces in suspension bridges and space truss.

UNIT I FINITE ELEMENT METHOD (9+3)

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

UNIT II PLASTIC ANALYSIS (9+3)

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

UNIT III FLEXIBILITY MATRIX METHOD (9+3)

Concept of flexibility matrix – determinate vs indeterminate - Analysis of indeterminate pin-jointed plane frames, analysis of continuous beams, rigid jointed plane frames and pin jointed plane trusses.

UNIT IV STIFFNESS MATRIX METHOD (9+3)

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

UNIT V SPACE AND CABLE STRUCTURES (9+3)

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

TOTAL: 60 PERIODS

TEXT BOOKS:

1. V.N.Vazirani & M.M.Ratwani, "Analysis of Structures" Volume I and II, Khanna Publishers, New Delhi, 2015.
2. S.S.Bhavikatti, "Structural Analysis" – Vol.I & II, Vikas Publishing Pvt Ltd., New Delhi, Fourth Edition 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
4	x	x	x			x	x				x	x
5	x	x		x								x

Approved by Fourth Academic council

13CE602 SOIL MECHANICS

L	T	P	C
3	0	0	3

OBJECTIVES:

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

CO1: Classify the soil based on index properties
CO2: Assess the permeability characteristics of soil and calculate stress at any point in a soil media due to load applied at the ground surface.
CO3: Find out the settlement of the structure
CO4: Assess the shear strength of various types of soil.
CO5: Analyze the stability of slopes using different methods.

UNIT I SOIL CLASSIFICATION AND COMPACTION (9)

Nature of soil - Phase relationships – Basic definitions and derivations - Index properties of soils - BIS classification system – Sieve analysis - Atterbergs limit - Soil compaction - comparison of laboratory &field compaction methods - Factors influencing compaction behavior of soils.

UNIT II SOIL WATER AND WATER FLOW (9)

Soil moisture - capillarity in soils – Terzaghi's effective stress law – flow of water in soils – Darcy's law - permeability, constant and falling head permeability tests - factors affecting permeability Seepage, critical hydraulic gradient, quick sand condition – introduction to flow nets - Simple problems

UNIT III STRESS DISTRIBUTION AND SETTLEMENT (9)

Vertical pressure distribution – Boussinesq equation for point load and uniformly distributed load of rectangular and circular shape - New marks influence chart – Westergaard equation - Components of settlement — immediate and consolidation settlement - Terzaghi's one-dimensional consolidation theory - computation of rate of settlement. - V_t and log t methods - e-log p relationship.

UNIT IV SHEAR STRENGTH (9)

Shear strength of cohesive and cohesion less soils - Mohr - Coulomb failure theory - Measurement of shear strength, direct shear - Triaxial compression, UCC and Vane shear tests – drained and undrained conditions - factors affecting shear strength of soil.

UNIT V SLOPE STABILITY (9)

Slope failure mechanisms - Types - infinite slopes - finite slopes - Friction circle method - Use of stability number - slope protection measures.

TOTAL: 45 PERIODS

TEXTBOOKS:

1. Murthy, V.N.S., "Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd., NewDelhi.2009.
2. Gopal Ranjan and Rao A.S.R. "Basic and Applied soil mechanics", Wiley Eastern Ltd, New Delhi (India), 2007.
3. Arora K.R. "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 2011.

REFERENCES:

1. McCarthy D, “Essentials of Soil Mechanics and Foundations” Pearson New International, Seventh Edition 2013
2. Das, B.M. “Principles of Geotechnical Engineering”, Cengage Learning, Seventh Edition 2009.
3. Punmia, B.C. Ashok Kumar Jain, Arun Kumar Jain “Soil Mechanics and Foundations”, Laxmi Publications Pvt. Ltd., New Delhi, 2005.
4. Palanikumar. M, "Soil Mechanics", Prentice Hall of India Pvt. Ltd, Leaning Private Limited, Delhi, 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			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	x		x	x	x
5	x	x	x	x	x	x		x	x	x	x	x

Approved by Fourth Academic council

13CE603 CONSTRUCTION TECHNIQUES, EQUIPMENT AND PRACTICE

L	T	P	C
3	0	0	3

OBJECTIVES:

- The main objective of this course is to make the student aware of the various construction techniques, practices and the equipment needed for different types of construction activities.
- To gain knowledge about the various construction procedures for sub to super structure
- To learn about the equipment needed for construction of various types of structures from foundation to super structure.

COURSE OUTCOMES:

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

CO1: Learn various processes exercised in the construction field.
CO2: Acquire knowledge on various techniques used for underground and under water structures.
CO3: Get exposure on construction techniques involved in substructure.
CO4: Gain knowledge about various high rise structures and their utilities.
CO5: Choose and adopt the suitable equipment in the mechanized construction towards speedy completion of projects.

UNIT I INTRODUCTION (9)

Specifications, details and sequence of activities and construction co-ordination – Site Clearance – Marking – Earthwork - masonry – stone masonry – Bond in masonry - concrete hollow block masonry – flooring – damp proof courses – construction joints – movement and expansion joints

UNIT II CONSTRUCTION PRACTICES (9)

Pre cast pavements - Building foundations – basements – temporary shed – centering and shuttering – slip forms – scaffoldings – de-shuttering forms – Fabrication and erection of steel trusses – frames – braced domes – laying brick — weather and water proof – roof finishes – acoustic and fire protection.

UNIT III SUB STRUCTURE CONSTRUCTION (9)

Techniques of Box jacking – Pipe Jacking - under water construction of diaphragm walls and basement -Tunneling techniques – Piling techniques - well and caisson - sinking cofferdam - cable anchoring and grouting - driving diaphragm walls, sheet piles - shoring for deep cutting - well points - Dewatering and stand by Plant equipment for underground open excavation.

UNIT IV SUPER STRUCTURE CONSTRUCTION (9)

Launching girders, bridge decks, off shore platforms – special forms for shells - techniques for heavy decks – in-situ pre-stressing in high rise structures, Material handling - erecting light weight components on tall structures - Support structure for heavy Equipment and conveyors - Erection of articulated structures, braced domes and space decks

UNIT V CONSTRUCTION EQUIPMENT (9)

Selection of equipment for earth work - earth moving operations - types of earthwork equipment - tractors, motor graders, scrapers, front end waders, earth movers – Equipment for foundation and pile driving. Equipment for compaction, batching and mixing and concreting - Equipment for material handling and erection of structures - Equipment for dredging, trenching, tunneling.

TOTAL: 45 PERIODS

TEXTBOOKS:

1. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., "Construction Planning, Equipment and Methods", 8th Edition, McGraw Hill, Singapore, 2010.
2. Arora S.P. and Bindra S.P., "Building Construction, Planning Techniques and Method of Construction", Dhanpat Rai and Sons, 2010.
3. Varghese, P.C. "Building construction", Prentice Hall of India Pvt. Ltd, New Delhi, 2007.

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REFERENCES:

1. Jha J and Sinha S.K., "Construction and Foundation Engineering", Khanna Publishers, 1999.
2. Sharma S.C. “Construction Equipment and Management”, Khanna Publishers New Delhi, 2002.
3. Deodhar, S.V. “Construction Equipment and Job Planning”, Khanna Publishers, New Delhi, 2012.
4. Dr. Mahesh Varma, “Construction Equipment and its Planning and Application”, Metropolitan Book Company, New Delhi, 1983.

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
3			x	x	x			x	x		x	x
4			x	x	x		x	x	x			x
5		x	x	x	x	x	x	x	x			x

AND BRICK MASONRY STRUCTURES

[IS 456, IS 1905,SP 16 and IS 3370 code books are to be permitted]

L	T	P	C
3	1	0	4

OBJECTIVES:

- 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 this 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 along with the staging and foundation.

CO3: Attain sufficient knowledge of design for staircases, flat slabs and reinforced concrete walls and gain knowledge about the principles of design of mat foundation, box culvert and road bridges.

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 RETAINING WALLS (9)

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

UNIT II WATER TANKS (9)

Design of rectangular and circular water tanks both below and above ground level - Design of circular slab.

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: 45 PERIODS

TEXTBOOKS:

1. Gambhir.M.L., "Design of Reinforced Concrete Structures", Prentice Hall of India Private Limited, 2012.
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. Mallick, D.K. and Gupta A.P., “Reinforced Concrete”, Oxford and IBH Publishing Company,1997
2. Syal, I.C. and Goel, A.K., “Reinforced Concrete Structures”, A.H. Wheelers & Co. Pvt. Ltd., 1998
3. Ram Chandra.N. and Virendra Gehlot, “Limit State Design”, Standard Book House, 2004.
4. Subramanian. N., "Design of Reinforced Concrete Structures", Oxford University, New Delhi, 2013.
5. IS456:2000, Code of practice for Plain and Reinforced Concrete, Bureau of Indian Standards, New Delhi, 2007
6. 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	

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L	T	P	C
3	0	0	3

13CE605 EARTHQUAKE ENGINEERING

[IS 1893, IS 13920 and IS 4326 code books are to be permitted]

OBJECTIVES:

- To know the basic principles of structural dynamics
- To understand the concepts of seismology
- To get an idea of about the applications of structural dynamics in earthquake engineering

COURSE OUTCOMES:

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

CO1: Know the basics principles and vibration effects on structures
CO2: Understand and analyse the dynamic forces caused by earthquakes and structures
CO3: Know the phenomena, measurements and the factors that affect the design of structures in seismic areas
CO4: Understand the design of Earthquake resistant structures
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 ofmode 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 IVEARTHQUAKE RESISTANT DESIGN (9)

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

UNIT V DESIGN METHODOLOGY (9)

IS1893-Codal provisions - Design horizontal seismic coefficient - Design base shear distribution, IS13920 and IS 4326 - Codal provisions - Base isolationtechniques - Vibration control measures - Important points in mitigating effects of earthquakeon structures.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. A K. Chopra, "Dynamics of Structures – Theory and Applications to Earthquake Engineering",
   Printice-Hall India Pvt Ltd, Fourth Edition, 2003.
2. PankajAgarwal and Manish Shrikhande, "Earthquake Resistant Design of Structures", Prentice Hall of India, 2006.

REFERENCES:

1. Mario Paz, "Structural Dynamics – Theory and Computation", CBS Publications, Second Edition, 2004.
2. IS 1893 – 2002, Criteria for Earthquake Resistant Design of Structures.

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3. IS 4326 – 1993, Earthquake Resistant Design and Construction of Buildings – Code of Practice.
4. IS 13920 – 1993, 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						X
2	x	x	x	x	x		x	x	x			x
3			x	x	x		x					x
4				x	x		x				x	x
5	x	x	x	x	x		x	x			x	x

Approved by Fourth Academic council

13CE611 CONCRETE AND HIGHWAY ENGINEERING LABORATORY

L	T	P	C
0	0	3	2

OBJECTIVES:

- To gain experience regarding the determination of properties of different building materials
- To provide an opportunity to learn how to measure the parameters which governs the quality of the materials
- To impart knowledge in the area of finding the quality of the road materials

COURSE OUTCOMES:

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

CO1: Do various workability tests on fresh concrete.
CO2: Assure the quality of coarse aggregate used in concrete.
CO3: Gain sufficient idea on practice and procedure of using bitumen in road works.
CO4: Ensure the strength characteristics of the given concrete.
CO5: Check the existing quality of conventional bituminous roads and binder

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

PRACTICES

1. Comparison between Conventional & 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: 45 PERIODS

REFERENCES:

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		

Approved by Fourth Academic council

13CE612 SOIL MECHANICS LAB

L	T	P	C
0	0	3	2

OBJECTIVES:

- To gain experience regarding the determination of properties of different types of soils and understand the bahaviour.
- 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

CO1: Classify soil based on its properties.
CO2: Assess the OMC required in the field.
CO3: Check stability of slopes by knowing shear strength of soil.
CO4: Gain knowledge about compressibility characteristics of soil.
CO5: Do the field test to find the density of soil.

LIST OF EXPERIMENTS

1. Determination of Moisture Content.
2. Determination of Relative Density for sand.
3. Sieve Analysis for Coarse Grained soil.
4. Consistency Limits and Indices.
5. Standard Proctor's Compaction Test.
6. Field Density Test. (Core cutter method and Sand Replacement method).
7. Permeability Test.
8. Unconfined Compression Test for Cohesive Soil.
9. Direct Shear Test on Sand.
10. Triaxial Compression Test (Demonstration only).
11. Consolidation Test (Demonstration only).

TOTAL: 45 PERIODS

REFERENCES:

1. "Soil Engineering Laboratory Instruction Manual" published by Engineering College Co-operative Society, Anna University, Chennai, 1996.
2. Lambe T.W. Soil Testing for Engineers, John Wiley and Sons, New York, (1997).
3. T.K.Bowles, Engineering Properties of Soils and their measurements, Tata McGraw Hill Publications (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
2		x	x		x		x					x
3		x	x	x	x		x	x	x	x	x	x
4			x		x		x					x
5		x	x	x	x		x	x	x	x	x	x

Approved by Fourth Academic council

13GE611 COMPREHENSION

L	T	P	C
0	0	2	1

OBJECTIVES:

- 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 this course, student will be able to

CO1: Understand and comprehend any given problem related to Civil Engineering field.
CO2: Recall the fundamentals 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: 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 Fourth Academic council

13PT611 VERBAL APTITUDE AND REASONING - II

L	T	P	C
0	0	2	0

OBJECTIVES :

- To develop students to workout solution for problems that involves mathematics aptitude.
- To develop students to workout solutions for problems that involving general reasoning.
- To develop students to become sharp in usage of English grammar.

COURSE OUTCOMES:

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

CO1: Solve aptitude problems with ease.
CO2: Solve reasoning problems with ease.
CO3: Improve written communication skills in English.

UNIT I VERBAL **(10)**

Error spotting-Confusable words- Idioms & phrases-Synonyms & Antonyms-Statement & Arguments-Reading comprehension-Theme detection- Transformation of sentences – Degrees of Comparison – Modifiers – Phrasal verbs - Connectives.

UNIT II REASONING **(10)**

Logical Puzzle-Cube problems-Analogy-Blood Relations-Directions-Data Interpretation-Data sufficiency-Statement & Assumption.

UNIT III APTITUDE **(10)**

Simple and Compound Interest-Probability-Permutation and Combination-Speed & Distance-Train-Time & Work- Pipes & cisterns-Calendar-Clock-Volume & surface areas.

TOTAL: 30 PERIODS

TEXT BOOKS:

1. Verbal Book by Kaushal.B.Shah.
2. Reasoning & Aptitude Book by Vignesh.D.

REFERENCES:

1. Quantitative Aptitude by Dinesh Khattar, Pearson Education India, 2008.
2. Objective English by Hari Mohan Prasad & Uma Rani Sinha 5th Edition, Mc- Graw hill Education India P Ltd.2009.
3. A Modern approach to verbal & non verbal reasoning by R.S.Aggarwal, S.Chand Publication, 2012.
4. High school English Grammar & Composition by Wren & Martin S.Chand Publication 1st Edition, 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												
2												
3									x	x	x	x

Approved by Fourth Academic council

13CE701 PRESTRESSED CONCRETE STRUCTURES
[IS 1343-2012 code book is to be permitted]

L	T	P	C
3	0	0	3

OBJECTIVES:

- 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 this course, student will be able to

CO1: Selection of various methods of prestressing.
CO2: To identify and apply the applicable industry design codes relevant to the design 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 bearing 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 limit based on 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: 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", Third Edition, Wiley India Pvt.Ltd. New Delhi, 2013.
3. IS 1343:2012, Code of Practice for Prestressed Concrete, 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

Approved by Fourth Academic council

13CE702 FOUNDATION ENGINEERING
[IS 6403:1981(R2002) code book is to be permitted]

L	T	P	C
3	0	0	3

OBJECTIVES:

- To impart knowledge on common method of sub soil investigation and design of foundation.
- At the end of this course student acquires the capacity to investigate the soil condition and to select and design a suitable foundation.

COURSE OUTCOMES:

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

CO1: To select type of foundation
CO2: To know the bearing capacity of soil
CO3: To Design the shallow foundation as per codal provisions
CO4: Design the pile foundation and study its factors for selection
CO5: Analysis and design of retaining structures

UNIT I SITE INVESTIGATION AND SELECTION OF FOUNDATION (9)

Scope and objectives – Methods of exploration – auguring and boring – Wash boring and rotary drilling – Depth of boring – Spacing of bore hole – Sampling techniques – Representative and undisturbed sampling – methods - Split spoon sampler, Thin wall sampler, Stationery piston sampler – Penetration tests (SPT and SCPT) - Bore log report –Selection of foundation based on soil condition.

UNIT II SHALLOW FOUNDATION (9)

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

UNIT III FOOTINGS AND RAFTS (9)

Types of footings – Contact pressure distribution: Isolated footing – Combined footings – Types and proportioning – Mat foundation – Types and applications – Proportioning – Floating foundation.

UNITIVPILE FOUNDATION (9)

Types of piles and their function – Factors influencing the selection of pile – Carrying capacity of single pile in granular and cohesive soil – static formula – dynamic formulae (Engineering news and Hileys) – Capacity from insitu tests (SPT and SCPT) – Negative skin friction – uplift capacity Group capacity by different methods (Feld's rule, Converse – Labarra formula and block failure criterion) – Settlement of pile groups – Interpretation of pile load test (routine test only) – Under reamed piles.

UNIT V RETAINING WALLS (9)

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

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Punmia, B.C. "Soil Mechanics and Foundations", Laxmi Publications Pvt.Ltd., New Delhi, 16th edition 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 edition, 2016.
3. Purushothama Raj. P., "Soil Mechanics and Foundation Engineering", 2nd Edition, Pearson Education, 2013
4. IS 6403- 1981(R2002) "Breaking capacity of shallow foundation", Bureau of Indian Standards, New Delhi, 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	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		
5	x	x	x	x	x		x				x	x

Approved by Fourth Academic council

13CE703 QUANTITY SURVEYING AND ESTIMATION

L	T	P	C
3	0	0	3

OBJECTIVES:

- This subject covers the various aspects of estimating of quantities of items of works involved in buildings, water supply and sanitary works, road works and irrigation works.
- This also covers the rate analysis, valuation of properties and preparation of reports for estimation of various items.
- At the end of this course the student shall be able to estimate the material quantities, prepare a bill of quantities, make specifications and prepare tender documents.
- Student should also be able to prepare value estimates.

COURSE OUTCOMES:

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

CO1: To study the estimation of buildings
CO2: To know the estimation of irrigation structures
CO3: To learn the tenders and contracts
CO4: To know the valuation of building
CO5: Prepare the report for civil structures

UNIT I ESTIMATIONS OF BUILDINGS (11)

Load bearing and framed structures – Calculation of quantities of brick work, RCC, PCC, Plastering, white washing, colour washing and painting / varnishing for shops, rooms, residential building with flat and pitched roof – Various types of arches – Calculation of brick work and RCC works in arches – Estimate of joineries for paneled and glazed doors, windows, ventilators, handrails, bidding, tiling, painting .

UNIT II ESTIMATE OF OTHER STRUCTURES (10)

Estimating of sanitary and water supply installations – water supply pipe line – sewer line – tube well – open well – estimate of bituminous and cement concrete roads – estimate of retaining walls – culverts – estimating of irrigation works – aqueduct, syphon, fall - Cement Adequacy.

UNIT III SPECIFICATION AND TENDERS (8)

Data – Schedule of rates – Analysis of rates – Specifications – sources – Detailed and general specifications – Tenders – Contracts – Types of contracts – Arbitration and legal requirements – Lead & Lift.

UNIT IV VALUATION (8)

Necessity – Basics of approximate estimation values in engineering – Capitalized value – Depreciation – Escalation – Value of building – Calculation of Standard rent – Mortgage – Lease.

UNIT V REPORT PREPARATION (8)

Principles for report preparation – report on estimate of residential building – Culvert – Roads – Water supply and sanitary installations – Tube wells – Open wells.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Dutta, B.N., “Estimating and Costing in Civil Engineering”, UBS Publishers & Distributors Pvt. Ltd., New Delhi, 2013
2. Kohli, D.D and Kohli, R.C., “A Text Book of Estimating and Costing (Civil)”, S.Chand & Company Ltd., 2014.

REFERENCES:

1. PWD Data Book 2015
2. CMDA Hand Book

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	x	x
4	x	x	x	x	x	x	x	x	x	x		x
5	x				x				x	x		x

Approved by Fourth Academic council

13CE731 DESIGN PROJECT

L	T	P	C
0	0	4	2

OBJECTIVES:

- 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 this course, student will be able to

CO 1: Formulate a problem definition in the field of Civil Engineering through literature survey.

CO 2: Develop methodology using appropriate tools for the problem.

CO 3: Identify the objectives of the project by thorough understanding of the problem

CO 4: Gain sufficient idea on practice of various fields in civil Engineering.

CO 5: To 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 : 20 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 : 50 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: 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	x	x
2	x	x			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	x

Approved by Fourth Academic council

13CE712 DESIGN AND DRAFTING LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

- 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 this course, student will be able to

CO 1: Identify and calculate the different types of loadings for various Structures
CO 2: Identify the method of analysis
CO 3: Acquires hands on experience in design structural drawings for concrete structures
CO 4: Gain sufficient idea on practice of construction of water tanks.
CO 5: 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

TOTAL: 60 PERIODS

Note: Manual Design & Auto CAD Drawing

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.

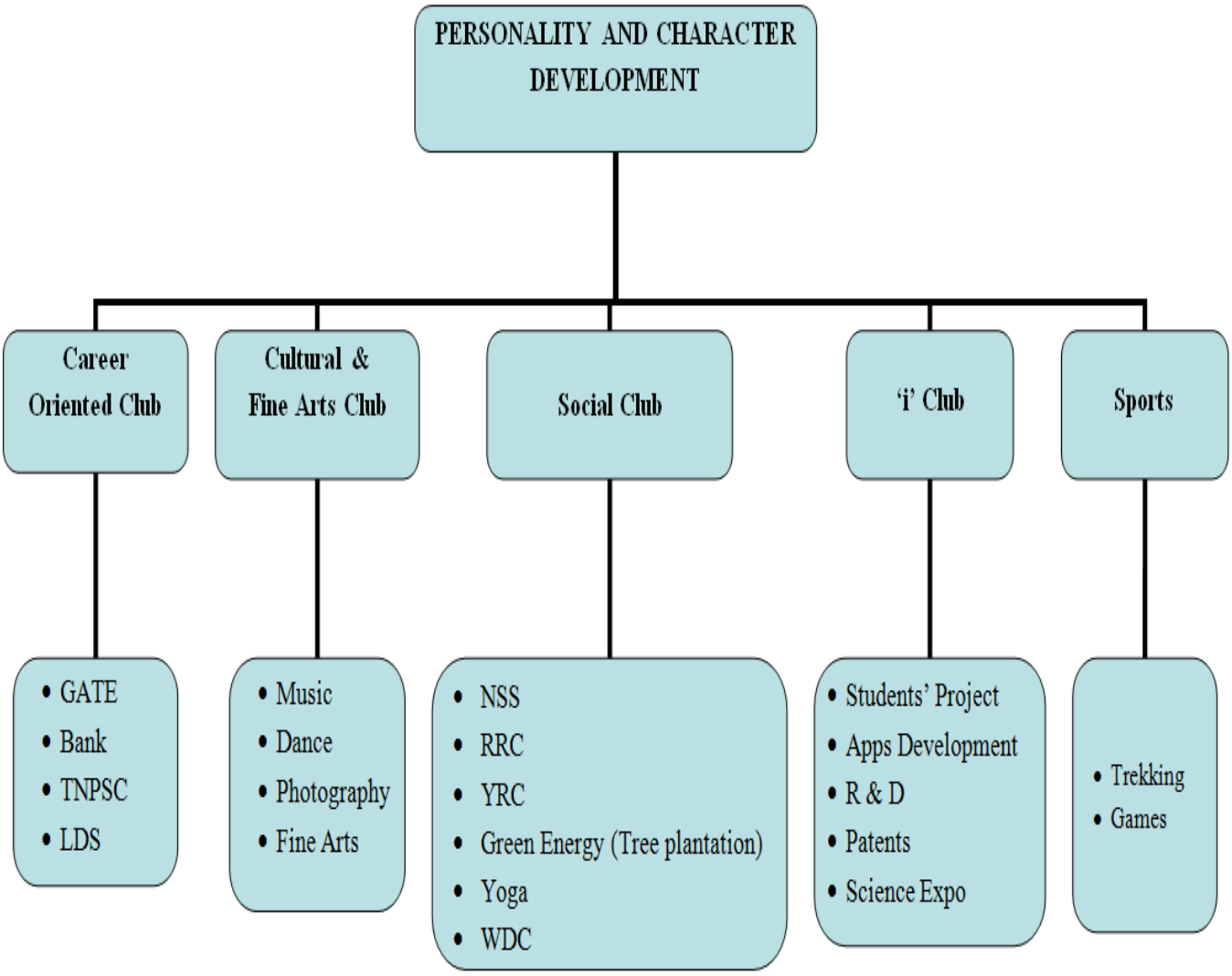
Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

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	

Approved by Fourth Academic council

13GE711 PERSONALITY AND CHARACTER DEVELOPMENT

L	T	P	C
0	0	1	0



***LDS - Leadership Development Skills**

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.

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)

Approved by Fourth Academic council

13CE713 PRACTICAL TRAINING

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

L	T	P	C
0	0	2	1

OBJECTIVES:

- This course 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 this course, student will be able to

CO 1: On completion of the practical training, students will have a 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

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

Approved by Fourth Academic council

13CE831 PROJECT WORK

L	T	P	C
0	0	20	10

OBJECTIVES:

- 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, student will be able to

CO 1: Identify the objectives of the project by thorough understanding of the problem.
CO 2: Develop methodology using appropriate tools for the problem.
CO 3: To take up any challenging practical problems and find solution based on literature.
CO 4: Analyze the problem based on the methodology and tabulate the results.
CO 5: 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.

TOTAL: 300 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	x	x	x	
2	x	x	x	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
5	x	x	x		x	x	x	x	x		x	

Approved by Fourth Academic council

LIST OF PROFESSIONAL ELECTIVES FOR E-1& E-2

13CEX01 HOUSING PLANNING AND MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVES:

- The objective of the course is to 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.
- Emphasis is given on the principles of sustainable housing policies and programmes.

COURSE OUTCOMES:

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

CO1: Do understand the basic housing related terms and principles.
CO2: Understand and comprehend the specifications and design of various Housing programme.
CO3: Handle the planning and design of various housing projects.
CO4: Use the cost effective Techniques and materials to reduce the project cost.
CO5: Have knowledge on housing finance and project appraisal.

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: 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 Edition, Tata McGraw Hill Edition, 2011
3. Walter Martin Hosack, "Land Development Calculations", McGraw Hill 2nd Edition, 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 Fourth Academic council

13CEX02 GIS AND REMOTE SENSING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the basic concepts of remote sensing.
- To give knowledge on various types of map analysis and GIS.
- To provide an exposure about DBMS and its practical applications
- To know the applications of Geographic information systems in Civil Engineering.

COURSE OUTCOMES:

At the end of this course, student 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: Use various analysis and interpretation of GIS results.
CO4: Study on GIS and Analyze the data using DBMS.
CO5: Interpret and enhance the image for analysis.

UNIT I INTRODUCTION TO REMOTE SENSING (9)

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

UNIT II PHOTOGRAMMETRY (9)

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

UNIT III IMAGE INTERPRETATION (9)

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 (9)

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: 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 Modelling, Prentice-Hall of India 2005.
4. Wolf, P.R., "Elements of Photogrammetry with Applications. in GIS", Mc.Graw- Hill International Book Company, Fourth Edition 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
2	x	x			x			x	x			
3		x		x					x	x		
4			x			x						x
5		x			x		x		x	x		

Approved by Fourth Academic council

13CEX03 ENVIRONMENTAL IMPACT ASSESSMENT

L	T	P	C
3	0	0	3

OBJECTIVES:

- 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 this course, student 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 (8)

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

(10) EIA for infrastructure projects – Dams – Highways – Multi-storey Buildings – Water Supply and Drainage Projects – Waste water treatment plants & STP.

TOTAL: 45 PERIODS

TEXTBOOKS:

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 Fourth Academic council

13CEX04 TRANSPORT PLANNING AND MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the concepts of transport planning
- To know the importance of distribution methods
- To evaluate transport planning alternates

COURSE OUTCOMES:

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

CO1. Study about the transportation planning process.
CO2. Understand the trip generation and its analysis
CO3.Adopt various distribution methods
CO4.Understand the assignment of traffic
CO5.Economical evaluate the transportation planning alternates

UNIT I TRANSPORT PLANNING PROCESS (10)

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 (9)

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 (9)

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: 45 PERIODS

TEXT BOOK:

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	x			
3			x				x					
4					x		x		x			x
5							x		x		x	

Approved by Fourth Academic council

13CEX05 CONSTRUCTION PLANNING AND SCHEDULING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To make the students to learn about planning of construction projects
- To study about scheduling procedures and techniques
- To understand the cost and quality control.

COURSE OUTCOMES:

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

CO1: The student should be able to plan construction projects
CO2: Determine the schedule activities using network diagrams
CO3: Determine the cost of the project, control the cost of the project by creating cash flows and budgeting
CO4: Understand about quality control and its safety during construction
CO5: Implement the use of project information.

UNIT I CONSTRUCTION PLANNING (6)

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 (12)

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 (9)

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 (9)

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: 45 PERIODS

TEXTBOOKS:

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 Edition, 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		x	x
2	x	x		x						x	x	
3	x		x		x	x	x			x		
4	x					x		x		x	x	
5				x	x	x		x			x	x

Approved by Fourth Academic council

13CEX06 HYDROLOGY

L	T	P	C
3	0	0	3

OBJECTIVES:

- To have good understanding of all the components of the hydrological cycle.
- To know the methods of estimating evaporation and infiltration losses.
- To realize the importance of flood control and mitigation measures.

COURSE OUTCOMES:

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

CO1: Understand the various components of hydrological cycle and their interactions.
CO2: Determine the magnitude of infiltration, evaporation and evapotranspiration by various empirical methods.
CO3: Study on various types of hydrographs and their applications
CO4: Estimate the flood by various methods and concept of flood routing.
CO5: Understand the dynamics of groundwater flow and their estimation

UNIT I 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 – S curve hydrograph – Unit hydrograph of different deviations - Synthetic Unit Hydrograph.

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 – Specific capacity – Pumping test – Steady flow analysis only.

TOTAL: 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			
2			x			x	x					
3			x		x	x						x
4			x	x	x		x					x
5					x	x						x

Approved by Fourth Academic council

13CEX07 OPERATION AND MANAGEMENT OF IRRIGATION SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To help the students to understand the principles and operations of various methods of water management in irrigation system.
- To teach students about the principles of water logging and water shed management.
- To teach importance of the reservoir planning, water laws, operational strategies and farmer's role in operation and management of irrigation systems.

COURSE OUTCOMES:

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

CO1: Develop the skills to compute the irrigation demand and suggest proper methods of meeting the demand from available supply.
CO2: Learn to suggest the scheduling of water releases to command area from impounded reservoir etc.
CO3: Demonstrate the conjunctive use of surface and ground water by selecting proper irrigation system with its optimal operating strategy.
CO4: Develop enough skills in preliminary designing of main canals, laterals and field channels, water control and regulating structures to meet outcome number
CO5: Develop skill in optimal operational strategy with farmer's involvement

UNIT I IRRIGATION SYSTEM REQUIREMENTS (9)

Irrigation system requirements – gravity and lift irrigation – supply and demand of water – cropping pattern – estimation of total and peak crop water requirements – effective and dependable rainfall – allowable deficits – irrigation efficiency.

UNIT II IRRIGATION SCHEDULING (9)

Frequency of irrigation – methods of scheduling irrigation – developing typical schedules – case studies – water conveyance systems – water measurements.

UNIT III MANAGEMENT (9)

Structural and non structural strategies in water use and management – conjunctive use of surface and ground water.

UNIT IV OPERATION (9)

Operational plans – main canals, laterals and field channels – water control and regulating structures – physical and administrative control – water law.

UNIT V FARMERS INVOLVEMENT (9)

Farmers role in system operation – farmers committee for water distribution, On-farm management and maintenance of the irrigation system – Government – farmer partnership in irrigation.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Mays,L.W., "Water Resource Systems Management Tools", McGraw Hill Co., 2004

REFERENCES:

1. R.T. Gandhi,"Handbook on Irrigation Water Requirements", Water Management division, Department of Agriculture, Ministry of Agriculture, New Delhi 1998.
1. A.R. Robinson, C.W.Laurizen & D.C. Muckel, "Distribution control and Measurement of Irrigation Water on the farm", USDA, Misc 1998.
2. W.E. Code, "Farm Irrigation Structures", Colorado State University Bulletin, 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	x
2						x						
3			x				x					
4	x	x				x	x					
5					x		x				x	

Approved by Fourth Academic council

13GEC04 TOTAL QUALITY MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand basic concepts and planning in total quality management.
- To understand the various principles adopted in maintaining quality in an organization.
- To familiarize on statistical analysis systems.
- To study various control tools to measure quality in an organization.
- To create awareness about ISO and QS certification process and its need.

COURSE OUTCOMES:

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

CO1: Adopt 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 - Customer focus - Customer orientation, Customer satisfaction, Customer complaints & Customer retention - Costs of quality.

UNIT II TQM PRINCIPLES (9)

Leadership - Strategic quality planning & Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Quality circles Recognition and Reward - Performance appraisal – Continuous process improvement – PDCA 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 Development (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: 45 PERIODS

TEXTBOOK:

1. Dale H. Besterfiled, et at., "Total quality Management", Pearson Education Asia, Third Edition, Indian Reprint, 2006.

REFERENCES:

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012.
2. Suganthi. L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.
3. 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
5			x				x					

Approved by Fourth Academic council

LIST OF PROFESSIONAL ELECTIVES FOR E-3 & E-6

13CEX08 CONSTRUCTION MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVES:

- 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 this course, student will be able to

CO1: To know about Contracts and organizational structure
CO2: To study the acts and safety aspects.
CO3: To learn graphical representation and networks.
CO4: Become a skilled at tenders and report preparation
CO5: 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 (9)

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 (9)

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 (9)

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 (9)

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: 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 Fourth Academic council

13CEX09 NATURAL DISASTER MITIGATION AND MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVES:

- 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 this course, student will be able to

CO1: To assess the natural disaster mitigation and recovery management
CO2: To study the natural disaster and their principles
CO3: To know the climate system and monitoring
CO4: Assess vulnerability and various methods of risk reduction measures as well as mitigation
CO5: To evaluate administrative mechanisms in disaster management

UNIT I NATURAL DISASTERS – OVERVIEW (9)

Introduction- Natural Disasters around the world- Natural Disaster Risk Assessment- Earth and its characteristics - Human Dimensions of Global environment Change – Disaster mitigation, preparedness, response and recovery comprehensive emergency management Early warning systems and Disaster Preparedness– Rehabilitation, Vulnerable Populations - Logistics and Services, Food, Nutrition and Shelter -Role of UN Red cross and NGOs.

UNIT II NATURAL HAZARDS (9)

Introduction and Review - Natural Disasters -Principles, Elements, and Systems - Geological-Geomorphologic aspects, - Earthquake-Geology, Seismology, Characteristics and dimensions– Landslides- Human impact on the mountainous terrain and its relationship with Rainfall, liquefaction etc- Tsunami - Nature and characteristics.

UNIT III CLIMATE SYSTEM ASPECTS AND PROCESSES (9)

Oceanic, Atmospheric and Hydrologic cycles - Severe Weather & Tornadoes , Cyclones, Floods and Droughts -Global Patterns - Mitigation & Preparation – Drought – Famine- nature and dimensions – Drought Assessment and Monitoring.

UNIT IV NATURAL DISASTER COMMUNICATION (9)

Mapping - Modeling, risk analysis and loss estimation – Natural disaster risk analysis - prevention and mitigation -Applications of Space Technology (Satellite Communications, GPS, GIS and Remote Sensing and Information / Communication Technologies (ICT) in Early warning Systems - Disaster Monitoring and Support Centre– Information Dissemination, mobile communication – etc.

UNIT V ADMINISTRATIVE MECHANISMS (9)

Community and Social organizations – Education and Training – Establishment of capacity building among various stake holders – Government - Educational institutions – Use of Multi-media knowledge products for self education.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Kovach, Robert L. Earth's Fury, “An Introduction to Natural Hazards and Disasters, Englewood Cliffs, N.J., Prentice Hall, 1995

REFERENCES:

1. Pardeep Sahni, Alka Dhameja, Uma Medury, Disaster Mitigation: Experiences and Reflections, PHI Learning, 2001
2. Blodget Robert, Keller Edwards, Earth’s processes as hazards disasters and catastrophe, Pearson Prentice Hall, 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					
2			x				x					
3					x				x		x	
4			x				x					x
5								x			x	

Approved by Fourth Academic council

13CEX10 ARCHITECTURE AND TOWN PLANNING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce the fundamental concepts of architecture.
- To know the different type of architectures and its importance
- To understand the basic principles of town planning.

COURSE OUTCOMES:

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

CO1: Know the Architecture that can enhance the building in terms of appearance and utility.

CO2: Acquire knowledge on interior planning and use of building materials.

CO3: Identify the suitable water supply and drainage patterns for different types of building.

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

CO5: Understand issues relating to Housing policy and its impact on housing development in Indian context**.**

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 & GIS in town planning.

TOTAL: 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 edition .,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 Edition, 1986.
2. S.C.Rangwala, K.S.Rangwala and P.S.Rangwala, 'Town Planning", Charotar Publishing House,18th Edition,2003.
3. National Building Code of India, SP7 (Group 1) Bureau of Indian Standards, New Delhi, 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
3			x		x		x	x		x		x
4			x		x		x		x	x		
5			x		x		x	x	x	x		x

Approved by Fourth Academic council

13CEX11 TRAFFIC ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To study the concepts of traffic engineering and its facilities
- To understand the methods for efficient management of traffic in urban roads
- To understand the design principles of pavement

COURSE OUTCOMES:

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

CO1: Perform traffic studies
CO2: Know importance of traffic management
CO3: Identify the specification of traffic facilities
CO4: Design different types of pavements
CO5: Have Knowledge about the components of Pavements

UNIT I TRAFFIC STUDIES (9)

Road user and Vehicle Characteristics - Traffic Studies -Traffic volume and composition - speed, Headway - Concentration and Delay & Flow principles - Capacity and level of service.

UNIT II TRAFFIC FACILITIES (9)

Signals - Islands - Types and General layout of at-grade and grade separated intersections – Intelligent Transport System – CCTV Detection.

UNIT III TRAFFIC REGULATIONS AND MANAGEMENT (9)

Traffic signs and markings - Parking practices - Traffic management measures – Highway Safety.

UNIT IV GENERAL PRINCIPLES AND FLEXIBLE PAVEMENT DESIGN (9)

Factors affecting pavements stability – equivalent single wheel load – vehicle, soil, traffic & Climatic factors – stress distribution in different conditions - CBR method of design - AASSO method & Burmister design method.

UNIT V RIGID PAVEMENT DESIGN (9)

Stresses in concrete pavement – IRC method – design of steel reinforcements – Function of joints, design of joints in concrete pavements - Joint Fillers and sealant.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Kadiyali.L.R. “Traffic Engineering and Transportation Planning”, Khanna Publishers, 2000

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				
2					x		x		x		x	
3					x		x					x
4	x	x	x		x		x	x		x		x
5				x			x					x

Approved by Fourth Academic council

13CEX12 CONSTRUCTION SAFETY

L	T	P	C
3	0	0	3

OBJECTIVES:

- To recognize reasons of accidents and hazards during progress of construction.
- To identify suitable method of safety against construction accidents.
- To recognize obligations for the duration of contract.

COURSE OUTCOMES:

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

CO1: To identify the correct and proper method of managing accidents by analyzing the situation.

CO2: To get trained to choose the appropriate safety programmes at the site.

CO3: To get acquainted to adopt the contractual obligations which are essential in the site.

CO4: To implement plan for safety technology for the safety of workers.

CO5: To know the hazard assessment procedures and their control.

UNIT I CONSTRUCTION ACCIDENTS (9)

Accidents and causes - accident prevention - principles of accident prevention - potential hazards/risks associated with construction sites - high risk activities - use of hoists - working at height and working in confined space - costs of construction injuries - accident management.

UNIT II CONSTRUCTION SAFETY PROGRAMMES (9)

Introduction - problem areas in construction safety - elements of effective safety programme - job safety analysis - fault free analysis - job-site safety assessment - safety regulations at construction sites - code of practice - human factors in construction safety - construction safety management safety meetings safety incentives safety training - safety policy - safety committees - safety inspection - safety audit.

UNIT III CONTRACTUAL OBLIGATIONS (9)

Government's policy in industrial safety - safety scenario in construction industries - safety and health legislation in India - safety provisions in construction contracts - sub contractual obligation -workers compensation - substance abuse - safety record keeping.

UNIT IV DESIGNING FOR SAFETY (9)

Safety culture - safe workers - first line supervisors - middle managers - top management practices - company activities on safety - safety personnel - project coordination and safety procedures - safety technology - principles of risk and loss control - machinery safety - machine guarding - workplace ergonomics including display screen equipment and manual handling - personal protective equipment - first aid and emergency preparedness - fire safety - electrical hazards.

UNIT V OCCUPATIONAL HEALTH PRACTICES (9)

Statutory requirements and regulations related to health hazards - legal implications - dust hazards and control - occupational and safety hazard assessment - noise assessment and control measures - impact and vibration.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Jimmy W. Hinze, "Construction Safety", Prentice Hall of India. 1997.
2. Richard J. Coble, Jimmie Hinze and Theo C. Haupt, "Construction Safety and Health Management", Prentice Hall of India. 2001.

REFERENCES:

1. Tamilnadu Factory Act, Department of Inspectorate of factories, Tamilnadu.
2. Koncz T., "Manual of precast concrete construction", Vol. I, II and III, Bauverlag, GMBH, 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	
2					x							
3			x				x				x	x
4			x								x	
5					x		x					x

Approved by Fourth Academic council

13CEX13 GROUND WATER ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the distribution of ground water, evaluation of aquifer parameters, solving groundwater equations.
- Ground water quality and development of ground water methods are dealt.

COURSE OUTCOMES:

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

CO1: To study the Hydrogeological Cycle
CO2: To know ground water flow and flow nets
CO3: To learn the estimation parameters
CO4: To identify the geophysical methods
CO5: To study the water quality properties

UNITI FUNDAMENTAL OF GROUND WATER (9)

Introduction – Characteristic of Ground water – Distribution of water - ground water column – Permeability - Darcy's Law - Types of aquifers - Hydrogeological Cycle – water level fluctuations.

UNITIIHYDRAULICS OFFLOW (9)

Storage coefficient - Specific field - Heterogeneity and Anisotrophy -Transmissivity – Governing equations of ground water flow - Steady state flow - Dupuit Forchheimer assumptions – Velocity potential - Flow nets.

UNIT III ESTIMATION OF PARAMETERS (9)

Transmissivity and Storativity – Pumping test - Unsteady state flow - Thiess method – Jacob method - Image well theory – Effect of partial penetrations of wells - Collectors wells.

UNIT IV GROUND WATER DEVELOPMENT (9)

Infiltration gallery - Conjunctive use - Artificial recharge Rainwater harvesting - Safe yield –Yield test – Geophysical methods – Selection of pumps.

UNIT V WATER QUALITY (9)

Ground water chemistry - Origin, movement and quality - Water quality standards – Saltwater intrusion –Environmental concern.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Raghunath H.M., "Ground Water Hydrology", Wiley Eastern Ltd., 2nd reprint 2000.
2. Todd D.K., "Ground Water Hydrology", John Wiley and Sons, 2nd Edition 2007.

REFERENCE:

1.C Walton, "Ground Water Resource Evaluation", McGraw-Hill Publications.

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		x
4				x	x			x		x	x	x
5			x	x			x			x		x

Approved by Fourth Academic council

13CEX14 REPAIR AND REHABILITATION OF STRUCTURES

L	T	P	C
3	0	0	3

OBJECTIVES:

- 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 this 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: 45 PERIODS

TEXT BOOKS:

1. Denison Campbell, Allen and Harold Roper, “Concrete Structures, Materials, Maintenance and Repair”, Longman Scientific and Technical UK, 1991.
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, 2010.
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. etal. Lecture Notes of Workshop on "Repairs and Rehabilitation of Structures", 29th - 30th October 1999.

Approved by Fourth 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		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 Fourth Academic council

13CEX15 INDUSTRIAL WASTE TREATMENT AND DISPOSAL

L	T	P	C
3	0	0	3

OBJECTIVES:

- 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 this 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: 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", McGraw Hill 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 Fourth Academic council

13CEX16 MUNICIPAL SOLID WASTE MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVES:

- 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 this 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: 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			

Approved by Fourth Academic council

13CEX17 ECONOMICS AND BUSINESS FINANCE FOR CIVIL ENGINEERS

L	T	P	C
3	0	0	3

OBJECTIVES:

- 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 this course, the students will be able to

CO1: Study the elements and laws of construction economics
CO2: Know the economics and values of ecology
CO3: Study the need for financial management
CO4: Know the few accounting methods
CO5: Study the Tender documents

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: 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

Approved by Fourth Academic council

13GEC01 PRINCIPLES OF MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVES:

- To give exposure on management concepts.
- To provide knowledge on Planning and decision making at different conditions.
- To give exposure on organising.
- To familiarize the concept of directing.
- To provide knowledge of quality control and cost control techniques

COURSE OUTCOMES:

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

CO 1: Have a comprehensive knowledge on management concepts
CO 2: Plan under different conditions and situations
CO 3: Do organizing of the human resources
CO 4: Motivate employees and manage the projects
CO 5: Do budgetary and non-budgetary control of projects

UNIT I OVERVIEW OF MANAGEMENT **(**9)

Organization - Management - Role of managers - Evolution of Management thought - Organization and the environmental factors - Managing globally - 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 groups I 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 - Leadership theories - Communication - Hurdles to effective communication – Organization Culture - Elements and types of culture - Managing cultural diversity.

UNIT V CONTROLLING (9)

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: 45 PERIODS

TEXT BOOKS:

1. Stephen P. Robbins and Mary Coulter, “Management”, Prentice Hall of India, 8th ed.
2. Charles W L Hill, Steven L Mc Shane, “Principles of Management”, Mc Graw Hill Education, Special Indian Edition, 2007.

REFERENCES:

1. Hellriegel, Slocum & Jackson, "Management - A Competency Based Approach", Thomson South Western, 10th edition, 2007.
2. Harold Koontz, Heinz Weihrich and Mark V Cannice, "Management - A global & Entrepreneurial Perspective", Tata Mc Graw Hill, 12th ed., 2007.
3. Andrew J. Dubrin, "Essentials of Management", Thomson Southwestern, 7th 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	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

Approved by Fourth Academic council

13GEC02 ETHICS AND CYBER SECURITY

L	T	P	C
3	0	0	3

OBJECTIVES:

- To impart basic knowledge on ethical issues, behaviours and responsibilities. To provide the overview of cyber crime and its effects.

COURSE OUTCOMES:

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

CO1: Describe the importance of ethical issues, theories and applications
CO2: Summarize the need of ethical behaviour in engineering by considering the safety aspects
CO3: List the ethical responsibilities and Intellectual Property Rights
CO4: Relate the ethical issues in global perspective
CO5: Explain the necessity for cyber security and its stages

UNIT I 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. Case studies - cellular phones and cancer, cellular phones and automotive safety.

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION AND SAFETY (9)

Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk. Case studies - The Challenger disaster, automobile crash testing.

UNIT III RESPONSIBILITIES AND RIGHTS (9)

Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights - Intellectual Property Rights (IPR) – discrimination - Case studies - Three Mile Island, Chernobyl.

UNIT IV GLOBAL ISSUES (9)

Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors - moral leadership. Case studies - Bhopal Gas Tragedy, Kumbakonam School Fire Tragedy

UNIT V CYBER SECURITY (9)

Cyber Security - Cyber Security policy - Cyber Security Evolution - Cyber Security Management - Arriving at Goals - Cyber Security Documentation - The Catalog Approach - Catalog Format - Cyber Security Policy Taxonomy - Risk Management

TOTAL: 45 PERIODS

TEXT BOOK:

1. Nagarajan R.S, “A textbook on Professional Ethics and Human Values”, New age International publishers, 1st ed., Reprint 2013

REFERENCES:

1. Kiran.D.R, "A textbook on Professional Ethics and Human Values", Tata McGraw Hill publishing company, 2007
2. Charles D. Fleddermann, "Engineering Ethics", 2nd ed., Pearson Education Singapore, 2007
3. Douglas Jacobson and Joseph Idziorek, "Computer Security Literacy - Staying Safe in a Digital World", CRC Press, 2013
4. Govindarajan M, Natarajan S, and Senthil Kumar V. S, "Engineering Ethics", 1st ed., Prentice Hall of India, New Delhi, 2009
5. James Graham, Ryan Olson, Rick Howard, "Cyber Security Essentials", CRC Press, Auerbach Publications 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
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

Approved by Fourth Academic council

13CEZ01 INDUSTRIAL SAFETY ENGINEERING

(*Common to All branches except Civil Engineering)*

L	T	P	C
3	0	0	3

OBJECTIVES:

- To achieve an understanding of principles of safety engineering.
- To enable the students to learn about various functions and activities of safety department.
- To have knowledge about various hazard identification and risk assessment techniques.

COURSE OUTCOMES:

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

CO1: Understand the functions and activities of safety engineering department.
CO2: Prepare an accident investigation report.
CO3: Estimate the accident cost using supervisors report and data.
CO4: Evaluate the safety performance of an organization from accident records.
CO5: List out requirements mentioned in factories act for the prevention of accidents.

UNIT I : CONCEPTS OF SAFETY MANAGEMENT AND ACCIDENT PREVENTION (10)

History of Safety movement – Evolution of modern safety concept - safety management functions –safety organization & safety department- safety committee - line and staff functions for safety - budgeting for safety - safety policy – accident causes - unsafe act and condition - principles of accident prevention – accident investigation and analysis – records for accidents - cost of accident.

UNIT II : HAZARD IDENTIFICATION, RISK ASSESSMENT AND CONTROL (10)

Hazard - classification - chemical, physical, mechanical, ergonomic & biological hazards - hazard evaluation techniques - job safety analysis, safety survey, safety inspection, safety sampling, - fault tree analysis – event tree analysis – failure modes and effect analysis and relative ranking techniques – past accident analysis - estimation of likelihood - consequence analysis – risk estimation – Hierarchy of Hazard control.

UNIT III : SAFETY IN ENGINEERING INDUSTRY (10)

Safety in use of machinery - turning machines, boring machines, milling machine, planning machine and grinding machines, CNC machines & wood working machinery - Principles of machine guarding -Guarding during maintenance, zero mechanical state (ZMS), definition, policy for ZMS – safety in welding and gas cutting- safety in cold forming and hot working of metals - safety in finishing, inspection and testing - occupational diseases - Lead –Nickel, Chromium &Manganese toxicity.

UNIT IV : SAFETY PERFORMANCE MONITORING (8)

Work injury experience – permanent total disabilities, permanent partial disabilities & temporary total disabilities - Calculation of accident indices, frequency rate, severity rate, frequency severity incidence, incident rate, accident rate & safety "t" – Total Injury score, illness incidence rate & Lost workday cases –Incidence rate (LWDI) & Number of lost workdays rate – problems - safety audit.

UNIT V : SAFETY AND HEALTH REGULATION (7)

History of legislations related to safety - Factories act 1948 with special reference to safety, Health and welfare provisions - Indian boiler act – smpv rules -The environmental protection act – Electricity act –Explosive act - Health and Safety at work act (HASAWA)UK, - Occupational Safety health act (OSHA) - OHSAS 18001:2007.

TOTAL: 45 PERIODS

Approved by third Academic council

TEXT BOOKS:

1. RayAsfahl.C, David W. Rieske "Industrial Safety and Health management", Prentice Hall, 5th ed., 2009.
2. Mishra.R.K., "Safety Management ", AITBS Publishers, 2012

REFERENCE BOOKS:

1. Dan Petersen, "Techniques of Safety Management", McGraw-Hill Company, Tokyo, 2001.
2. Blake R.B., "Industrial Safety" Prentice Hall, Inc., New Jersey, 2003.

13CEZ02 HUMAN BEHAVIOURS AT WORK

(*Common to All branches except Civil Engineering)*

L	T	P	C
3	0	0	3

OBJECTIVES:

- This course will help the student to understand about ergonomics and Human behaviour.
- To know the importance of anthropometry and designing the machine for man.

COURSE OUTCOMES:

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

CO1: Understand about ergonomics, anthropometry, designing a job for the worker.
CO2: Student will have a deep knowledge about human behaviour.
CO3: Know the fundamental aspects of standing and sitting, an ergonomics approach.
CO4: Gain knowledge about man Vs machine handling task
CO5: Know about a general information about human skill and performance

UNIT I : ERGONOMICS AND ANATOMY (**9)**

Introduction to ergonomics: - The focus of ergonomics, ergonomics and its areas of application in the work system, a brief history of ergonomics, attempts to humanize work, modern ergonomics, future directions for ergonomics. Anatomy, Posture and Body Mechanics: - Some basic body mechanics, anatomy of the sprine and pelvis related to posture, posture stability and posture adaptation, low back pain, risk factors for musculoskeletal disorders in the workplace, behavioral aspects of posture, effectiveness and cost effectiveness, research directions.

UNIT II : HUMAN BEHAVIOR **(9)**

Individual differences - Factors contributing to personality - Fitting the man to the job - Influence of difference on safety - Method of measuring characteristics - Accident Proneness – Motivation - Complexity of motivation - Job satisfaction - Management theories of motivation - Job enrichment theory - Frustration and Conflicts - Reaction to frustration - Emotion and Frustration - Attitudes-Determination of Attitudes - Changing attitudes Learning - Principles of Learning – Forgetting - Motivational requirements.

UNIT III : ANTHROPOMETRY AND WORK DESIGN FOR STANDING AND SEATED WORKS (9)

Designing for a population of users, percentile - sources of human variability, anthropometry and its uses in ergonomics - principals of applied anthropometry in ergonomics - application of anthropometry in design, design for everyone - anthropometry and personal space, effectiveness and cost effectiveness - Fundamental aspects of standing and sitting, an ergonomics approach to work station design - design for standing workers, design for seated workers - work surface design - visual display units, guidelines for design of static work**.**

UNIT IV : MAN MACHINE SYSTEM AND REPETETIVE WORKS AND MANUAL HANDLING TASK

(9)

Applications of human factors engineering, man as a sensor, man as information processor, man as controller – Man vs Machine - Ergonomics interventions in Repetitive works, handle design, key board design measures for preventing in work related musculoskeltal disorders (WMSDs) - reduction and controlling - training Anatomy and biomechanics of manual handling - prevention of manual handling injuries in the work place - design of manual handling tasks - carrying, postural stability.

UNIT V : HUMAN SKILL AND PERFORMANCE **(9)**

A general information-processing model of the users - cognitive system, problem solving – effectiveness - Principles for the design of visual displays - auditory displays - design of controls combining displays and controls- virtual (synthetic) environments - research issues.

TOTAL: 45 PERIODS

TEXTBOOKS:

1. Bridger.R.S, “Introduction to Ergonomics", CRC Press, Third Edition, 2012.

REFERENCES :

1. Michael O’Neill. “Ergonomic design for organizational effectiveness”, CRC Press, 2004.
2. Mark S Sanders, Ernest J. McCormick. “Human factors in engineering and design”, Tata McGraw Hill 2006.
3. Dan Macleod, Roderick MacLeod. “The Ergonomics Edge: Improving Safety, Quality and Productivity”, John Wiley and Sons, 2008.

13CEZ03 AIR POLLUTION MANAGEMENT
(*Common to All branches except Civil Engineering)*

L	T	P	C
3	0	0	3

OBJECTIVES:

- This subject covers the sources, characteristics and effects of air and noise pollution and the methods of controlling the same.
- The student is expected 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: Understand the basic elements of atmosphere and its stability.
CO3: An ability to design stacks and particulate air pollution control devices to meet applicable standards.
CO4: Understand the basic concepts of air quality management.
CO5: An ability to 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: 45 PERIODS

TEXTBOOKS:

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.

13CEZ04 BUILDING SERVICES

(*Common to All branches except Civil Engineering)*

L	T	P	C
3	0	0	3

OBJECTIVES:

- This course will help the student to understand about ergonomics and Human behaviour.
- To know the importance of anthropometry and designing the machine for man.
- Planning and scheduling the frequency of inspection and maintenance of building

COURSE OUTCOMES:

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

CO1: Student will know about the basic electrical systems in buildings
CO2: Gain knowledge about the modern lighting systems.
CO3: Study about the HVAC systems.
CO4: know 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: 45 PERIODS

Approved by third Academic council

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. Philips Lighting in Architectural Design, McGraw-Hill, New York, 1964.
4. R.G.Hopkinson and J.D.Kay, “The Lighting of buildings”, Faber and Faber, London,
5. 1969.
6. William H.Severns and Julian R.Fellows, “Air-conditioning and Refrigeration”, John
7. Wiley and Sons, London, 1988.
8. A.F.C. Sherratt, “Air-conditioning and Energy Conservation”, the Architectural Press, London, 1980.

13CSZ01 COMPUTER NETWORKS
(*Common to All branches except CSE Branch)*

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the division of network functionalities into layers.
- To be familiar with the components required to build different types of networks.
- To be exposed to the required functionality at each layer.
- To learn the flow control and congestion control algorithms.

COURSE OUTCOMES:

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

CO1: Identify the components required to build different types of networks
CO2: Choose the required functionality at each layer for given application
CO3: Identify solution for each functionality at each layer.

UNIT I : FUNDAMENTALS & PHYSICAL LAYER (9)

Building a network – Requirements - Layering and protocols - Network software – Performance –Encoding schemes-Ethernet (802.3) –Wireless LANs – 802.11.

UNIT II : DATA LINK LAYER (9)

Link layer Services – Framing – Error Detection –Flow control –Media access control –Flow and error control Protocils– Connecting LANS: Connecting devices.

UNIT III : NETWORK LAYER (9)

Internetworking-IPV4 – Address Mapping – ARP – RARP – ICMP – IGMP – Forwarding –Routing – Unicast and multicast routing – RIP – OSPF – DVR–LSR.

UNIT IV : TRANSPORT LAYER (9)

Overview of Transport layer - UDP - Reliable byte stream (TCP) - Connection management – Flow control - Retransmission – TCP Congestion control - Congestion avoidance (DECbit, RED) – QoS – Application requirements

UNIT V : APPLICATION LAYER (9)

Traditional applications –Electronic Mail (SMTP, POP3, IMAP, MIME) – HTTP – FTP – Web Services – DNS .

TOTAL: 45 PERIODS

TEXT BOOK:

1. Behrouz A. Forouzan, “Data communication and Networking”, Fourth Edition, Tata McGraw Hill,2011.

REFERENCE BOOKS:

1. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, Morgan Kaufmann Publishers, 2011.
2. James F. Kurose, Keith W. Ross, “Computer Networking - A Top-Down Approach Featuring the Internet”, Fifth Edition, Pearson Education, 2009.
3. Nader. F. Mir, “Computer and Communication Networks”, Pearson Prentice Hall Publishers, 2010.

13CSZ02 SOFTWARE ENGINEERING
(*Common to All branches except CSE Branch)*

L	T	P	C
3	0	0	3

OBJECTIVES:

- To Understand the life cycle models of software process
- To Understand fundamental concepts of requirements engineering and Analysis Modeling
- 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 and Analysis Modeling.
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: 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.

13CSZ03 DATA STRUCTURES
(*Common to All branches except CSE Branch)*

L	T	P	C
3	0	0	3

OBJECTIVES :

- To learn the basics of abstract data types.
- To learn the principles of linear and non linear data structures.
- To learn various searching and sorting techniques.
- To learn different tree traversals.

COURSE OUTCOMES:

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

CO1: Demonstrate the concept of linear and non linear data structures.
CO2: Determine the efficiency of algorithms.
CO3: Design of algorithms for various searching and sorting techniques.

UNIT I: INTRODUCTION (9)

Pseudo code–Abstract data types-Model for an ADT-ADT Implementations-Algorithm efficiency-Time complexity and space complexity-Designing recursive algorithms-Recursive examples.

UNIT II: STACKS, QUEUES AND LISTS (9)

Arrays – Basic stack operation- Stack ADT - Applications of stack – Queues operations- Queue ADT – Queue applications -List ADT - Circular - Doubly linked list.

UNIT III: SORTING AND SEARCHING TECHNIQUES (9)

Sorting: Insertion Sort- Selection Sort- Bubble Sort - Merge sort – Quick sort –Heap sort-shell sort-Searching: Sequential search- Binary Search – Hashed list searches.

UNIT IV: NON LINEAR LIST (9)

Basic Tree concepts - Binary Trees – Tree Traversals – Expression Trees - Binary Search Trees – AVL Search Trees- Splay Trees.

UNIT V: GRAPHS (9)

Definitions – Traverse Graph: Depth first Traversal-Breadth first Traversal-Shortest Path Algorithms: Unweighted Shortest Paths – Dijkstra‘s Algorithm. Minimum Spanning Tree: Prim‘s Algorithm– Kruskal‘s Algorithm.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Richard F. Gilberg, and Behrouz A. Forouzan, Data Structures – A Pseudocode Approach with C,Thomson 2009.
2. M.A.Weiss, Data Structures and Algorithm Analysis in C, Pearson Education Asia, 2007.

REFERENCE BOOKS:

1. Y.Langsam, M.J.Augenstein and A.M.Tenenbaum, Data Structures using C, PHI, 2004
2. Aho, J.E.Hopcroft and J.D.Ullman, Data Structures and Algorithms, Pearson education, Asia, 2010
3. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, Fundamentals of Data Structures in C, Silicon Press, 2007.

13CSZ04 OPEN SOURCE SOFTWARE
(*Common to All branches except CSE Branch)*

L	T	P	C
3	0	0	3

OBJECTIVES:

- 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 should be able to:

CO1: Ability to install and run open-source operating systems.

CO2: Ability to gather information about Free and Open Source Software projects from software releases and from sites on the internet.

CO3: Develop programs using PHP, Perl, Python and MySQL.

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: 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

REFERENCE BOOKS:

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.

13CSZ05 INFORMATION SECURITY

(*Common to All branches except CSE branch)*

L	T	P	C
3	0	0	3

OBJECTIVES:

- 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: 45 PERIODS

TEXT BOOK:

1. Michael E Whitman and Herbert J Mattord, “Principles of Information Security”, Vikas Publishing House, New Delhi, 2003

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.

13ECZ01 - AVIONICS (OE)
(Common to All Branches except ECE branch)

L	T	P	C
3	0	0	3

OBJECTIVES:

- 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 : Explain the communication and navigation techniques used in aircrafts.
CO3 : Discuss about the autopilot and cockpit display related concepts.

UNIT- I INTRODUCTION TO AVIONICS (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 DIGITAL AVIONICS BUS ARCHITECTURE (9)

Hydraulic, pneumatic and electric drives – determination of HP of motor and gearing ratio – variable sped arrangements – path determination – micro machines in robotics – machine vision – ranging – laser – acoustic – magnetic, fiber optic and tactile sensors.

UNIT- III AVIONICS SYSTEMS (9)

Construction of manipulators – manipulator dynamics and force control – electronic and pneumatic manipulator control circuits – end effectors – U various types of gripers – design considerations.

UNIT- IV ON BOARD NAVIGATION SYSTEMS (9)

Solution of inverse kinematics problem – multiple solution Jacobian work envelop – hill Climbing Techniques – robot programming languages.

UNIT- V CASE STUDY (9)

Multiple robots – machine interface – robots in manufacturing and non- manufacturing applications – robot cell design – selection of robot.

TOTAL: 45 PERIODS

TEXT BOOK:

1. R.P.G. Collinson, "Introduction to Avionics", Chapman & Hall Publications, 1996.Ghosh, Control in Robotics and Automation: Sensor Based Integration, Allied Publishers, Chennai, 1998.

REFERENCES:

1. Cary R .Spitzer, “The Avionics Handbook”, CRC Press, 2000.
2. Middleton, D.H. “Avionics Systems”, Longman Scientific and Technical, Longman Group UK.Ltd., England, 1989.
3. Spitzer, C.R. “Digital Avionics Systems”, Prentice Hall, Englewood Cliffs, N.J., U.S.A., 1987.
4. Brain Kendal, “Manual of Avionics”, The English Book House, 3rd Edition, New Delhi, 1993
5. Jim Curren, “Trend in Advanced Avionics”, IOWA State University, 1992.

13ECZ02 SENSORS AND TRANSDUCERS

(Common to All Branches except ECE branch)

L	T	P	C
3	0	0	3

OBJECTIVES:

- To impart knowledge on various types of sensors and transducers for Automation in science, Engineering and medicine.

COURSE OUTCOMES:

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

CO1 : Know basic concepts of various sensors and transducers.

CO2 : Develop knowledge in selection of suitable sensor based on requirement and applications.

UNIT- I INTRODUCTION (9)

Definition, classification, static and dynamic parameters, Characterization – Electrical, mechanical, thermal, optical, biological and chemical, Classification of errors – Error analysis, Static and dynamic characteristics of transducers, Performance measures of sensors.

UNIT-II MECHANICAL AND ELECTROMECHANICAL SENSORS (9)

Resistive Potentiometer, strain gauge, Inductive sensors and transducer, capacitive sensors, ultrasonic sensors.

UNIT-III THERMAL SENSOR (9)

Thermal Sensors: Gas thermometric sensors, acoustic temperature sensors, magnetic thermometer, resistance change -type thermometric sensors, thermo emf sensors, junction semiconductor types.

UNIT-IV MAGNETIC SENSOR (9)

Magnetic Sensors: Force and displacement measurement, magneto resistive sensors, Hall Effect sensor, Inductance and eddy current sensors, Angular/rotary movement transducer, Electromagnetic flow meter, squid sensor.

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UNIT-V SENSORS AND THEIR APPLICATIONS (9)

Automobile sensor, Home appliance sensor, Aerospace sensors, sensors for manufacturing, medical diagnostic sensors, environmental monitoring.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Patranabis D, “Sensor and Actuators”, Prentice Hall of India (Pvt) Ltd., 2006

REFERENCES:

1. Ian Sinclair, “Sensor and Transducers”, Elsevier India Pvt Ltd, 3rd Edtion, 2011.
2. A.K. Sawhney, Puneeth sawhney, “A Course in Electrical and Electronic Measurements and Instrumentation”, Dhanpat Rai Publications, 2012.
3. Ernest O. Doeblin, “Measurement System, Application and Design”, Tata McGraw Hill Publishing Company Ltd., 5 th Edition, 2008.

13ECZ03 MODERN WIRELESS COMMUNICATION SYSTEMS (OE)

(Common to All Branches except ECE branch)

L	T	P	C
3	0	0	3

OBJECTIVES:

- This course is to provide comprehensive background knowledge of wireless and mobile communication.
- This course is intended for anyone who wants to learn about the new wave of wireless networks.

COURSE OUTCOMES:

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

CO1 : Discuss the fundamentals of cellular mobile wireless networks.

CO2 : Provide an overview of various approaches to communication networks.

CO3 Study the numerous different-generation technologies

CO4 : Know about the principles of operation of the different access technologies like FDMA, TDMA, SDMA and CDMA

UNIT- I TRANSMISSION FUNDAMENTALS (9)

Cellphone Generations: 1G, 2G, 2.5G, 3G & 4G Transmission Fundamentals: Time domain & Frequency domain concepts, Radio, Analog Vs Digital, channel capacity, transmission media, carrier-based signaling, spread-spectrum signaling.

UNIT –II NETWORK CONCEPTS (9)

Communication Networks: LANs, MANs, WANs, circuit switching, packet switching, ATM Cellular Networks: Cells, duplexing, multiplexing, voice coding Multiple Access Techniques: 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, WLANs, cordless telephony, IrDA, Bluetooth .Smart Phones: Future phones, mobile OSs, smart phone applications.

TOTAL : 45PERIODS

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, Pearson Education, 2009.
2. William Stallings, "Wireless communications and networking", Prentice Hall, 2005.

13ECZ04 RADAR AND NAVIGATIONAL AIDS (OE)
(Common to All Branches except ECE branch)

OBJECTIVES:

L	T	P	C
3	0	0	3

- To make the student understand the principles of Radar and its use in military and civilian environment
- Also to make the student familiar with navigational aids available for navigation of aircrafts and ships.

COURSE OUTCOMES:

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

CO1 : Derive and discuss the Range equation and the nature of detection.
CO2 : Apply Doppler principle to radars and hence detect moving targets, cluster, also to understand tracking radars
CO3 : Refresh principles of antennas and propagation as related to radars, also study of transmitters and receivers.
CO4 : Understand principles of navigation, in addition to approach and landing aids as related to navigation

UNIT I INTRODUCTION TO RADAR (9)

Basic Radar –The simple form of the Radar Equation- Radar Block Diagram- Radar Frequencies –Applications of Radar – The Origins of Radar

UNIT II MTI AND PULSE DOPPLER RADAR (9)

Introduction to Doppler and MTI Radar- Delay –Line Cancelers- Staggered Pulse Repetition Frequencies –Doppler Filter Banks - Digital MTI Processing - Moving Target Detector - MTI from a Moving Platform (AMIT) – Pulse Doppler Radar

UNIT III DETECTION OF SIGNALS IN NOISE (9)

Radar Transmitters- Introduction –Linear Beam Power Tubes - Solid State RF Power Sources - Magnetron - Crossed Field Amplifiers - Other RF Power Sources – Other aspects of Radar Transmitter. Radar Receivers - The Radar Receiver - Receiver noise Figure – Superheterodyne Receiver

UNIT IV HYPERBOLIC SYSTEMS OF NAVIGATION (9)

Loran-A - Loran-A Equipment- Range and precision of Standard Loran - Loran-C - The Decca Navigation System -Decca Receivers - Range and Accuracy of Decca - The Omega System

UNIT V DME AND TACAN (9)

Distance Measuring Equipment - Operation of DME - TACAN - TACAN Equipment Aids to Approach and Landing - Instrument Landing System - Ground Controlled Approach System - Microwave Landing System Satellite Navigation System - The Transit System - Navstar Global Positioning System(GPS)

TOTAL : 45 PERIODS

TEXTBOOKS:

1. Merrill I. Skolnik ," Introduction to Radar Systems", Tata McGraw-Hill (3rd Edition) 2003.
2. N.S.Nagaraja, Elements of Electronic Navigation Systems, 2nd Edition, TMH, 2000.

REFERENCES:

1. Peyton Z. Peebles:, "Radar Principles", Johnwiley, 2004
2. J.C Toomay, " Principles of Radar", 2nd Edition –PHI, 2004

13EEZ01 RENEWABLE ENERGY TECHNOLOGY

(Common to All Branches except EEE branch)

L	T	P	C
3	0	0	3

OBJECTIVES:

- 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 basics of solar energy
CO3: Understand the concepts of wind energy
CO4: Understand and apply concepts of biomass energy
CO5: Understand 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.

13EEZ02 PLC AND AUTOMATION

(Common to All Branches except EEE branch)

L	T	P	C
3	0	0	3

OBJECTIVES:

- To impart knowledge on Programmable Logic Controller and Automation
- To design controller for industrial automation system

COURSE OUTCOMES:

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

CO1: Select the right hardware for a given application

CO2: Consider such aspects of the automation system as network communication and human machine interface

UNIT I : PROGRAMMABLE LOGIC CONTROLLERS (9)

Basics of PLC - Architecture of PLC - Advantages - Types of PLC - Introduction to PLC Networking- Networking standards - Protocols - Field bus - Process bus and Ethernet IEEE Standard.

UNIT II : PROGRAMMING OF PLC & HMI SYSTEMS PROGRAMMING OF PLC (9)

Types of Programming - Simple process control programs using Relay Ladder Logic and Boolean logic methods - PLC arithmetic functions - Introduction to advanced programming methods.

HMI systems: Necessity and Role in Industrial Automation, Text display - Operator panels - Touch panels - Panel PCs – Integrated displays (PLC & HMI).

UNIT III : DISTRIBUTED CONTROL SYSTEMS (DCS) (9)

Difference between SCADA system and DCS - Architecture - Local control unit - Programming language – communication facilities - Operator interface - Engineering interfaces.

UNIT IV : APPLICATIONS OF PLC & DCS (9)

Case studies of Machine automation - Process automation - Introduction to SCADA - Comparison between SCADA and DCS.

UNIT V : AUTOMATION (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

TEXTBOOK:

1. John.W.Webb & Ronald A. Reis, "Programmable logic controllers: Principles and Applications", Prentice Hall of India, 2003.

REFERENCES:

1. Michael P. Lukas, "Distributed Control systems", Van Nostrand Reinfold Company, 1995.
2. Gary Dunning, "Introduction to Programmable Logic Controllers", Thomson Press, USA, 2005.
3. W. Bolton, "Programmable Logic Controllers", Elsevier India Private Limited, New Delhi, 2008.
4. Mikell P. Groover, "Automation Production systems and Computer Integrated Manufacturing", Prentice Hall of India, New Delhi, 2007.

13EEZ03 AUTOMOTIVE ELECTRONICS

(Common to All Branches except EEE branch)

L	T	P	C
3	0	0	3

OBJECTIVES:

- To study the electronic instruments for automobiles
- To study the advanced electronics instruments for ignition and braking systems

COURSE OUTCOMES:

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

CO1: Provide an introduction and a deep knowledge in various ignition and instrumentation systems in vehicles

CO2: Model and stimulate the various modern electronics automotive systems by using various numerical analysis and simulation tools

CO3: Formulate and solves electronic engineering challenges related to the most representative automotive systems using the classical and modern methodologies in electronics engineering

UNIT I : INTRODUCTION (9)

Automotive component operation - Electrical wiring terminals and switching - Multiplexed wiring systems - Circuit diagrams and symbols - Charging Systems and Starting Systems: Charging systems principles, alternations and charging circuits - Basic starting circuit.

UNIT II : IGNITION SYSTEMS (9)

Ignition fundamental, Electronic ignition systems - Programmed ignition distribution less ignition direct ignition spark plugs - Electronic Fuel Control - Basics of combustion Engine fuelling and exhaust emissions - Electronic control of carburetion - Petrol fuel injection Diesel fuel injection.

UNIT III : INSTRUMENTATION SYSTEMS (9)

Introduction to instrumentation systems - Various sensors used for different parameters sensing - Driver instrumentation systems - Vehicle condition monitoring trip - Different types of visual display

UNIT IV : ELECTRONIC CONTROL OF BRAKING AND TRACTION (9)

Introduction and description control elements - control methodology - electronic control of automatic transmission - Introduction and description Control of gear shift and torque converter lockup - Electric power steering - Electronic clutch.

UNIT V : ENGINE MANAGEMENT SYSTEMS (9)

Combined ignition and fuel management systems - Exhaust emission control - Digital control techniques - Complete vehicle control systems - Artificial intelligence and engine management - Automotive microprocessor uses.

Lighting and Security Systems:

Vehicles lighting Circuits - Signaling Circuit Central locking and electric windows security systems - Airbags and seat belt tensioners - Miscellaneous safety and comfort systems.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Tom Denton, "Automobile Electrical and Electronic Systems", Edward Arnold publications, 1995

REFERENCES:

1. Don Knowles, Don Knowles, Prentice Hall, Englewood Cliffs, "Automotive Electronic and Computer controlled Ignition Systems", New Jersey 1988.
2. William, T.M., "Automotive Electronic Systems", Heiemann Ltd., London ,1978.
3. Ronald K Jurgen, "Automotive Electronics Handbook", McGraw Hill, Inc, 1999.

13EEZ04 UTILIZATION AND CONSERVATION OF ELECTRICAL ENERGY

(Common to All Branches except EEE branch)

L	T	P	C
3	0	0	3

OBJECTIVES:

- To impart knowledge on Generation of electrical power by conventional and non – conventional methods
- To expose students to the main aspects of generation, utilization and conservation
- Electrical energy conservation, energy auditing and power quality
- Principle and design of illumination systems and methods of heating and welding

COURSE OUTCOMES:

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

CO1: Design the wiring circuits and protection schemes for various types of electrical installations

CO2: Apply the electric drives and their power supply systems used in various types of electric traction applications

CO3: Acquire software development skills and experience in the usage of standard packages necessary for analysis

UNIT I : ILLUMINATION, HEATING AND WELDING (9)

Nature of radiation – definition – laws – Photometry – Lighting calculations – Design of illumination systems (for residential, industrial, commercial, health care, street lightings, sports, administrative complexes) - Types of lamps - energy efficiency lamps. Methods of heating, requirement of heating material – Design of heating element –Furnaces – Welding generator – Welding transformer and its characteristics.

UNIT II : ELECTRIC TRACTION (9)

Introduction – requirements of an ideal traction system – Supply systems – Mechanics of train movement – Traction motors and control – Multiple units – Braking – Current collection systems – Recent trends in electric traction.

UNIT III : DRIVES AND THEIR INDUSTRIAL APPLICATIONS (9)

Introduction – motor selection and related factors – Loads – Types – Characteristics – Steady state and transient characteristics – Load equalization – Industrial applications – Modern methods of speed control of industrial drives.

UNIT IV : CONSERVATION (9)

Economics of generation – definitions – load curves – number and size of units – cost of electrical energy – tariff – need for electrical energy conservation – methods – energy efficient equipment – energy management – energy auditing. Economics of power factor improvement – design for improvement of power factor using power capacitors – power quality – effect on conservation.

UNIT V : DEMAND SIDE MANAGEMENT (9)

Introduction - Automated demand response - Peak saving - Load Leveling - Load control- Issues Involving the Implementation Demand Side Management Solutions - Public Benefits Programs, Rate Schedules, Time-of-Use Rates, Power Factor Charges, and Real - Time Pricing - Solar investment tax credit.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. E. Openshaw Taylor, Utilization of Electrical Energy in SI Units, Orient Longman Pvt.Ltd, 2003.
2. B.R. Gupta, Generation of Electrical Energy, Eurasia Publishing House (P) Ltd, New Delhi, 2003.

REFERENCES:

1. H. Partab, "Art and Science of Utilisation of Electrical Energy", Dhanpat Rai and Co, New Delhi, 2004.
2. Gopal.K.Dubey, "Fundamentals of Electrical Drives", Narosa Publishing House, New Delhi, 2002.
3. C.L. Wadhwa, Generation, "Distribution and Utilization of Electrical Energy", New Age International Pvt.Ltd, 2003.
4. J.B. Gupta, "Utilization of Electric Power and Electric Traction", S.K.Kataria and Sons, 2002.

13EIZ01 AUTOTRONIX

(Common to All Branches except EIE branch)

L	T	P	C
3	0	0	3

OBJECTIVES:

- 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, 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:45 PERIODS

TEXT BOOKS:

1. Arthur Primrose Young, Leonard Griffiths, "Automobile Electrical and Electronic Equipment", London Butterworths, 9th ed, 1986.
2. William Ribbens, "Understanding Automotive Electronics: An Engineering Perspective", Butterworth-Heinemann, 7th ed., 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, "Diesel-Engine Management", John Wiley & Sons, Fourth Edition, 2006.
4. Robert Bosch GmbH and Horst Bauer, "Gasoline-Engine Management", Bentley Publishers, Second Edition, 2006.
5. Robert. N, Brady, "Automotive Computers and Digital Instrumentation", Prentice Hall, First Edition, 1988.
6. V.A.W Hillier, "Fundamentals of Automotive Electronics", Nelson Thornes Limited, Sixth Edition, 2012.

(Common to All Branches except EIE branch)

L	T	P	C
3	0	0	3

OBJECTIVES:

- 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, 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 interferometric optical fibre sensors and their applications.
CO4: Demonstrate fibre components.
CO5: Understand fibre optic sensor multiplexing.

UNIT I : OPTICAL SOURCES AND DETECTORS (9)

Light-emitting diode-Principles, Structures, LED characteristics, Modulation of LED. Lasers-Principles, Laser diode structures and radiation pattern, Laser characteristics, Modulation of Semiconductor Laser. Photo detectors-Principles, Quantum efficiency, Responsitivity of P.I.N photodiode, and Avalanche photodiode.

UNIT II : OPTICAL FIBER SENSORS AND DEVICES (9)

Overview of fibre optic sensors – advantages over conventional sensors, broadband classification. Intensity Modulated Optical Fibre Sensors-Introduction, intensity modulation through light interruption shutter/ schlieren multimode fibre optic sensors – reflective fibre optic sensors, evanescent wave fibre sensors -microbend optical fibre sensors – fibre optic refractometers, intensity modulated fibre optic thermometers, distributed sensing with fibre optics.

UNIT III : INTERFEROMETRIC OPTICAL FIBRE SENSORS (9)

Introduction, basic principles of interferometric optical fibre sensors, components and applications of interferometric sensors. Fused Single Mode Optical Fibre Couplers-Introduction, physical principles (coupling coefficient) polarization effect, experimental properties, theoretical modelling, and comparison with experiment.

UNIT IV : SINGLE MODE ALL FIBRE COMPONENTS (9)

Introduction, directional couplers, polarizes, polarization splitters polarization controllers, optical isolators, single mode fibre filters wave length multiplexers and demultiplexers, switches and intensity modulators, phase and frequency modulators.

UNIT V : FIBRE OPTIC SENSOR MULTIPLEXING (9)

Introduction, general topological configuration, and incoherent and coherent detection. Signal Processing in Monomode Fibre Optic Sensor Systems-Introduction, Transduction mechanisms, Optical Signal Processing, Electronic Processing.

TOTAL:45 PERIODS

TEXT BOOKS:

1. Dr. M. Arumugam, "Optical Fiber Communications and Sensors". Anuradha Publications, 3rd ed., 2014.

REFERENCES:

1. Gerd Keiser, " Optical Fiber Communications" , McGraw Hill, 3rd ed., 2001
2. Bishnu, P PAL "Fundamentals of Fibre Optics in Telecommunication and Sensor Systems" Wiley Eastern Ltd, 1994.

13EIZ03- INDUSTRIAL AUTOMATION
(Common to All Branches except EIE branch)

L	T	P	C
3	0	0	3

OBJECTIVES:

- 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 this 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.

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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 : 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.

13EIZ04 ULTRASONIC INSTRUMENTATION

(Common to All Branches except EIE branch)

L	T	P	C
3	0	0	3

OBJECTIVES:

- This course provides adequate knowledge about the properties of ultrasonic wave and the method of generation.
- It also gives the knowledge about the testing and applications of ultrasonic waves.

COURSE OUTCOMES:

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

CO1: Demonstrate properties and characteristics of ultrasonic wave.
CO2: Generate and test ultrasonic waves using different methods.
CO3: Measure the properties of ultrasonic wave and apply to various real time applications
CO4: Analyze Gyroscopic Instruments and engine Instruments.

UNIT I : ULTRASONIC WAVES CHARACTERISTICS (9)

Ultrasonic waves – Principle and propagation of various waves – Characterization of ultrasonic transmission – Reflection and transmission coefficients – Intensity and attenuation of sounds beam Power level – Medium parameters.

UNIT II : ULTRASONIC WAVE GENERATION (9)

Generation of ultrasonic waves – Magnetostrictive and piezoelectric effects – Search unit types – Construction and characteristics

UNIT III : ULTRASONIC TEST METHODS (9)

Ultrasonic test methods – Pulse echo – Transit time – Resonance – Direct contact and immersion type – 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 applications – Ultrasonic applications in medical diagnosis and therapy, acoustical holography.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. J David and N Cheeke, " Fundamentals and Applications of Ultrasonic Waves", CRC Press 2002.
2. Dale Ensminger, " Ultrasonic: Fundamentals, Technology and Applications", CRC press 1988.

REFERENCES:

1. Baldev Raj Palanichamy and V Rajendran, "Science and Technology of Ultrasonic", Alpha Science 2004.
2. Emmanuel P Papadakis, " Ultrasonic Instruments and Devices: Reference for Modern Instrumentation Techniques, and Technology", Academic Press, 1999.

13ITZ01 PC HARDWARE AND TROUBLE SHOOTING

(Common to All Branches except IT branch)

L	T	P	C
3	0	0	3

OBJECTIVES:

- 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, students 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: 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

13ITZ02 ESSENTIALS OF INFORMATION TECHNOLOGY

(Common to All Branches except IT branch)

L	T	P	C
3	0	0	3

OBJECTIVES:

- To provide extensive knowledge on IT Essentials including client-server modeling, designing data store, and working with Internet.
- To document artifacts using common quality standards.

COURSE OUTCOMES:

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

CO1: Understand fundamentals computer hardware and operating system concepts.

CO2: Use techniques, skills and apply algorithmic principles to Identify, formulate and solve problems.

CO3: Understand and apply object oriented concepts.

UNIT : I : **(9)**

Fundamentals of Computer architecture-introduction-organization of a small computer-Central Processing Unit - Execution cycle – Instruction categories – measure of CPU performance Memory – Input/output devices - BUS-addressing modes. System Software –Assemblers – Loaders and linkers – Compilers and interpreters. Operating system – introduction – memory management schemes Process management Scheduling – threads.

UNIT : II **(9)**

Problem solving with algorithms- Programming styles – Coding Standards and Best practices - Introduction to C Programming Testing and Debugging. Code reviews System Development Methodologies – Software development Models User interface Design – introduction – The process – Elements of UI design and reports.

UNIT : III **(9)**

RDBMS- data processing – the database technology – data models. ER modeling concept – notations – Extended ER features. Logical database design – normalization SQL – DDL statements – DML statements – DCL statements. Writing Simple queries – SQL Tuning techniques – Embedded SQL – OLTP.

UNIT : IV **(9)**

Objected oriented concepts – object oriented programming. UML Class Diagrams– relationship – Inheritance – Abstract classes – polymorphism Object Oriented Design methodology - Common Base class Alice Tool – Application of OOC using Alice tool.

UNIT : V **(9)**

Client server computing - Internetworking – Computer Networks – Working with TCP/IP – IP address – Sub netting – DNS – VPN – proxy servers World Wide Web – Components of web application - browsers and Web Servers URL – HTML – HTTP protocol – Web Applications - Application servers – Web Security.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Andrew Tanenbaum, Modern Operating Systems, Pearson Education, Third Edition, 2007.
2. Elmasri, Navathe, Fundamentals of Database Systems, Addison Wesley, Fifth Edition, 2006.

REFERENCES:

1. Sivasubramanyam Y, Deepak Ranjan Shenoy, Foundation Program - Computer Hardware & System Software Concepts, version 1.0 Vol-1, Infosys: Campus Connect 2008.
2. Hanumesh V.J.,Seema Acharya, Foundation Program - Relational Database Management System, Client Server Concepts, Introduction to Web technologies version 1.0 Vol-2, Infosys: Campus Connect 2008.
3. Sundar K.S., Foundation Program - Analysis of Algorithms, Object Oriented Concepts, System Development Methodology, User Interface Design version 1.0 Vol-3, Infosys: Campus Connect 2008.

13ITZ03 D**EVELOPING MOBILE APPS**

(Common to All Branches except IT branch)

L	T	P	C
3	0	0	3

OBJECTIVES:

- 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 (5)

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 (8)

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 (8)

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 (12)

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 (12)

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 : 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.

13ITZ04 SOFTWARE PROJECT MANAGEMENT
(Common to All Branches except IT branch)

L	T	P	C
3	0	0	3

OBJECTIVES :

- 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: 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.

13MEZ01 SIX SIGMA

(Common to All Branches except Mechanical Engineering)

L	T	P	C
3	0	0	3

OBJECTIVES:

- To develop a comprehensive set of skills that will allow the engineers to function effectively as six sigma team members.
- To introduce the techniques and various phases of six sigma for professionals

COURSE OUTCOMES:

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

CO1: Understand and apply the five-step DMAIC model as a framework to organize process or business improvement activity

CO2: Employ Six Sigma skills to lead a successful process or business improvement project.

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 - case study

TOTAL: 45 PERIODS

TEXT BOOK:

1. Betsi Harris Ehrlich, “Transactional Six Sigma and Lean Servicing”, St. Lucie Press, 2002

REFERENCES:

1. Michael L George, David T Rowlands, and Bill Kastle, “What is Lean Six Sigma”, McGraw Hill, New York, 2004.
2. Kai Yang and Basem El Haik, “Design for Six Sigma”, McGraw Hill, New York, 2004.
3. Thomas Pyzdek, “Six Sigma Handbook: Complete Guide for Green belts, Black belts and Managers at All Levels”, Tata McGraw Hill Companies Inc, 2003.
4. Donald W Benbow and Kubiak T M, “Certified Six Sigma Black Belt Handbook”, Pearson Education, 2007.

13MEZ02 ESSENTIALS OF RADIO FREQUENCY IDENTIFICATION

(Common to All Branches except Mechanical Engineering)

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the physical principle of RFID system.
- To get knowledge on information processing through RFID system.

COURSE OUTCOMES:

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

CO1: Demonstrate various components of RFID system

CO2: Apply the methodology in engineering applications like inventory management, material handling etc.,

UNIT I : INTRODUCTION AND RFID ARCHITECTURE (9)

Case for RFID - Eras of RFID - applications - RFID Architecture - confluence of technologies - key functionalities- system components - systemic quality considerations - architecture guidelines - System Management

UNIT II : TAGS AND PROTOCALS (9)

Basic tag capabilities - physical characteristics - power source - air interface - information storage and processing capacity - standards - protocol terms and concepts - how tags store data - singulation and anti-collision procedures- tag features for security and privacy - learn to troubleshoot tag communications

UNIT III : READERS, PRINTERS AND READER PROTOCOLS (9)

Physical and logical components of RFID reader - parts of RFID printer and applicator - types of readers - layout for readers and antennas - configuring readers - parts of a reader protocol - vendor protocols - EPC global protocol overview - simple lightweight RFID reader protocol - future protocols

UNIT IV : MIDDLEWARE AND INFORMATION SERVICE (9)

Motivations - logical architecture - application level events specification - commercial RFID middleware - RFID Data - EPC global network - object naming service - EPC information services

UNIT V : MANAGEABILITY, PRIVACY AND SECURITY (9)

Edge deployment options - capabilities needed for edge management - standards and technologies - privacy and security issues - RFID Privacy - RFID Security - EPC identity encodings

TOTAL : 45 PERIODS

TEXT BOOK:

1. Himanshu Bhatt, Bill Glover, “RFID Essentials”, O'Reilly Media publications, 2006

REFERENCES:

1. Klaus Finkenzeller, “RFID Handbook”, John Wiley & Sons, Ltd, 2010
2. Stephen B. Miles, Sanjay E. Sarma, John R. Williams, “RFID Technology and Applications”, Cambridge University Press, 2008
3. Patrick J Sweeney, “RFID for DUMMIES”, Wiley India Publications, 2005
4. Elaine Cooney, “RFID + The Complete review of Radio Frequency Identification”, 1st ed., Delmar Cengage Learning 2007

13MEZ03 ELECTRIC VEHICLE TECHNOLOGY

(Common to All Branches except Mechanical Engineering)

L	T	P	C
3	0	0	3

OBJECTIVES:

- To know the various components of electric vehicles and their working principles.
- To get knowledge on types of batteries and fuel cell

COURSE OUTCOMES:

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

CO1: Identify the elements of an electric vehicle for a particular application.

CO2: Apply the knowledge on mathematical modelling to find out the operating characteristics of an electric vehicle.

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 : 45 PERIODS

TEXT BOOK:

1. James Larminie, John Lowry, "Electric Vehicle Technology Explained", John Wiley & Sons Ltd 2012

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

13MEZ04 VALUE ENGINEERING

(Common to All Branches except Mechanical Engineering)

L	T	P	C
3	0	0	3

OBJECTIVES:

- To know the concept of value engineering and its applications.
- To get knowledge on various stages of value engineering implementation

COURSE OUTCOMES:

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

CO1: Identify and prioritize functions of the products.

CO2: Apply the techniques of cost reduction to minimize the product cost by maintaining the required performance

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 : 45 PERIODS

TEXT BOOK:

1. Mukhophadhyaya A K, “Value Engineering”, Sage Publications Pvt. Ltd., New Delhi, 2003

REFERENCES:

1. Mukhophadhyaya A K, “Value Engineering Mastermind”, Sage Publications Pvt. Ltd., New Delhi, 2009
2. Richard J Park, “Value Engineering – A plan for inventions”, St.Lucie Press, London, 1998.
3. Larry W Zimmesman. P E , “VE –A Practical approach for owners designers and contractors”, CBS Publishers, Delhi, 1992
4. Arthus E Mudge, “Value Engineering”, McGraw Hill book company, 1971

GROUP II OPEN ELECTIVES LIST

13GEZ01- SUSTAINABLE DEVELOPMENT
(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- To understand the principle of sustainable d-evelopment and resource degradation.
- To know the concepts of international contribution on sustainable engineering & legal system in sustainable development.
- To gain knowledge on public participation on economic growth and resource protection management.

COURSE OUTCOMES:

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

CO1: Know the principle of sustainable development and resource degradation.
CO2: Know the concepts of legal system in sustainable development.
CO3: Gain knowledge on international contribution on sustainable engineering.
CO4: Identify the public participation on economic growth.
CO5: Understand the approach on resource protection and management.

UNIT I : PRINCIPLES OF SUSTAINABLE DEVELOPMENT (6)

History and emergence of the concept of Sustainable Development – Definitions – Environmental issues and crisis – Resource degradation – green house gases – desertification – social insecurity – Industrialization – Globalization and Environment.

UNIT II : INDIANS JUDICIARY SYSTEM & SUSTAINABLE DEVELOPMENT (6)

Judicial System in India – Induction of sustainability concepts through legal systems – concepts – principles – doctrines – case laws.

UNIT III : SUSTAINABLE DEVELOPMENT AND INTERNATIONAL CONTRIBUTION (6)

Components of sustainability – Complexity of growth and equity – International Summits – Conventions – Agreements – Trans boundary issues – Action plan for implementing sustainable development – Moral obligations and Operational guidelines.

UNIT IV : SOCIO-ECONOMIC SUSTAINABLE DEVELOPMENT SYSTEMS (6)

Socio-economic policies for sustainable development – Strategies for implementing eco-development programmes – Sustainable development through trade – Economic growth – Carrying Capacity – Public participation.

UNIT V : AGENDA FOR FUTURE GLOBAL SUSTAINABLE DEVELOPMENT (6)

Role of developed countries in the sustainable development of developing countries – Demographic dynamics and sustainability – Integrated approach for resource protection and management.

TOTAL: 30 PERIODS

REFERENCES:

1. Kirkby, J., O' Keefe, P. and Timberlake, Sustainable Development, Earth scan Publication, London, 1996.
2. Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 1998.
3. Bowers, J., Sustainability and Environmental Economics – an alternative text, Longman, London, 1997.
4. Revelle CS, Whitlach EE & Wright JR. *Civil & Environmental Systems Engineering*, **1st or 2nd** Edition, Prentice Hall of India.

13GEZ02 - WASTE MANAGEMENT

(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- 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 (6)

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 (6)

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 (6)

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 (6)

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 (6)

Elements of integrated waste management - Economy and financial aspects of waste management. Other Waste Types: Nuclear and Radio Active Wastes.

TOTAL: 30 PERIODS

REFERENCES:

1. Hilary Theisen and Samuel A, Vigil, George Tchobanoglous, Integrated Solid Waste Management, McGraw- Hill, New York, 1993
2. CPHEEO, Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organization, Government of India, New Delhi, 2000
3. 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.
4. Vesilind P.A., Worrell W and Reinhart, Solid waste Engineering, Thomson Learning Inc., Singapore, 2002.
5. Charles A. Wentz, Hazardous Waste Management, Second Edition, Pub: McGraw Hill International Edition, New York, 1995.

13GEZ03 DESIGN THINKING

(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- 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 students will be able to,

CO1: Have a sense of self-efficacy & creative confidence

CO2: Know how to manage a Design Thinking workshop: Layout, roles, times and process.

CO3: Apply Design thinking tools to increase research output.

UNIT I : INTRODUCTION TO DESIGN THINKING (6)

Overview - Use of Design Thinking – Design Process. Getting Started: Define Challenges – Create a Project Plan. Design Thinking Tools.

UNIT II : DISCOVERY (6)

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 (6)

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 (6)

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 (6)

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: 30 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

13GEZ04 BIG DATA ANALYTICS

(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- To know the fundamentals of big data analytics.
- To learn about Hadoop components and storage
- To understand Hadoop operations.
- To use Map-Reduce programming model for processing large sets of data in parallel.
- To work with tools like HBase and Hive..

COURSE OUTCOMES:

On completion of this course the student will be able to

CO1. Identify the need for big data analytics for a domain.
CO2. Explore Hadoop distributed system and its components.
CO3. Install and utilize Hadoop tool.
CO4. Design applications using Map Reducing Concepts.
Implement Big Data concepts using tools like HBase and Hive

UNIT - I BIG DATA INTRODUCTION (6)

Introduction – Characteristics of Big Data – Various V's of Data – Data in Warehouse and Hadoop – Need of Big Data Solution – Use Cases: Patterns for Big Data Deployment, IT for IT Log Analytics, The Fraud Detection Pattern, Social Media Pattern – The Call Center Mantra – Risk –Energy Sector

UNIT - II HADOOP (6)

History of Hadoop – Components – Distributed File System – Basics of Map Reduce – Hadoop Common Components – HDFS Shell Commands – Application Development in Hadoop – Other Hadoop Components

UNIT- III HADOOP OPERATIONS (6)

Setting up a Hadoop Cluster – Cluster Specification – Cluster Setup and Installation – Hadoop Configuration – Case Study: Installing Apache Hadoop.

UNIT - IV MAPREDUCE (6)

The Configuration API – Setting up the Development Environment – Writing a Unit Test With MR Unit – Running Locally on Test Data – Running on a Cluster – Anatomy of a Map Reduce Job Run – Failures – Shuffle and Sort – Task Execution

UNIT- V HBASE AND HIVE (6)

HBASE: HBasics –Concepts – Installation – Clients – Building an Online Query Application – HBase versus RDBMS – Praxis; HIVE: Installing Hive – Running Hive – Comparison with Traditional Databases – HiveQL – Tables – Querying Data.

TOTAL: 30 PERIODS

REFERENCES:

1. Chris Eaton, Dirk Deroos et al., "Understanding Big Data: Analytics For Enterprise Class Hadoop And Streaming Data", The McGraw-Hill Companies, 2012.
2. Tom White, "Hadoop: The Definitive Guide ",O Reilly 2012.
3. Frank J. Ohlhorst, Big Data Analytics ,1st Edition, Wiley, 2012

13GEZ05 ROBO DESIGN
(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- To impart knowledge about the engineering aspects of Robots and their applications.

LEARNING OUTCOMES:

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

CO1: End effectors and sensors.
CO2: Robots cell design and programming.
CO3: Industrial application of robot

UNIT I : INTRODUCTION (6)

Basic concepts - Robot anatomy - Manipulators - kinematics: Forward and inverse kinematics - Precision movement, robot specifications and Work volume, Types of Robot drives - Basic robot motions - Point to point control, continuous path control. Robot control - unit control system concept - servo and non-servo control of robot joints, adaptive and optimal control.

UNIT II : END EFFECTORS AND SENSORS (6)

End effectors - classification - mechanical, magnetic, vacuum and adhesive gripper - gripper force analysis and design. Sensor devices, Types of sensors - contact, position and displacement sensors, Force and torque sensors - Proximity and range sensors - acoustic sensors - Robot vision systems - Sensing and digitizing - Image processing and analysis.

UNIT III : ROBOT CELL DESIGN (6)

Robot work cell design and control – Safety in Robotics – Robot cell layouts – Multiple. Robots and machine interference – Robot cycle time analysis.

UNIT IV : ROBOT PROGRAMMING (6)

Robot language classification - programming methods - off and on line programming - Lead through method - Teach pendent method - VAL systems and language, simple program.

UNIT V : INDUSTRIAL APPLICATIONS (6)

Application of robots - Material handling - Machine loading and unloading, Assembly, Inspection, Welding, Spray painting, Mobile robot, Microbots - Recent developments in robotics- safety considerations.

TOTAL : 30 PERIODS

TEXT BOOKS:

1. Deb .S.R, "Robotics technology and flexible automation", Tata McGraw Hill publishing company limited, New Delhi, 2010.
2. Mikell P. Groover, "Industrial Robotics Technology Programming and Applications", McGraw Hill Co., Singapore, 2008.

REFERENCES:

1. Klafter.R.D, Chmielewski.T.A and Noggins,"Robot Engineering: An Integrated Approach", Prentice Hall of India Pvt. Ltd., New Delhi, 2011.
2. Fu K.S, Gonzalez.R.C,& Lee, C.S.G, "Robotics control, sensing, vision and intelligence", McGraw Hill Book Co., Singapore, Digitized 2007.
3. Craig.J.J, "Introduction to Robotics mechanics and contro"l, Addison- Wesley, London, 2008.

13GEZ06 CREATIVITY INNOVATION AND NEW PRODUCT DEVELOPMENT

(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- The students should develop their leadership qualities and creative thinking capability in product development.

LEARNING OUTCOMES:

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

CO1: Improve their creativity and problem solving methods.

CO2: Improve their knowledge in project selection.

CO3: Understand the Patent Laws

CO4: Know the Quality standards

UNIT I : PROJECT SELECTION **(6)**

Collection of ideas and purpose of project - Selection criteria.

UNIT II : PROJECT EVALUATION **(6)**

Screening ideas for new products (evaluation techniques).

UNIT III : NEWP RODUCT DEVELOPMENT **(6)**

Research and new product development - Patents - Patent search - Patent laws - International code for patents - Intellectual property rights (IPR).

UNIT IV : NEW PRODUCT PLANNING **(6)**

Design of proto type - testing - quality standards - marketing research - introducing new products.

UNIT V : LABORATORY **(6)**

Creative design - Model Preparation - Testing - Cost evaluation - Patent application.

TOTAL: 30 PERIODS

TEXT BOOKS:

1. Harry Nystrom; Creativity and innovation, John Wiley & Sons, 1979.
2. Brain Twiss; Managing technological innovation, Pitman Publishing Ltd., 1992.
3. Paul Sloane; The leader's guide to lateral thinking skills kogan page india, 2008.

REFERENCES:

1. Harry B, Watton, "New Product Planning", Prentice Hall Inc., 1992.
2. Khandwalla, RN.,- "Fourth Eye (Excellence through Creativity) - Wheeler Publishing",Allahabad, 1992. I.P.R. Bulletins, TIFAC, New Delhi, 1997.

13GEZ07 ENERGY AUDITING

(*Common to All branches*)

L	T	P	C
2	0	0	2

COURSE OBJECTIVE:

- To familiarize the students about energy management and energy audit

COURSE OUTCOMES:

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

CO1: Fa miliarize about forms of energy

CO2: Un derstand energy management concepts

CO3: An alyze and report the outcome of energy audit

UNIT I : FUNDAMENTALS OF ENERGY **(6)**

Basics of energy and its various forms: Conventional and non-conventional sources - Different fuels and its energy contents - Renewable energy: solar energy, wind energy, bio energy, hydro energy, geothermal energy, wave energy, tidal energy and OTEC.

UNIT II : ENERGY MANAGEMENT **(6)**

Energy management: various approaches, cost effectiveness, bench marking, optimization of energy requirement and maximization of system efficiencies - Fuels and energy substitution

UNIT III : ENERGY AUDIT **(6)**

Energy audit : need, preliminary audit, detailed audit, methodology and approach - Instruments for audit, monitoring energy and energy savings.

UNIT IV : ASSESSMENT AND REPORTING **(6)**

Evaluation of saving opportunities – Determining the savings in INR, Non-economic factors, conservation opportunities, estimating cost of implementation - Energy audit reporting: Plant energy study report, importance, effective organization, report writing and presentation.

UNIT V : ENERGY SAVINGS CASE STUDY **(6)**

Case study: Simple calculations of energy savings and conservation in process equipments like boilers, heat exchangers only.

TOTAL : 30 PERIODS

TEXT BOOKS:

1. Paul. O. Callaghan., "Energy Management", McGraw-Hill Professional Publishing, 2003.
2. Albert Thumann, "Handbook of energy audits", 6th ed., The Fairmount Press, 2003.

REFERENCES:

1. Murphy.W.R and McKay.G, "Energy Management" , Butterworths, London, 2007.
2. Steve Doty, Wayne C.Turner, " Energy Management Handbook", Fairmont Press, 7th ed., 2009.
3. Barney L. Capehart, Wayne C.Turner, William J.Kennedy, "A Guide to Energy Management", The Fairmont Press, 6th ed., 2008.

13GEZ08 - ENERGY CONSERVATION

(*Common to All branches*)

L	T	P	C
2	0	0	2

COURSE 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 management

CO2: Measure the electrical energy conservation

UNIT I :ENERGY CONSERVATION PRINCIPLES **(6)**

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 **(6)**

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 **(6)**

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 **(6)**

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 MANAGEMENT **(6)**

Organizational background desired for energy management persuasion – Motivation - Publicity role - Tariff analysis - Industrial energy management systems energy monitoring - Auditing and targeting - Economics of various energy conservation schemes – Energy policy and energy labeling.

TOTAL : 30 PERIODS

TEXT BOOKS:

1. Reay.D.A, "Industrial energy conservation", Pergamon Press, 1st ed., 2003.
2. White.L.C, "Industrial Energy Management and Utilization", Hemisphere Publishers, 2002.

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.

13GEZ09 LAW FOR ENGINEERS

(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVE

- To familiarize the students with fundamental knowledge of laws that would be of utility in their profession.
- Enable the students to understand the new areas of law like IPR.

LEARNING OUTCOMES :

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 1 INTRODUCTION TO INDIAN CONSTITUTION (6)

Introduction to Constitution, Longest known Constitution, Preamble, Importance of Preamble, Justice, Liberty, Equality, Fraternity, Secular, Origin of Secularism.

UNIT 2 FUNDAMENTAL RIGHTS AND DUTIES (6)

Inalienable Human Rights, Fundamental Rights: Definition, Need, History, Suspension, Classification and Amendments, Fundamental Duties: General, Comparison with Directive Principles, List of Duties.

UNIT 3 INTELLECTUAL PROPERTY RIGHTS (IPR) (6)

Introduction to IPR, Main forms of IP, Copyrights, Trademarks, Patents and Designs, Protection in Foreign Countries, Protection inside Country, Patentable inventions, Process of obtaining patent - application, examination, opposition and sealing of patents, Duration of patents.

UNIT 4 COLLECTIVE BARGAINING (6)

Concept and Meaning of Collective Bargaining, Prerequisites of Collective Bargaining, Advantages and Disadvantages, Collective Bargaining in India.

UNIT 5 INDUSTRIAL AND INDIVIDUAL DISPUTE (6)

Industrial Dispute: Overview, Factum of Industrial Dispute, Parties to the Dispute, Subject Matter of the Dispute, Origin of the Dispute, Individual Dispute.

TOTAL : 30 PERIODS

TEXT BOOKS:

1. Brij Kishore Sharma (2011), Introduction to the Constitution of India, PHI Learning Private Limited.
2. S C Srivastava (2008), Industrial Relations and Labour Laws, VIKAS Publishing House Pvt Ltd.

REFERENCE BOOKS:

1. Agarwal H. O.(2008), International Law and Human Rights, Central Law Publications.
2. S.K. Awasthi & R.P. Kataria(2006), Law relating to Protection of Human Rights, Orient Publishing.
3. S.K. Kapur(2001), Human Rights under International Law and Indian Law, Central Law Agency.

13GEZ10 - ADVANCED MATHEMATICS FOR ENGINEERS
(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

The main objective of this paper is to gain familiarity with the application of statistics and graph theory.The paper is oriented towards the techniques needed to solve research problems.This paper is intended to help students to build the skill necessary to analyze the research oriented problems in their course of study.

UNIT I: STATISTICS **(6)**

Linear Correlation and Regression - Curve fitting - Method of least squares - Multiple Regression.

UNIT II: DISTRIBUTIONS **(6)**

Discrete and Continuous distributions: Binomial – Poisson - Geometric Distributions and Uniform – Exponential Distributions.

UNIT III: TEST OF HYPOTHESIS **(6)**

Testing hypothesis Involving Means and Proportions - Small Samples t – Test and Chi Square test.

UNIT IV: GRAPH THEORY **(6)**

Basic definitions in graphs, walk, path, circuits – Connected and Disconnected - Components - Euler graphs - Operations on graph.

UNIT V: TREES **(6)**

Properties of Trees – Distance and Centers in a tree – Rooted and Binary trees, Spanning trees - Adjacency matrix – Incidence matrix.

TOTAL : 30PERIODS

TEXT BOOKS

1. S.C.Gupta and V.K.Kapoor, "Fundamentals of Mathematical Statistics ", Sultan Chand & Co, 2002.
2. T.Veerarajan, " Probability and Random Processes", TMH,2006.
3. NarsinghDeo, "Graph Theory", Prentice – Hall of India,2004.

REFERENCES

1. P.Kandasamy, K.Thilagavathy,K.Gunavathy," Probability and Random Variable and Random Processes", S.Chand& Co Ltd, 2004.
2. V.K.Balakrishnan,"Theory and Problems of Graph Theory", Schaum'sOutlines,Tata McGraw-Hill Publishing Company ltd, New Delhi,2004.

13GEZ11 - DISASTER MANAGEMENT
(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- Develop an understanding of why and how the modern disaster manager is involved with pre-disaster and post-disaster activities
- Identify the organizations that are involved in natural disaster assistance

LEARNING OUTCOMES:

On completion of this course the students will be able to

CO1: Know the key personnel or specialists related to disaster management and associate them with the types of disasters and phases in which they are useful.
CO2: Understand the six elements of disaster management.

UNIT I : INTRODUCTION **(6)**

Introduction – Disaster preparedness – Goals and objectives of ISDR Programme- Risk identification – Risk sharing – Disaster and development: Development plans and disaster management –Alternative to dominant approach – disaster-development linkages -Principle of risk partnership

UNIT II : APPLICATION OF TECHNOLOGY IN DISASTER RISK REDUCTION **(6)**

Application of various technologies: Data bases – RDBMS – Management Information systems – Decision support system and other systems – Geographic information systems – Intranets and extranets – video teleconferencing. Trigger mechanism – Remote sensing-an insight – contribution of remote sensing and GIS - Case study.

UNIT III : AWARENESS OF RISK REDUCTION **(6)**

Trigger mechanism – constitution of trigger mechanism – risk reduction by education – disaster information network – risk reduction by public awareness

UNIT IV : DEVELOPMENT PLANNING ON DISASTER **(6)**

Implication of development planning – financial arrangements – areas of improvement – disaster preparedness – community based disaster management – emergency
response.

UNIT V : SEISMICITY **(6)**

Seismic waves – Earthquakes and faults – measures of an earthquake, magnitude and intensity – ground damage – Tsunamis and earthquakes

TOTAL: 30 PERIODS

TEXT BOOKS:

1. Pardeep Sahni, Madhavi malalgoda and ariyabandu, "Disaster risk reduction in south asia", PHI
2. Amita sinvhal, "Understanding earthquake disasters" TMH, 2010.

REFERENCES

1. Pardeep sahni, Alka Dhameja and Uma medury, "Disaster mitigation: Experiences and reflections", PHI

13GEZ12 - INDUSTRIAL PSYCHOLOGY

(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- To develop an awareness of the history and major perspectives underlying and driving the field of Industrial and Organizational (I/O) Psychology.
- To develop an understanding for the potential I/O Psychology has for society and organizations now and in the future.

LEARNING OUTCOMES:

On completion of this course the students will be able to

CO1: Understand and work effectively with a diversity of individuals and groups.

CO2: Apply theory and research to contemporary problems.

UNIT I : INTRODUCTION **(5)**

Introduction to Industrial Psychology – Definitions & Scope**.** Major influences on industrial Psychology- Scientific management and human relations schools Hawthorne Experiments

UNIT II : INDIVIDUAL IN WORKPLACE-I **(5)**

Motivation and Job satisfaction, stress management. Organizational culture, Leadership & group dynamics.

UNIT III : INDIVIDUAL IN WORKPLACE-II **(5)**

Performance Management: Training & Development.

UNIT IV : WORK ENVIRONMENT & PSYCHOLOGY **(7)**

Work Environment & Psychology-fatigue. Boredom, accidents and safety. Job Analysis, Recruitment and Selection – Reliability & Validity of recruitment tests

UNIT V: DYNAMICS OF INDUSTRIAL BEHAVIOUR **(8)**

Organizational culture and climate – Factors affecting organizational climate – Importance. Job satisfaction – Determinants – Measurements – Influence on behavior. Organizational change – Importance – Stability Vs Change – Proactive Vs Reaction change – the change process – Resistance to change – Managing change. Stress – Work Stressors – Prevention and Management of stress – Balancing work and Life. Organizational development – Characteristics – objectives –. Organizational effectiveness Developing Gender sensitive workplace

TOTAL: 30 PERIODS

REFERENCES:

1. Miner J.B. (1992) Industrial/Organizational Psychology. N Y : McGraw Hill.
2. Blum & Naylor (1982) Industrial Psychology. Its Theoretical & Social Foundations CBS Publication.
3. Aamodt, M.G. (2007) Industrial/Organizational Psychology : An Applied Approach (5th edition) Wadsworth/Thompson : Belmont, C.A.
4. Aswathappa K. (2008). Human Resource Management (fifth edition) New Delhi : Tata McGraw Hill.

13GEZ13 PROJECT MANAGEMENT

(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- 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: Apply project management concepts by identifying and carrying out a real time project

UNIT I : PROJECTS, PROJECT MANAGEMENT AND PROJECT MANAGER (6)

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 (6)

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 (6)

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 (6)

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 (6)

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 : 30 PERIODS

TEXT BOOK:

1. Gary R. Heerkens, "Project Management", 2nd ed., McGraw-Hill Book Company , 2013

REFERENCES:

1. Harold Kerzner, "Project Management", 10th ed., Wiley India Pvt Ltd., 2013
2. John M Nicholas, Herman Steyn, "Project Management for Engineering, Business and Technology", Routledge Publications, 2012
3. Prasanna Chandra, "Projects : Planning, Analysis, Selecting, Financing, Implementation and Review", 7th ed., Tata McGraw Hill Education Private Ltd., 2009
4. Clifford F Gray, Eric W Larson, Gautam V Desai, "Project Management: The Managerial Process", 4th ed., Tata McGraw Hill Education Private Ltd., 2011

13GEZ14 QUALITY MANAGEMENT AND ECONOMICS

(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- To know the stages of quality management in an organization and economic aspects
- To understand the roles and responsibilities of an engineer in quality management.

COURSE OUTCOMES:

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

CO1: Demonstrate the skill set of engineer in quality management

CO2: Apply quality management concepts in an organization for process improvement

UNIT I : ORGANIZING AND PLANNING FOR QUALITY (6)

Categorizing duties - breaking categories into classifications - basic functional structure - authority, accountability and responsibility - authority principles - revise and adjust - communication - planning for quality - objectives - setting business metrics - planning - business quality, process and product quality, project, product verification and validation - policies, procedures and objectives - forms and records - blueprints - process flowcharting

UNIT II : CONTROLLING, STAFFING, MOTIVATING FOR QUALITY (6)

Introduction - organizational responsibility - role of quality management - quality report - activity reporting - journalizing procedure - posting - product performance reporting - analysis - controlling nonconformance identification - segregation - disposition - CAPA methodology - forecasting human resources needs - job descriptions - education and training - lead, coach and guide - leadership styles - rewards based upon performance-praise and censure fairly - motivating environment

UNIT III : SPECIAL TOPICS IN QUALITY (6)

Overview of statistical methods - risk analysis - reliability engineering - systems analysis - auditing - audit planning and scheduling - sampling plans - audit implementation steps - notification to auditee - opening meeting information, verification and evaluation - audit observations - audit supervision - audit follow up - preparation of the report - content of the report - reporting the audit - cost of quality

UNIT IV : INTRODUCTION TO ECONOMICS AND MARKET EFFICIENCY (6)

Ten principles of economics - people's interest and decision making - interaction of people - economy - Thinking like an economist - economist as scientist - economist as policy advisor - why economists disagree - consumers, producers and efficiency of markets - consumer and producer surplus - market efficiency - Supply, demand and government policies - controls on prices, taxes, subsidies

UNIT V : SUPPLY AND DEMAND (6)

Market forces of supply and demand - markets and competition - demand - supply - supply and demand together - elasticity and its applications - the theory of consumer choice - standard economic model, budget constraint, preferences, optimization, Consumer behavior - firms in competitive markets - production and costs - various measures of cost - Costs in the short run and in the long run - competitive market - profit maximization

TOTAL : 30 PERIODS

TEXT BOOKS:

1. Peter D. Mauch, "Quality Management", CRC Press, 2010
2. Gregory Mankiw N and Mark P. Taylor, "Economics", 3rd ed., Cengage Learning, 2010

REFERENCES:

1. David Hoyle, "Quality Management Essentials", 1st ed., Elsevier, 2007
2. Mohamed Zairi, Total Quality Management for Engineers", Wood Head publishing Limited, 1991
3. Irvin B. Tucker, "Economics for Today", 7th ed., Cengage Learning, 2011

LANGUAGE ELECTIVES

13GEY01 HINDI LANGUAGE
(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- To impart knowledge in Hindi.
- To introduce the language skills, vocabulary, grammar to the students.
- To introduce themselves and initiate a conversation.
- To develop the ability among the students to read and understand small texts written in Hindi.
- To enable the students to elementary conversational skills.

COURSE OUTCOME:

On completion of this course the students will be able to

CO1: Achieve proficiency in Hindi.
CO2: Develop their different skills in Hindi language.
CO3: Develop their skills in communicative Hindi.
CO4: Express their ideas in Hindi language.

UNIT I : BASIC SOUNDS & LETTERS/LETTER-SOUNDS **(6)**

Letters – Consonants & Vowels - Joining Words – Numbers - Gender.

UNIT II : GRAMMAR **(6)**

Basic Grammatical Structure- Usage of Noun, Pronoun and Verb – Basic sentence Pattern – Tenses – Phrases.

UNIT III : COMPOSITION **(6)**

Short story collections - Lesson – Letter Writing- Filling the blanks.

UNIT IV : READING **(6)**

Poem – Short-story – Newspaper - Letters.

UNIT V: SPEAKING **(6)**

Short Conversation – Self-introduction – Asking questions.

TOTAL : 30 PERIODS

TEXT/ REFERENCES BOOKS:

13GEY02 GERMAN LANGUAGE
(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

To enable students

- To introduce the language, phonetics and the special characters in German language
- To introduce German culture and traditions to the students.
- To introduce themselves and initiate a conversation..
- To develop the ability among the students to read and understand small texts written in German.
- To enable the students to elementary conversational skills.

COURSE OUTCOME:

On completion of this course the students will be able to

CO1: Achieve proficiency in German.

CO2: Identify German culture and traditions.

CO3: Read and Understand the text written in German.

CO4: Express their ideas in German.

UNIT I: **(6)**

Wichtige Sprachhandlungen: Phonetics – Sich begrüßen - Sich und andere vorstellen formell / informell - Zahlen von 1 bis 1 Milliarde - verstehen & sprechen.
Grammatik: regelmäßige Verben im Präsens - "sein" und haben im Präsens - Personalpronomen im Nominativ.

UNIT II: **(6)**

Wichtige Sprachhandlungen: Telefon Nummern verstehen und sprechen Uhrzeiten verstehen und sagen Verneinung "nicht und kein" (formell und informell).
Grammatik : Wortstellung – Aussagesatz – W-Frage und Satzfrage (Ja/Nein Frage) Nomen buchstabieren und notieren bestimmter und unbestimmter Artikel und Negativartikel im Nom. & Akkusativ.

UNIT-III: **(6)**

Wichtige Sprachhandlungen: Tageszeiten verstehen und über Termine sprechen -Verabredungen verstehen - Aufgaben im Haushalt verstehen.
Grammatik: Personalpronomen im Akkusativ und Dativ - W-Fragen "wie, wer, wohin,wo, was usw.- Genitiv bei Personennamen - Modalverben im Präsens "können, müssen, möchten".

UNIT IV: **(6)**

Wichtige Sprachhandlungen: Sich austauschen, was man kann, muss – Bezeichnungen Lebensmittel – Mengenangaben verstehen – Preise verstehen und Einkaufzettel schreiben
Grammatik: Wortstellung in Sätzen mit Modalverben – Konnektor "und" – "noch"- kein-------mehr – "wie viel, wie viele, wie alt, wie lange" –Possessivartikel im Nominativ.

UNIT V: **(6)**

Wichtige Sprachhandlungen: Freizeitanzeigen verstehen – Hobbys und Sportarten Anzeigen für Freizeitpartner schreiben bzw. darauf antworten – Vorlieben und Abneigungen ausdrucken
Grammatik: Verben mit Vokalwechsel im Präsens – Modalverben im Präsens " dürfen, wollen und mögen- "haben und sein" im Präteritum – regelmäßige Verben im Perfekt – Konnektoren "denn, oder, aber.

TOTAL : 30 PERIODS

TEXT/ REFERENCES BOOKS

1. Studio d A1. Deutsch als Fremdsprache with CD.(Kursbuch und Sprach training).

13GEY03 JAPANESE LANGUAGE
(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- To help students learn the Japanese scripts.
- To make the students acquire basic conversational skills.
- To enable students to know about Japan and Japanese culture.
- To create an advantageous situation for the students to have better opportunity for employability by companies who have association with Japan.
- To enable the students to elementary conversational skills.

COURSE OUTCOME:

On completion of this course the students will be able to

CO1: Understand the Japanese scripts.
CO2: Understand the culture and traditions.
CO3: Read and Understand the text written in Japanese.
CO4: Express their ideas in Japanese in Written and Spoken form.

UNIT I: **(6)**

1. Introduction to Japanese language. Hiragana Chart 1 - vowels and consonants and related vocabulary.
2. Self introduction
3. Grammar – usage of particles wa, no, mo and ka and exercises
4. Numbers (1-100)
5. Kanji – introduction and basic kanjis – naka, ue, shita, kawa and yama
6. Greetings, seasons, days of the week and months of the year
7. Conversation – audio
8. Japan – Land and culture.

Conversation – audio

UNIT II: **(6)**

1. Hiragana Chart 1 (contd.) and related vocabulary
2. Grammar – usage of kore, sore, are, kono, sono, ano, arimasu and imasu. Particles – ni (location) and ga. Donata and dare.
3. Numbers (up to 99,999)
4. Kanji – numbers (1-10, 100, 1000, 10,000 and yen)
5. Family relationships and colours.
6. Conversation – audio
7. Festivals of Japan.

Conversation – audio

UNIT III: **(6)**

Hiragana Charts 2&3, double consonants, vowel elongation and related vocabulary
Grammar - particles ni (time), kara, made and ne. Koko, soko, asoko and doko.
Time expressions (today, tomorrow, yesterday, day before, day after)
Kanji – person, man, woman, child, tree and book
Directions – north, south, east and west.

UNIT IV: **(6)**

Grammar - directions,-kochira, sochira, achira and dochira. Associated vocabulary (mae, ushiro, ue, shita, tonari, soba, etc.)
Conversation – audio, Japanese art and culture like ikebana, origami, etc.

UNIT V: **(6)**

Kanji – hidari, migi, kuchi
Japanese sports and martial arts
Adjectives (present/past – affirmative and negative)
Conversation – audio

TOTAL=30 PERIODS

TEXT/ REFERENCES BOOKS

1. First lessons in Japanese, ALC Japan