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. – Electronics and Communication Engineering [R13]
(1^{st} to 8^{th} Semesters)

(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

VISION OF THE DEPARTMENT:

- To empower the Electronics and Communication Engineering students with academic excellence and societal commitment.

MISSION OF THE DEPARTMENT:

- To groom skilled and employable graduates to meet the growing challenges in the Industry.
- To equip the students with an aptitude for continuous learning and to enrich their knowledge by organizing Seminars, Faculty Development Programs and Workshops.
- To nurture the students to understand the societal needs and equip them with technical expertise to provide appropriate solutions.

PROGRAMME EDUCATIONAL OBJECTIVES:

PEO 1: To provide students with sound foundation in the Mathematical, Scientific and Engineering fundamentals necessary to formulate, Analyze and solve Engineering problems.

PEO 2 : To enable the students to adapt to the emerging technologies through continuous learning.

PEO 3: To enrich the students to pursue post graduate programs in Engineering and interdisciplinary areas to emerge as educators and research experts.

PEO 4: To empower the students with the leadership qualities along with technical skills.

PEO 5: To inculcate the ethical values for professional development of the students to solve complex problems and provide solutions leading to societal benefits.

PROGRAM SPECIFIC OUTCOMES:

Graduates should be able to

- Apply a systematic approach to the solution of problems in the field of Electronics and Communication Engineering.
- Engage in lifelong learning, commitment to quality and continuous improvement.
- Ability to work in multidisciplinary groups.
- Design applications related to Signal Processing, Computer Networks and Communication.

PROGRAM OUTCOMES:

At the end of a programme a student will be able to demonstrate ability to

Engineering Knowledge	PO1	Apply knowledge of mathematics, science, and engineering fundamentals to solve problems in the domain of electronics and communication engineering
Problem Analysis	PO2	Identify, formulate and analyze complex problems in real world using principles of science and engineering
Design and Development of Solutions	PO3	Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health, safety, manufacturability and sustainability
Investigation of Complex Problems	PO4	Conduct experiments, analyze and interpret experimental results and synthesize information to provide valid conclusion
Modern Tool Usage	PO5	Apply techniques, skills, and modern engineering tools necessary for engineering practice
The Engineer and Society	PO6	Develop and model complex electronic hardware and software systems for human needs.
Environment and Sustainability	PO7	Comprehend the impact of engineering solutions in a global, economic, environmental, and societal context
Ethics	PO8	Apply professional and ethical principles and function with responsibility

Individual and Team Work.	PO9	Function as an individual and as a member or leader in multidisciplinary teams
Communication	PO10	Communicate facts successfully with people in engineering domain and effectively design and prepare documents and reports
Lifelong Learning	PO11	Acquire knowledge of contemporary issues and recognize the need for life-long learning
Project Management and Finance	PO12	Apply knowledge of engineering and management principles in multidisciplinary environment and projects

NANDHA ENGINEERING COLLEGE

REGULATIONS 2013 (R-13)

I - VIII SEMESTER CURRICULUM

B.E.Electronics and Communication 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 – I	3	0	0	3
13GE104	Engineering Chemistry	3	0	0	3
13GE105	Engineering Graphics	3	1	0	4
13CS101	Problem Solving and C Programming	3	0	0	3
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
13CS111	Computer Programming Laboratory	0	0	3	2
TOTAL		**18**	**3**	**9**	**27**

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
13GE203	Engineering Physics – II	3	0	0	3
13GE204	Environmental Science and Engineering	3	0	0	3
13EC201	Electronic Devices	3	0	0	3
13EE201	Circuit Theory	3	1	0	4
PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13GE211	Physics and Chemistry Laboratory - II	0	0	3	2
13EC211	Circuits and Devices Laboratory	0	0	3	2
TOTAL		**18**	**3**	**6**	**25**

SEMESTER III

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13GE301	Transforms and partial differential equations	3	1	0	4
13EE306	Electrical Engineering	3	0	0	3
13CS304	Data Structures and Algorithm	3	0	0	3
13EC301	Digital Logic Design	3	0	0	3
13EC302	Signals & Systems	3	1	0	4
13EC303	Electronic circuits-I	3	0	0	3

PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13CS313	Data Structures and Algorithm Lab	0	0	3	2
13EC311	Digital Logic Design Lab	0	0	3	2
13EC312	Electronic circuits-I Lab	0	0	3	2
13PT311	Language Competency Development - 1	0	0	2	0
	TOTAL	**18**	**2**	**11**	**26**

SEMESTER IV

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13GE402	Probability and Random Processes	3	1	0	4
13EC401	Measurements & Instrumentation	3	0	0	3
13EC402	Analog Circuit Design	3	0	0	3
13EC403	Electromagnetic Fields	3	1	0	4
13EC404	Microprocessor & its applications	3	0	0	3
13EC405	Electronic circuits-II	3	0	0	3
PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EC411	Analog Circuit Design Lab	0	0	3	2
13EC412	Electronic circuits-II &Simulation Lab	0	0	3	2
13EC413	Mini Project	0	0	2	1
13PT411	Language Competency Development – 2	0	0	2	0
	TOTAL	**18**	**2**	**10**	**25**

SEMESTER V

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EC501	Analog Communication	3	0	0	3
13EC502	Microcontroller & Interfacing	3	0	0	3
13ECC02	Digital Signal Processing	3	0	0	3
13EC503	Transmission Lines & Waveguides	3	1	0	4
13IT503	Object Oriented Programming Concepts	3	0	1	4
E1	Elective I (PE)	3	0	0	3
PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EC511	Microprocessors & Microcontrollers Interfacing Lab	0	0	3	2
13ECC12	Digital Signal Processing Lab	0	0	3	2
13EC512	Programming in Tools Lab	0	0	2	1
13PT511	Verbal Aptitude and Reasoning - I	0	0	2	0
	TOTAL	**18**	**1**	**11**	**25**

SEMESTER VI

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EC601	Digital Communication	3	0	0	3
13ECC03	VLSI Design	3	0	0	3
13EC602	Antenna and Wave Propagation	3	1	0	4
13GEC01	Principles of Management	3	0	0	3
13EC603	Data Communication & Networks	3	0	0	3
E2	Elective II (PE)	3	0	0	3
PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EC611	Communication System Lab	0	0	3	2
13ECC13	VLSI Design Lab	0	0	3	2
13EC612	Data Communication & Networks Lab	0	0	3	2
13PT611	Verbal Aptitude and Reasoning – II`	0	0	2	0
13GE611	Comprehension	0	0	2	1
	TOTAL	**18**	**1**	**13**	**26**

SEMESTER VII

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EC701	Microwave Engineering	3	0	0	3
13EC702	Optical Communication	3	0	0	3
13EC703	Embedded and Real Time Systems	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**
13EC711	Microwave & Optical Lab	0	0	3	2
13EC712	Embedded Systems Lab	0	0	3	2
13GE711	Personality and Character Development	0	0	2	0
	TOTAL	**17**	**0**	**6**	**21**

SEMESTER VIII

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

PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EC831	Project work	0	0	20	10
	TOTAL	**5**	**0**	**20**	**15**

Total Credits=27+25+26+25+25+26+21+15=190

LIST OF ELECTIVES

B.E. Electronics and Communication Engineering

Professional Electives:

LIST OF ELECTIVES FOR E1					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13ECX01	Medical Electronics	3	0	0	3
13ECX02	Digital Image Processing	3	0	0	3
13ECX03	Consumer Electronics	3	0	0	3
13ECX04	Electronic Testing	3	0	0	3
LIST OF ELECTIVES FOR E2					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13ECX05	Computer Hardware Interfacing	3	0	0	3
13ECX06	Control Systems	3	0	0	3
13ECX07	Nano Electronics	3	0	0	3
13ECX08	MEMS and its Application	3	0	0	3
LIST OF ELECTIVES FOR E3					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13ECX09	High Speed Networks	3	0	0	3
13ECX10	Advanced Microprocessors and Microcontrollers	3	0	0	3
13GEC03	Professional Ethics and Human Values	3	0	0	3
13GEC04	Total Quality Management	3	0	0	3
LIST OF ELECTIVES FOR E6					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13ECX11	Protocols and Architectures for Wireless Sensor Networks	3	0	0	3
13ECX12	Telecommunication Switching and Networks	3	0	0	3
13ECX13	Television and Video Engineering	3	0	0	3
13ECX14	Satellite Communication	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 system	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

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
13GEZ05	Robo Design	2	0	0	2
13GEZ06	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 CERDIT 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 course is applicable from Third semester onwards.**

Total Credits=27+25+26+25+25+26+21+15=190

***PE – Professional Elective *OE – Open Elective**

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

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 and Ashraf.M, "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.

REFEENCE BOOKS:

1. Norman Whitby, Business Benchmark – Pre-Intermediate to Intermediate, Students Book, Cambridge University Press, 2006.
2. Dhanavel, S.P. 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. Hewings. M, "Advanced English Grammar", Cambridge University Press, Chennai, 2000.
5. Raman M & 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)

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

13GE102 - ENGINEERING MATHEMATICS - I **L T P C**
(Common to All B.E/ B.Tech. Programmes) **3 1 0 4**

OBJECTIVES:

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

- 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 solutions in certain cases and to have acquired the technique of diagonalizing a matrix which would render the Eigen solution procedure very simple.

CO2 : Have 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 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 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.

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

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.

UNITIII: 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. Veerarajan.T, "Engineering Mathematics for first year," 3rd ed., Tata McGraw-Hill, 2011.
3. Kandasamy .P, Thilagavathy .K 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)

	POs											
COs	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
4	X	X		X	X							X
5	X	x			X							X

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

L	T	P	C
3	0	0	3

OBJECTIVES:

- The aim of this course is 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 : Acoustics, Production and the applications of Ultrasonics in Engineering and Medical Fields.
CO2 : Interference, different types of lasers and its application in various fields.
CO3 : Fiber optics and optical fiber and its applications.
CO4 : Development of quantum mechanics and its necessary, wave equations and its applications, X - Ray.
CO5 : Crystallography and can able to calculate the crystal parameters.

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).

TOTAL: 45 PERIODS

TEXT BOOKS:

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

REFERENCES:

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

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

13GE104 - ENGINEERING CHEMISTRY
(Common to All B.E/ B.Tech. Programmes)

	L	T	P	C
OBJECTIVES :	**3**	**0**	**0**	**3**

- 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, "New Delhi, 15th ed., Dhanpat Rai Pub.Co, 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 Hi-tech 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)

	POs											
COs	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	
5	X		X	X				X				X

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

CONCEPTS AND CONVENTIONS:

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

UNIT - I: GEOMETRICAL CONSTRUCTIONS AND PLANE CURVES (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

REFERENCES:

1. Venugopal.K, Prabhu Raja.V, "Engineering Drawing + AutoCAD," 5th ed., Reprint, New Age International, 2011.
2. Basant Agarwal and Agarwal C.M., "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)

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

13CS101 - PROBLEM SOLVING & 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-1: 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-2: 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-3: 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-4: POINTERS & ARRAYS (9)

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

UNIT-5: 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," 3 rd ed., BPB publications, New Delhi, 2011.
2. E.Balagurusamy, "Fundamentals of computing and programming," 2 nd ed., Tata McGraw-Hill Publishing Company Limited, 2012.

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. Dromey R.G., "How to Solve it by Computer," 4th Reprint, Pearson Education, 2007.
4. Kernighan B.W and Ritchie D.M, "The C Programming language,"2nd ed., Pearson Education, 2006.

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

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

13GE111-PHYSICS AND CHEMISTRY LABORATORY- I
(Common to All B.E/ B.Tech. Programmes)

L	T	P	C
0	0	3	2

OBJECTIVES:

- To provide the basic practical exposure to all the engineering and technological streams in the field of physics. .
- To provide the basic practical exposure to all the engineering and technological streams in the field of chemistry.
- The students are able to know about the water containing impurities and some physical parameters.
- To gain the knowledge about light, sound, laser, fiber optics and magnetism.
- To develop the knowledge of conductometric titration and viscometry

LEARNING OUTCOMES:

On completion 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

PHYSICS LABORATORY- I

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)

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	
5	X	X		X								X

13GE112- ENGINEERING PRACTICES LABORATORY
(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.
- 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

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

CO2 : Understand various manufacturing processes.

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

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

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

I-MECHANICAL ENGINEERING PRACTICE

Welding:

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

(a) Simple Turning and Taper turning
(b) Drilling Practice

(a) Forming & Bending:
(b) Model making – Trays, funnels, etc.
(c) Different type of joints.

(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.

II - CIVIL ENGINEERING PRACTICE

Buildings:

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

(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, planning and cutting.

GROUP-B (ELECTRICAL AND ELECTRONICS)

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 an 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. Jeyachandran K., Natarajan S. & Balasubramanian S., "A Primer on Engineering Practices Laboratory," Anuradha Publications, 2007.
2. Jeyapoovan T., Saravanapandian M. & Pranitha S., "Engineering Practices Lab Manual," Vikas Puplishing House Pvt.Ltd, 2006.
3. Bawa H.S., "Workshop Practice," Tata McGraw Hill Publishing Company Limited, 2007.
4. Rajendra Prasad A. & Sarma P.M.M.S, "Workshop Practice," Sree Sai Publication, 2002.
5. Kannaiah P. & Narayana K.L., "Manual on Workshop Practice," SciTech Publications, 1999.

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

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

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

L	T	P	C
0	0	3	2

OBJECTIVE:

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

COURSE OUTCOMES:

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

CO1 : Use MS Word and MS Excel for document preparation.

CO2 : Draw flowchart using open source tool.

CO3 : Develop program using basic C constructs.

CO4 : Write program using arrays and functions.

CO5 : Create program using pointer, structure and files.

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

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

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

13GE201 - ENGLISH FOR ENGINEERS - II | **L T P C**
(Common to All B.E/B.Tech Programmes) | **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.

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. Rizvi, M.A., "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

REFEENCE BOOKS:

1. Raman M & Sangeetha Sharma, "Technical Communication," Oxford University Press, USA, 2005.
2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering, Orient Blackswan, Chennai. 2011.
3. Dhanavel S.P, "English and Soft skill," Orient Black swan Pvt. Ltd., 2010.
4. Gerson, Sharon.J 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)

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

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

L	T	P	C
3	1	0	4

OBJECTIVES:

To enable students to

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

CO2: Have studied the basics of vector calculus comprising of gradient, divergence and curl and line, surface and volume integrals and the classical theorems involving them, which would be encountered by them in their engineering subjects in the same or higher semesters.

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

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

CO5: Have a sound knowledge of Laplace transform and its properties and sufficient exposure to solution of certain linear differential equations using the Laplace transform technique which have applications 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

TEXT BOOKS:

1. N.P.Balaji, Manish Goyal, "A text book of, Engineering Mathematics: Sem-II," 5th ed., Laxmi Publications.2011.
2. Veerarajan.T, "Engineering Mathematics for first year," 3rd ed., Tata McGraw Hill, 2011.
3. Kandasamy .P, Thilagavathy .K , Gunavathy .K , "Engineering Mathematics for first year,", 7th Rv. Edition, 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)

	POs											
COs	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							X
5	X	X			X							X

13GE203 - ENGINEERING PHYSICS - II
(For Circuit Branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

The objective of this course is to develop the skills of the students in Material science under various topics. This will provide the basic ideas in large number of engineering subjects like Electrical conductions, Semiconductors and Devices, Electronic devices, Nano technology, etc.

COURSE OUTCOMES:

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

CO1 : Electric conduction, electrical conductivity, carrier concentration of metals.
CO2 : Semiconductors, carrier concentration of semiconductors, Hall effect and semiconductor devices.
CO3 : Types of magnetic materials, ferro magnetic materials, magnetic storage devices, Super conductors and their properties and applications.
CO4 : Dielectrics, properties and its applications, ferro electricity.
CO5 : Modern engineering materials, Nano materials and Carbon nano tubes.

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: MAGNETIC AND SUPERCONDUCTING MATERIALS (9)

Origin of magnetic moment – Bohr magneton – Dia and para magnetism – Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – anti – ferromagnetic materials – Ferrites – applications – magnetic recording and readout – storage of magnetic data – tapes, floppy and magnetic disc drives. Superconductivity : properties - Types of super conductors – BCS theory of superconductivity(Qualitative) - High Tc superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.

UNIT IV: 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 V :MODERN ENGINEERING MATERIALS (9)

Metallic glasses: preparation, properties and applications. Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application, advantages and disadvantages of SMA. Nanomaterials: synthesis – plasma arcing – chemical vapour deposition – sol-gels – electrodeposition – ball milling - properties of nanoparticles and applications. Carbon nanotubes: fabrication – arc method – pulsed laser deposition – chemical vapour deposition - structure – properties and applications.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. V.Rajendran, "Engineering Physics," Tata McGraw-Hill. New Delhi, 2011.
2. Palanisamy P.K, "Materials science," Chennai, second ed., SciTech publications (India) Pvt. LTd., 2007.

REFERENCES:

1. Jayakumar, S. "Materials science," R.K. Publishers, Coimbatore, 2008.
2. K. Tamilarasan, K. Prabu, "Engineering Physics II," Second Edition, Tata McGraw-Hill. New Delhi. 2011.
3. M. Arumugam, "Materials Science,"Anuradha publications, Kumbakonam, 2006.
4. Senthilukumar G, "Engineering Physics- II," VRB Publications, 2011.

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

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

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.

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 PERIODS

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 Hi-tech publishing Co.Pvt .Ltd, 2012.

REFERENCE BOOKS:

1. Masters, Gilbert M, "Introduction to Environmental Engineering and Science,"Second ed., Pearson Education, New Delhi, 2004.
2. Santosh Kumar Garg, Rajeshwari garg and smf Ranjni Garg "Ecological and Environmental Studies," Khanna Publishers, Nai Sarak, Delhi 2006.
3. Miller T.G. Jr., "Environmental Science," Tenth ed., Wadsworth Publishing Co., 2004.

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

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

13EC201 - ELECTRONIC DEVICES
(For ECE Branch ONLY)

L	T	P	C
3	0	0	3

OBJECTIVE:

To learn the fundamentals of various semiconductor devices and their applications.

COURSE OUTCOMES:

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

CO1 : Understand the operation and characteristic of PN junction diode.
CO2 : Acquire the knowledge in bipolar junction transistor.
CO3 : Learn the difference between Field effect transistor and BJT.
CO4 : Gain knowledge about special semiconductor devices .
CO5 : Apply gained knowledge to develop the real time applications.

UNIT I: SEMICONDUCTOR DIODE (9)

PN junction diode - Current equations - Diffusion and Drift Current Densities - Forward and Reverse bias characteristics - Switching Characteristics.

UNIT II: BIPOLAR JUNCTION (9)

NPN and PNP – Junctions - Early effect - Current equations – Input and Output characteristics of CE, CB, CC-Configurations - Hybrid -π model - h-Parameter Model - Ebers Moll Model - Gummel Poon-Model - Multi Emitter Transistor.

UNIT III: FIELD EFFECT TRANSISTORS (9)

JFETs – Drain and Transfer Characteristics - Current equations - Pinch off voltage and its significance, MOSFET – Characteristics - Threshold voltage - Channel length modulation - D-MOSFET - E-MOSFET-Current equation - Equivalent circuit model and its parameters – FINFET - DUAL GATE MOSFET.

UNIT IV: SPECIAL SEMICONDUCTOR DEVICES (9)

Metal-Semiconductor Junction – MESFET – Schottky barrier diode - Zener diode - Varactor diode – Tunnel diode - Gallium Arsenide Device - LASER diode - LDR.

UNIT V: POWER DEVICES AND DISPLAY DEVICES (9)

UJT - SCR - Diac - Triac - Power BJT - Power MOSFET - DMOS – VMOS, LED – LCD - Photo transistor - Opto-Coupler - Solar cell - CCD.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Donald A Neaman, “Semiconductor Physics and Devices,” Third ed., Tata Mc Graw Hill Inc. 2007.

REFERENCES:

1. Yang, "Fundamentals of Semiconductor devices," McGraw Hill International Edition, 1978.
2. Robert Boylestad and Louis Nashelsky," Electron Devices and Circuit Theory" 10th ed., Pearson Prentice Hall, 2008.

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

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

13EE201 - CIRCUIT THEORY
(For ECE, EEE & EIE Branches)

L	T	P	C
3	1	0	4

OBJECTIVE:

- To introduce the concepts and investigate the behaviour of electric circuits by analytical techniques

COURSE OUTCOMES:

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

CO1 : understand the basic concepts of single phase, three phase and DC Electrical circuits
CO2 : To identify the transient and steady state response of the circuits subjected to step and sinusoidal excitations.
CO3 : analyze about Resonance And Coupled Circuits
CO4 : identify the methods of transient response for dc circuits
CO5 : understand the concept of three phase circuits.

UNIT I: BASIC CIRCUITS ANALYSIS (9+3)

Ohm‟s Law – Kirchhoff‟s laws – DC and AC Circuits – Resistors in series and parallel circuits – Mesh Current and node voltage method of analysis for D.C and A.C. circuits – Phasor Diagram – Power,Power Factor and Energy

UNIT II: NETWORK REDUCTION AND NETWORK THEOREMS FOR DC ANDAC CIRCUITS (9+3)

Network reduction: voltage and current division, source transformation – star delta conversion.Thevenins and Novton & Theorem – Superposition Theorem – Maximum power transfer theorem –Reciprocity Theorem.

UNIT III: RESONANCE AND COUPLED CIRCUITS (9+3)

Series and paralled resonance – their frequency response – Quality factor and Bandwidth - Self andmutual inductance – Coefficient of coupling – Tuned circuits – Single tuned circuits.

UNIT IV: TRANSIENT RESPONSE FOR DC CIRCUITS (9+3)

Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. withsinusoidal input – Characterization of two port networks in terms of Z,Y and h parameters.

UNIT V: THREE PHASE CIRCUITS (9+3)

Three phase balanced / unbalanced voltage sources – analysis of three phase 3-wire and 4-wirecircuits with star and delta connected loads, balanced & un balanced – phasor diagram of voltages and currents – power and power factor measurements in three phase circuits.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, “Engineering Circuits Analysis,” 6th ed., Tata McGraw Hill publishers, New Delhi, 2003.
2. Joseph A. Edminister and Mahmood Nahri, “Electric circuits,” Schaum‟s series, Tata McGraw-Hill New Delhi, 2001.

REFERENCES:

1. Paranjothi SR, “Electric Circuits Analysis,” New Age International Ltd., New Delhi, 1996.
2. Sudhakar A and Shyam Mohan SP, “Circuits and Network Analysis and Synthesis,” Tata McGraw Hill, 2007.
3. Chakrabati A, “Circuits Theory (Analysis and synthesis), Dhanpath Rai & Sons, New Delhi, 1999.
4. Charles K. Alexander, Mathew N.O. Sadiku, “Fundamentals of Electric Circuits,” Second ed., McGraw Hill, 2003.

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

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

13GE211-PHYSICS AND CHEMISTRY LABORATORY- II

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

L	T	P	C
0	0	3	2

OBJECTIVES

- To provide the basic practical exposure to all the engineering and technological streams in the field of physics. .
- To provide the basic practical exposure to all the engineering and technological streams in the field of chemistry.
- The students are able to know about the water containing impurities and some physical parameters.
- To gain the knowledge about properties of matter, semiconductors and solar
- cells To develop the knowledge of spectrophotometry.
-

LEARNING OUTCOMES:

On completion of this course the students will be able to

CO1 : Acquire the practical knowledge in various module.

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, conductance, EMF and pH

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

PHYSICS LABORATORY- II

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.

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

	POs											
COs	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
4	X	X				X	X				X	
5	X	X		X		X						X

13EC211 - CIRCUITS AND DEVICES LABORATORY
(For ECE Branch ONLY)

L	T	P	C
0	0	3	2

OBJECTIVE:

To provide the students with practice in the experimental setup, measurement, and analysis of basic electronic devices and circuits.

COURSE OUTCOMES:

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

CO1 : verify the working of diodes, transistors and their applications.
CO2 : investigate / test / verify property or characteristics of electronic devices and circuits.
CO3 : verify the characteristics of thyristors.
CO4 : verify the electrical theorems.
CO5 : understand and analyse the working of resonance circuits.

LIST OF EXPERIMENTS:

1. Characteristics of PN Junction Diode
2. Zener Diode Characteristics & Voltage Regulator using Zener diode
3. Input- Output Characteristics of Common Emitter Configuration
4. Input- Output Characteristics of Common Base Configuration
5. FET Characteristics
6. SCR Characteristics
7. Diode Applications – Clipper, Clamper & Full Wave Rectifier
8. Verification of Thevenin & Norton Theorems
9. Verification of KVL & KCL
10. Verification of Super Position Theorems
11. Verification of Maximum Power Transfer & Reciprocity Theorems
12. Determination of Resonance Frequency of Series & Parallel RLC Circuits
13. Transient analysis of RL and RC circuits

TOTAL: 45 PERIODS

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

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

13GE301 - TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS
(COMMON TO ALL B.E/B.TECH)

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 IIIBOUNDARY 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 IVFOURIER 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 VZ -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. Veerarajan.T, "Engineering mathematics (for III Semester),"3rd ed., Tata Mc Graw Hill, New Delhi,2005.
2. Kandasamy. P, Thilagavathy. K and Gunavathy. K, "Engineering Mathematics- Volume III," S. Chand & Co Ltd., 2006.

REFERENCES:

1. Goyal. Manish and Bali. N.P, "A Textbook of Engineering mathematics," 6th ed.,Laxmi Publication (P) Ltd. New Delhi, 2012.
2. Grewal. B.S, "Higher Engineering Mathematics," 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)

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

13EE306 - ELECTRICAL ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVE:

- To expose the students to the concepts of various types of electrical machines and transmission and distribution of electrical power.

COURSE OUTCOMES:

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

CO1 : Constructional details, principle of operation, performance, starters and testing of D.C. machines.

CO2 : Constructional details, principle of operation, testing and efficiency of Transformer.

CO3 : Constructional details, principle of operation, performance of Induction Motors.

CO4 : Constructional details and principle of operation of alternators and special machines,

CO5 : Power System transmission and distribution.

UNIT I D.C. MACHINES (9)

Constructional details – emf equation – Methods of excitation – Self and separately excited generators – Characteristics of series, shunt and compound generators –Principle of operation of D.C. motor – Back emf and torque equation – Characteristics of series, shunt and compound motors - Starting of D.C. motors – Types of starters -Testing, brake test and Swinburne‟s test – Speed control of D.C. shunt motors.

UNIT IITRANSFORMERS (9)

Constructional details – Principle of operation – emf equation – Transformation ratio –Transformer on no load – Parameters referred to HV/LV windings – Equivalent circuit –Transformer on load – Regulation - Testing – Load test, open circuit and short circuit tests.

UNIT III INDUCTION MOTORS (9)

Construction – Types – Principle of operation of three-phase induction motors – Equivalent circuit – Performance calculation – Starting and speed control – Single-phase induction motors (only qualitative treatment).

UNIT IVSYNCHRONOUS AND SPECIAL MACHINES (9)

Construction of synchronous machines- types – Induced emf – Voltage regulation; emf and mmf methods – Brushless alternators – Reluctance motor – Hysteresis motor –Stepper motor.

UNIT V TRANSMISSION AND DISTRIBUTION (9)

Structure of electric power systems – Generation, transmission and distribution systems - EHVAC and EHVDC transmission systems – Substation layout – Insulators – cables.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. D.P.Kothari and I.J.Nagrath, “Basic Electrical Engineering,” Tata McGraw Hill publishing company ltd, Third ed., 2009.
2. C.L. Wadhwa, “Electrical Power Systems,” New Age International, sixth ed., 2012.

REFERENCES:

1. S.K.Bhattacharya, “Electrical Machines,” Third ed., Tata McGraw Hill publishing company Ltd, 2009.
2. V.K.Mehta and Rohit Mehta, “Principles of Power System,” S.Chand and Company, Fourth (Multi-color) edition.

.

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

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

13CS304 - DATA STRUCTURES AND ALGORITHMS
(Common to ECE, EEE and EIE)

L	T	P	C
3	0	0	3

OBJECTIVE:

- The course aims to introduce the concept of arrays, recursion, stack, queue, linked list, trees and graph data structures.

COURSE OUTCOMES:

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

CO1 : The concept of arrays, structures pointers and recursion

CO2 : The concept of stack, queue and linked list concepts

CO3 : Trees, representation of trees, tree traversal and basic operations on trees to any algorithm

CO4 : Some of the sorting and searching techniques

CO5 : The concept of graphs, traversal techniques and minimum spanning tree.

UNIT I INTRODUCTION TO DATA STRUCTURES (9)

Abstract data types – sequences as value definitions – Data types in C - Pointers in C – Data Structures in C - Arrays in C – Array as ADT - One dimensional array -Implementing one dimensional array – Array as parameter - Two dimensional array -Structures in C - Implementing structures - Unions in C - Implementation of unions

UNIT II STACK, QUEUE AND LINKED LIST (9)

Stack definition and examples – Primitive operations – Example - Representing stacks in C - Push and pop operation implementation. Queue as ADT - C Implementation of queues - Insert operation - Priority queue - Array implementation of priority queue. Inserting and removing nodes from a list-linked implementation of stack, queue and priority queue – other list structures – Circular lists: Stack and queue as circular list

UNIT III TREES (9)

Binary trees: Operations on binary trees - Applications of binary trees - Binary tree representation - Node representation of binary trees - Implicit array representation of binary tree – Binary tree traversal in C – Representing list as binary tree - Finding the K^{th} element - Deleting an element. Trees and their applications: C representation of trees - Tree traversals - Evaluating an expression tree - Constructing a tree.

UNIT IV SORTING AND SEARCHING (9)

General background of sorting. Exchange sorts: Bubble sort; Quick sort; Selection sort; Binary tree sort; Heap sort. - Insertion sorts: Simple insertion - Shell sort –Merge sort – Radix sort. Sequential search: Indexed sequential search – Binary search – Interpolation search.

UNIT V GRAPHS (9)

Application of graph - C representation of graphs –Warshall‟s algorithm – Shortest path algorithm - Linked representation of graphs - Dijkstra‟s algorithm - Graph traversal - Traversal methods for graphs –Undirected graph and their traversals - Depth first traversal – Application of depth first traversal – Efficiency of depth first traversal - Breadth first traversal – Minimum spanning tree – Kruskal‟s algorithm.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Aaron M. Tenenbaum, Yeedidyah Langsam and Moshe J. Augenstein, "Data structures using C,"Pearson Education, 2009 / PHI.

REFERENCES:

1. E. Balagurusamy, "Programming in Ansi C," Second ed., Tata McGraw Hill Publication, 2006.
2. Robert L. Kruse, Bruce P. Leung Clovis L.Tondo, "Data Structures and Program Design in C," Pearson Education, 2009 / PHI.

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

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

13EC301 - DIGITAL LOGIC DESIGN

L	T	P	C
3	0	0	3

OBJECTIVES:

- Establish a strong understanding of the principles of Digital Design.
- Provide Understanding of number systems and Boolean algebra.
- Represent logical functions in Canonical form and standard forms.
- Develop the Knowledge of combinational and sequential circuits design.
- Enable the student to design and implement their circuits

COURSE OUTCOMES:

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

CO1	:	Understand the basic principles of Boolean algebra
CO2	:	Develop state diagrams and algorithmic state machine charts methods of minimization of next state transition tables and strategies for state assignment
CO3	:	Gain knowledge on Verilog HDL CODING STYLE
CO4	:	Design and analyze combinational logic and sequential logic digital circuits
CO5	:	Design and implement Combinational and Sequential circuits

UNIT I NUMBER SYSTEMS AND BOOLEAN ALGEBRA (9)

Brief review of Digital systems, Binary numbers, Number base conversions, Representation of Negative Numbers, Complements, Binary arithmetic, Binary Codes for Decimal Numbers. Basic Definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Digital Logic Gates and timing concepts.

UNIT II GATE-LEVEL MINIMIZATION (9)

The Map Method - K-map 4 variable, Product of Sums Simplification, NAND and NOR Implementation, Other Two-Level Implementations. Review of , RTL, DTL, TTL, ECL, CMOS families.

UNIT III Verilog HDL CODING STYLE (9)

Lexical Conventions - Ports and Modules – Operators - Gate Level Modeling - System Tasks & Compiler Directives - Test Bench - Data Flow Modeling - Behavioral level Modeling -Tasks & Functions

UNIT IV DESIGN AND MODELING OF COMBINATIONAL LOGIC CIRCUITS USING Verilog (9)

Analysis Procedure, Design Procedure, Binary Adder-Subtractor, Parallel Adder, Carry look Ahead Adder, Binary Multiplier, Code Converters-Binary to Gray, Gray to Binary, BCD to Excess-3 Code Conversion and vice versa, BCD to 7-segment code converter, Magnitude Comparator-4 bit, Decoders, Encoders, Multiplexers, De-multiplexer, Parity generator and checker. Modeling of above combinational circuits using Verilog

UNIT V SEQUENTIAL LOGIC (9)

Latches, Flip-Flops-SR, D, JK & T, realization of FFs, synchronous and asynchronous sequential circuits-State table and state diagrams, State reduction, Shift Registers-SISO, SIPO, PISO,PIPO, Design of counters-Modulo-n, Johnson, Ring, Up/Down, Design of Serial Adder, Serial Multiplier, FSM, Mealy and Moore state machines - State minimization – Sequence detection. Modeling of above sequential circuits using Verilog

TOTAL: 45 PERIODS

TEXT BOOKS:

1. M. Morris Mano, "Digital Design," 4th ed., *Prentice Hall of India Pvt.Ltd.* 2012.
2. Samir Palnitkar, “Verilog HDL: A Guide to Digital Design and Synthesis,” Second ed., Prentice Hall, 2009.

REFERENCES:

1. Charles H. Roth, Jr., "Fundamentals of Logic Design," 7th ed., Brooks/Cole, 2013.
2. Thomas L. Floyd & R P Jain, “Digital Fundamentals,” 10th ed., PHI, 2011.
3. Ronald J Tocci & Neal S. Widmer, “Digital Systems, Principles and Applications,” 10th ed., Pearson education, 2011.
4. Frank Vahid, “Digital Design with RTL Design, Verilog and VHDL,” 10th ed., John Wiley and Sons, 2010.

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

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

	L	T	P	C
13EC302 - SIGNALS AND SYSTEMS	**3**	**1**	**0**	**4**

OBJECTIVES:

- To study and analyze characteristics of continuous, discrete signals and systems.
- Study of different forms and properties of Fourier transform.
- Study of utility of Fourier transform for analysis of signals passed through systems.
- Laplace Transform as a tool for analysis of continuous systems.
- Z-transform as a tool for analysis of discrete systems.

COURSE OUTCOMES:

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

CO1 : Understand the operation of continuous time & discrete time signals
CO2 : Analyze the properties of signals & systems
CO3 : Apply Laplace transform, Fourier transform, Z transform and DTFT in signal analysis
CO4 : Implementation of continuous time LTI systems using Fourier and Laplace Transforms.
CO5 : Designing of discrete time LTI systems using Z transform and DTFT.

UNIT I CONTINUOUS TIME SIGNALS (9+3)

Signal classification – Types of standard signals: unit step, ramp, sign and exponential functions – Classification of CT signals – Operations on signals – Fourier series – Fourier transform and its properties.

UNIT II CONTINUOUS TIME SYSTEMS (9+3)

Systems defined by differential equations-Classification of systems – Linearity and time invariance – Transmission of signals through LTI systems – Convolution – Impulse response – Frequency response- Block diagram representation.

UNIT III DISCRETE TIME SIGNALS AND SYSTEMS (9+3)

Continuous to Discrete signal conversion (sampling)-Unit impulse, step, ramp, and exponential signals – Periodicity of signals – Operations on signals – Linear Shift Invariant (LSI) system – Stability – Causality – Convolution and Correlation – Linear constant coefficient difference equation – Impulse response – Discrete time Fourier transform – Properties – Transfer function – System analysis using DTFT.

UNIT IV THE Z-TRANSFORM (9+3)

Derivation and definition – ROC – Properties – Linearity, time shifting, change of scale, Z-domain differentiation, differencing, accumulation, convolution in discrete time, initial and final value theorems – Poles and zeros in Z-plane – The inverse Z-transform – System analysis – Transfer function - BIBO stability – System response to standard signals – Solution of difference equations with initial conditions.

UNIT V LAPLACE TRANSFORM (9+3)

Definition – ROC – Properties – Inverse Laplace transform – the S-plane and BIBO stability – Transfer functions – System response to standard signals – Solution of differential equations with initial conditions

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Alan V.Oppenheim, Alan S.Wilsky and S.Hamid Nawab, "Signals and Systems,"2nd ed., Prentice-Hall of India.2010.
2. Dr. Michael J. Roberts, “Signals and Systems Analysis Using Transform Methods and MATLAB," 2nd ed., McGraw-Hill Higher Education 2012.

REFERENCES:

1. Simon Haykin “Signals and Systems,” John weily pub. Ltd, New Delhi. 2008.
2. Simon Haykin, "Communication Systems,” Wiley Eastern Ltd., New Delhi.
3. Ashok Ambardar, "Analog and Digital Signal Processing," Thomson Learning Inc.
4. B.P.Lathi, "Signals, Systems and Communications," B.S. Publications.,2006.

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

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

13EC303 - ELECTRONIC CIRCUITS I

L	T	P	C
3	0	0	3

OBJECTIVE:

- The course aims to familiarize the student with the analysis and design of basic transistor Amplifier circuits and power supplies.

COURSE OUTCOMES:

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

CO1 : Understand the biasing technique of amplifier.
CO2 : Analyze the small signal equivalent circuit of transistor.
CO3 : Analyze the frequency response of amplifier.
CO4 : Understand the different types of large signal amplifier.
CO5 : Study of rectifiers and power supplies.

UNIT I TRANSISTOR BIAS STABILITY (9)

Introduction to semiconductor theory, BJT – Need for biasing – Stability factor - Fixed bias circuit, Load line and quiescent point. Variation of quiescent point due to h_{FE} variation within manufacturers tolerance -Stability factors - Different types of biasing circuits - Method of stabilizing the Q point - Advantage of Self bias (voltage divider bias) over other types of biasing, Bias compensation – Diode, Thermister and Sensistor compensations, Biasing the FET and MOSFET.

UNIT II MIDBAND ANALYSIS OF SMALL SIGNAL AMPLIFIERS (9)

CE, CB and CC amplifiers - Method of drawing small-signal equivalent circuit - Midband analysis of various types of single stage amplifiers to obtain gain, input impedance and output impedance - Miller‟s theorem - Comparison of CB, CE and CC amplifiers and their uses - Methods of increasing input impedance using Darlington connection and bootstrapping - CS, CG and CD (FET) amplifiers - Multistage amplifiers. Basic emitter coupled differential amplifier circuit - Bisection theorem. Differential gain – CMRR - Use of constant current circuit to improve CMRR - Derivation of transfer characteristic.

UNIT III FREQUENCY RESPONSE OF AMPLIFIERS (9)

General shape of frequency response of amplifiers - Definition of cutoff frequencies and bandwidth - Low frequency analysis of amplifiers to obtain lower cutoff frequency Hybrid – equivalent circuit of BJTs - High frequency analysis of BJT amplifiers to obtain upper cutoff frequency – Gain Bandwidth Product - High frequency equivalent circuit of FETs - High frequency analysis of FET amplifiers - Gain-bandwidth product of FETs - General expression for frequency response of multistage amplifiers - Calculation of overall upper and lower cutoff frequencies of multi stage amplifiers- Amplifier rise time and sag and their relation to cutoff frequencies

UNIT IV LARGE SIGNAL AMPLIFIERS (9)

Classification of amplifiers, Class A large signal amplifiers, second harmonic distortion, higher order harmonic distortion, transformer-coupled class A audio power amplifier – efficiency of Class A amplifiers. Class B amplifier – efficiency - push-pull amplifier - distortion in amplifiers - complementary-symmetry (Class B) push-pull amplifier, Class C, Class D amplifier – Class S amplifier – MOSFET power amplifier, Thermal stability and heat sink.

UNIT V RECTIFIERS AND POWER SUPPLIES (9)

Classification of power supplies, Rectifiers - Half-wave, full-wave and bridge rectifiers with resistive load. Analysis for V_{dc} and ripple voltage with C, L, LC and CLC filters. Voltage multipliers, Voltage regulators - Zener diode regulator, principles of obtaining a regulated power supply, regulator with current limiting, over voltage protection, Switched mode power supply (SMPS).

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Millman J and Halkias .C, Integrated Electronics, McGraw-Hill, 2009.
2. S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, Electronic Devices and Circuits, 2nd ed., TMH, 2011.

REFERENCES:

1. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 10th ed., Pearson Education / PHI, 2013.
2. David A. Bell, Electronic Devices & Circuits, 5th ed., Oxford University Press, 2008.
3. Floyd, Electronic Devices, Ninth ed., Pearson Education, 2014.
4. I.J. Nagrath, Electronic Devices and Circuits, PHI, 2009.
5. Anwar A. Khan and Kanchan K. Dey, "A First Course on Electronics," PHI, 2006.
6. B.P. Singh and Rekha Singh, Electronic Devices and Integrated Circuits, 2nd ed., Pearson Education, 2010.
7. Rashid M, Microelectronics Circuits, 2nd ed., Cengage Learning, 2010.

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

	POs											
COs	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	X								X

13CS313- DATA STRUCTURES AND ALGORITHMS LABORATORY
(Common to ECE, EEE and EIE)

L	T	P	C
0	0	3	2

OBJECTIVES:

- To implement concept of Linked list and their applications.
- To implement concept of Trees.
- To implement concept of Hashing.
- To implement concept of Sorting.

COURSE OUTCOMES:

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

CO1 : A Design and implement abstract data types such as linked list, stack, queue and tree.
CO2 : An ability to apply knowledge of mathematics, science, and engineering.
CO3 : An ability to engage in life-long learning.
CO4 : An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
CO5 : An ability to apply and implement learned algorithm design techniques and data structures to solve problems.

LIST OF EXPERIMENTS:

1. Implementation of singly linked list.
2. Implementation of Doubly linked list.
3. Implement stack and use it to convert infix to postfix expression .
4. Implement array-based circular queue and use it to simulate a producer-consumer problem.
5. Implement binary search tree.
6. Implement priority queue using heaps.
7. Implement Dijkstra's algorithm using priority queues.
8. Implementation of Heap Sort.
9. Implementation of Quick Sort.
10. Implementation of Depth first traversal.

TOTAL: 45 PERIODS

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

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

13EC311 -DIGITAL LOGIC DESIGN LABORATORY

L	T	P	C
0	0	3	2

OBJECTIVE:

- To design and implement Combinational and Sequential circuits used in digital systems.

COURSE OUTCOMES:

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

CO1 : Design and implement adder, subtractor, Code Converters, Magnitude comparators, Multiplexers and demultiplexers, Parity generator and checker.

CO2 : Design multiplexer and Demultiplexer.

CO3 : Design and implement sequential circuits like counters and shift registers.

CO4 : Modeling of Combinational circuits using Verilog.

CO5 : Modeling of Sequential circuits using Verilog.

LIST OF EXPERIMENTS:

1. Verification of logic gates
2. Design of HA, FA, HS, FS.
3. MUX and De-MX (SOP, POS-Minimization)
4. Encoder and Decoder
5. Parity Generator and checker
6. Code Converters.
7. Verification of Flip Flops.

Software experiments (Altera Quartus-II and Model Sim)

8. Modeling of HA, FA, HS, FS, MUX ,De-MUX, Encoder, Decoder and FF
9. Shift Registers and their types.
10. Counters and their typed.
11. Design of Sequential Circuit.
12. Sequence Detector.

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

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

13EC312-ELECTRONIC CIRCUITS – I LABORATORY

L	T	P	C
0	0	3	2

OBJECTIVES:

- To specify various active and passive electronic components and devices and identify the terminals and to draw the symbols for different electronic components.
- To understand and operate multimeter for current, voltage and resistance measurements. To investigate test / verify property or characteristics of amplifiers.

COURSE OUTCOMES:

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

CO1 : Design various types of transistor biasing circuits.
CO2 : Design high gain amplifiers.
CO3 : Know about analyzing of amplifier bandwidth.
CO4 : Learn about power amplifier and their characteristics.
CO5 : Have knowledge about power supplies and their characteristics.

Ex No: 1 Fixed Bias Amplifier Circuit using BJT

1. Waveforms with input and output without Bias
2. Determination of Bias resistance to locate-Q point at center of load line
3. Measurement of Gain
4. Plot the frequency response and Determination of Gain Bandwidth Product

Ex No: 2 Design and Construct BJT Common Emitter Amplifier using Voltage Divider Bias

1. Measurement of Gain
2. Plot the frequency response and Determination of Gain Bandwidth Product

Ex No: 3 Design and Construct BJT Common Collector Amplifier using Voltage Divider Bias(Self Bias)

1. Measurement of Gain
2. Plot the frequency response and Determination of Gain Bandwidth Product

Ex No: 4 Darlington Amplifier using BJT

1. Measurement of Gain and Input Resistance
2. Comparison with Calculated Values
3. Plot the frequency response and Determination of Gain Bandwidth Product.

Ex No: 5 Source follower with Bootstrapped Gate Resistance

1. Measurement of Gain, Input Resistance and Output Resistance with and without bootstrapping
2. Comparison with calculated values.

Ex No: 6 Differential Amplifier using BJT

1. Measurement of CMRR.

Ex No: 7 Class A Amplifier

1. Observation of output waveform
2. Measurement of maximum power output
3. Determination of efficiency
4. Comparison with calculated values

Ex No: 8 Class B Complementary Symmetry Power Amplifier

1. Observation of output waveform with cross over distortion
2. Modification of the circuit to avoid cross over distortion
3. Measurement of maximum power output
4. Determination of efficiency
5. Comparison with calculated values

Ex No: 9 Power Supply Circuit -Half Wave Rectifier with simple capacitor filter

1. Measurement of DC voltage under Load and Ripple factor, Comparison with calculated values.

Ex No: 10 Power Supply Circuit -Full Wave Rectifier with simple capacitor filter

1. Measurement of DC voltage under Load and Ripple factor, Comparison with calculated values.

Ex No: 11 Cascade Amplifier Circuit

1. Observation of Output wave form
2. Plot the frequency response and Determination of Gain Bandwidth Product

Ex N0:12 Cascode Amplifier Circuit

1. Observation of Output wave form
2. Plot the frequency response and Determination of Gain Bandwidth Product

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

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

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…dit 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 BOOKS:

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.

Continuous Assessment Rubrics:

Sl. No.	Evaluation Activities	Mark Allotment	Metrics		
1	News Presentation	15	Articulation	(a)	Average (a+b+c+d+e)
2	Debate	20	Word Usage	(b)	
3	Class Participation	15	Content	(c)	
			Listening	(d)	
			Body Language	(e)	
	Internal Total	**50**			

Final Assessment Rubrics:

Sl. No.	Evaluation Activities	Mark Allotment	Metrics		
1	Assessment Centre	20	Role delivery	(a)	Average (a+b+c+d)
			Articulation & Word Usage	(b)	
			Content Validity	(c)	
			Participation in team	(d)	
2	Written Test	30	Objective type		
	Final Total	**50**			

Notes:

- News presentation and debate shall happen in every class. So the final marks will be the average of all the attempts.
  - News presentation and debate will be unconventional where in it will be within the team and not for the whole class at once.
  - On a given hour a faculty can assess two teams so considering that there will 72 students there will 6 teams of 12 each and hence every students would have done presentation and debate at least twice per semester for assessment alone.
- Class participation is based on the student‟s regularity in doing home work.
- Assessment Centre is one where a case shall be given and the students shall be given roles to perform. Language skills, Behavioral skills, General Awareness, Persuasion Skills shall be measured during this exercise.

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

	POs											
COs	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	
5						X		X		X		

13GE402 - PROBABILITY AND RANDOM PROCESSES

L	T	P	C
3	1	0	4

OBJECTIVE:

- Enable students to understand the topics such as signals & systems, pattern recognition, voice and image processing and filtering theory.

COURSE OUTCOMES:

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

CO1 : Have a fundamental knowledge of the basic probability concepts.

CO2 : Have a well-founded knowledge of standard distributions which can describe real life phenomena.

CO3 : Acquire skills in handling situations involving more than one random variable and functions of random variables.

CO4 : Understand and characterise phenomena which evolve with respect to time in probabilistic manner.

CO5 : Be able to analyze the response of random inputs to linear time invariant systems.

UNIT I PROBABILITY AND RANDOM VARIABLE (9+3)

Axioms of probability – Conditional probability – Total probability – Baye‟s theorem - Random variable- Probability mass function – Probability density functions – Properties - Moments –Moment generating functions and their properties.

UNIT II STANDARD DISTRIBUTIONS (9 + 3)

Discrete distributions: Binomial, Poisson, Geometric-Continuous distributions: Uniform, Exponential and normal distributions and their properties-Function of Random Variable.

UNIT III TWO DIMENSIONAL RANDOM VARIABLES (9 + 3)

Joint distributions-Marginal and conditional distributions-Covariance-Correlation and Regression-Transformation of random variables-Central limit theorem (Excluding proof)

UNIT IV CLASSIFICATION OF RANDOM PROCESSES (9 + 3)

Definition and examples-first order, second order, strictly stationary, wide-sense stationary and ergodic process-Markov process-Binomial, Poisson and Normal processes-Sine wave process.

UNIT V CORRELATION AND SPECTRAL DENSITIES (9 + 3)

Auto correlation-Cross correlation-Properties-Power spectral density-Cross spectral density-Properties-Relationship between cross power spectrum and cross correlation function. Linear time invariant system – System transfer function-Linear systems with random inputs-Auto correlation and cross correlation functions of input and output.

TOTAL : 60 PERIODS

TEXT BOOK:

1. Veerarajan. T, "Probability, Statistics and Random Processes," 3rd ed., New Delhi, Tata McGraw-Hill, 2008.

REFERENCES:

1. Miller. L, Scott and Childers, G. Donald, "Probability and Random Processes with applications to Signal Processing and communications," Elsevier, 2004.
2. Stark, Henry and Woods, W. John, "Probability and Random Processes with Applications to Signal Processing," 3rd ed., Pearson Education, 2002.
3. Hsu and Hwei, "Schaum"s Outline of Theory and Problems of Probability, Random variables and Random Processes," Tata McGraw –Hill, New Delhi, 2008.
4. Leon-Garcia, Albert, "Probability and Random Processes for Electrical Engineering,"2nd ed., Pearson Education, 2007.

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

	POs											
COs	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	X
5		X		X	X					X		X

13EC401- MEASUREMENTS & INSTRUMENTATION

L	T	P	C
3	0	0	3

OBJECTIVES:

The aim of this course is to impart knowledge on

- Basic measurement concepts
- Concepts of electronic measurements
- Virtual Instrumentation and VI tools
- Importance of signal generators and signal analyzers in measurements.

COURSE OUTCOMES:

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

CO1 : The basic measurement concepts, units, standards, various types of meters and bridges.
CO2 : State the special features of various signal generators and analyzers.
CO3 : Overview of Virtual Instrumentation and VI tools
CO4 : Outline the objectives and working principles of the different types of transducers.
CO5 : Provide an overview of modern measurement techniques.

UNIT I MEASUREMENT CONCEPTS & INDICATING EQUIPMENTS (9)

Measurement systems – Static and dynamic characteristics , units , calibration and standards of measurements – error: accuracy and precision, types, statistical analysis – moving coil, moving iron meters – multimeters – Q meters – Vector meters – True RMS meters. Bridge measurements: Maxwell, Hay, Schering, Anderson and Wien Bridge.

UNIT II TRANSDUCERS (9)

Classification of Transducers-Variable Resistive transducers-Strain gauges, Thermistor, RTD- Variable Inductive transducers-LVDT, RVDT,- Variable Capacitive Transducers - Capacitor microphone- Photo electric transducers Piezoelectric transducers- Thermocouple, Measurement of Pressure, Temperature, and velocity .

UNIT III SIGNAL GENERATORS AND ANALYZERS (9)

Function generators – pulse and square wave generators, RF signal generators – Sweep generators – Frequency synthesizer – wave analyzer – Harmonic distortion analyzer – spectrum analyzer :- digital spectrum analyzer. Cathode ray oscilloscopes – block schematic – applications – special oscilloscopes: delayed time base oscilloscopes, analog and digital storage oscilloscope, sampling oscilloscope.

UNIT IV DATA ACQUISITION AND RECORDING SYSTEMS (9)

Elements of a digital data acquisition system – interfacing of transducers – multiplexing – data loggers – computer controlled instrumentation - IEEE 488 bus. Types of Analog and Digital Recorders and printers. Measurement systems applied to Micro and Nanotechnology.

UNIT V VIRTUAL INSTRUMENTATION (9)

Introduction- block diagram of a virtual instrument- physical quantities and analog interfaces-hardware and soft ware –user interface-advantages over conventional instruments- architecture of a virtual instruments and its relation to the operating system- overview of software-lab view- graphical user interface- controls and indicators-labels and texts- data types- format- data flow programming-editing- debugging and running a virtual instrument-graphical programming palettes and tools- front panel objects- functions and libraries.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Ernest.O.Doeblin and Dhanesh N.Manik, "Measurement Systems- Application and Design," 5th ed., Tata McGraw-Hill, New Delhi, 2007.
2. Albert D.Helfrick and William D.Cooper – Modern Electronic Instrumentation and Measurement Techniques, Prentice Hall of India, 2003.

REFERENCES:

1. B.C Nakara, K.K Chaudhry, Instrumentation Measurement and Analysis, 2nd ed., TMH, New Delhi, 2004.
2. Sanjay Gupta, Virtual Instrumentation, LABVIEW, TMH, New Delhi, 2003.
3. Joseph J.Carr, Elements of Electronics Instrumentation and Measurement, Pearson Education, 2003.

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

	POs											
COs	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		
4			X		X	X			X			
5			X		X	X			X			

13EC402 - ANALOG CIRCUIT DESIGN

	L	T	P	C
OBJECTIVES:	**3**	**0**	**0**	**3**

- Describe the Characteristics, frequency response and limitations of the operational amplifiers.
- Analyze and design operational amplifier circuits to perform analog computations, switching circuits, waveform generators and active filters.
- Describe the operations of the 555 timers and PLLs and their applications.
- Exhibit the characteristics of DAC and ADC circuits.

COURSE OUTCOMES:

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

CO1 : Gain knowledge about op amp characteristics.
CO2 : Understand the working of op-amp applications.
CO3 : Obtain the knowledge about rectifiers and comparators.
CO4 : Understand the working concept of timers, oscillators and waveform generators.
CO5 : Gain knowledge about Active and passive filters.

UNIT I OP-AMP CHARACTERISTICS (9)

Op-Amp equivalent circuits, terminals, ideal Op-Amp, Op-Amp DC characteristics: Low- Frequency Model of Op-Amp, Non inverting Amplifier, Inverting Amplifier, bias, offset, thermal drift, AC characteristics: Closed-Loop Frequency Response, Slew Rate, Combination of Linear Noise in Operational Amplifier, Common Mode Rejection

UNIT II LINEAR OP- AMP CIRCUITS (9)

DC and AC amplifiers, summing, scaling, and averaging amplifiers, Instrumentation amplifiers, I/V, V/I converter, Integrator, Differentiator, differential amplifiers. Op-amp with negative feedback: voltage series, voltage shunt feedback amplifiers, Signal conditioning Circuits

UNITIII OP-AMPS WITH DIODES & COMPARATORS AND WAVEFORM GENERATORS (9)

Logarithmic Amplifiers, Rectifiers, Peak Detection and Voltage Regulation, LM 117/LM317 Regulators Comparator – zero crossing detector, Schmitt trigger, free-running, one-shot Multivibrators, sine wave generators- Barkhausen Criterion ,phase-shift, Wein-bridge oscillators, Square/Triangular, saw-tooth wave Function Generator

UNIT IV ACTIVE FILTERS & PLL AND TIMERS (9)

Filter Classifications, Frequency and Impedance Scaling Butterworth Filter Responses Low-Pass and High Pass PLL, PLL applications, operating modes 555 timer, Astable and monostable operation and applications

UNIT V A/D AND D/A CONVERTERS (9)

Sample-and-hold circuits, DAC characteristics, D/A conversion techniques, A/D characteristics, A/D conversion techniques-integrating, successive approximation, flash converters

TOTAL: 45 PERIODS

TEXT BOOKS:

1. R. A. Gayakwad, "Op-Amps and Linear Integrated Circuit," 4th ed., Pearson Education, 2013.
2. D. Roy Choudhury, "Linear integrated Circuits," New-Age International Publishers, 2014.

REFERENCES:

1. Robert F. Coughlin and Driscoll, "Operational Amplifiers and Linear Integrated Circuits,"6th ed., Pearson Education. 2009.
2. P. R. Gray and R. G. Meyer, "Analysis and Design of Analog Integrated Circuit," John Wiley, 2009.

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

	POs											
COs	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							
5	X		X		X							

13EC403 –ELECTROMAGNETIC FIELDS

L	T	P	C
3	1	0	4

OBJECTIVES:

- Analyze the electric field intensity due to point, line, surface, volume charges
- Define potential, gradient and solve capacitance problems
- Relate the magnetic field intensity and current, force and torque and the Maxwell‟s equations in point form and integral form.
- Develop the Boundary conditions between two different medium in electric and magnetic field
- Understand the uniform plane wave propagation from the time varying electric and magnetic fields

COURSE OUTCOMES:

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

CO1 : Apply vector calculus to static electric- magnetic fields in different engineering situations.

CO2 : Analyze fields a potentials due to static changes.

CO3 : Evaluate static magnetic fields.

CO4 : Understand the relation between the fields under time varying situations.

CO5 : Understand principles of propagation of uniform plane waves.

UNIT I VECTOR CALCULUS (9+3)

Cartesian, cylindrical, and spherical coordinate systems – Divergence, gradient, curl, and Laplacian – Divergence and Stokes' theorems.

UNIT II ELECTROSTATICS (9+3) Coulomb's Law, electric field intensity – Field due to continuous line, sheet, and volume charges – Electric

flux density – Gauss Law & it's applications – Energy expended in moving a charge in an electric field, potential & potential gradient – Energy density in an electrostatic field (qualitative study)

Current and Current Density – Properties & boundary conditions of metallic conductors, and method of images – Properties & boundary conditions of semiconductors and dielectrics – Poisson's & Laplace‟s equations – Uniqueness Theorem.

UNIT III MAGNETOSTATICS (9+3)

Biot-Savart‟s law, magnetic field intensity – Ampere‟s circuital law – Magnetic flux and flux density – Magnetic scalar and vector potentials – Force on a moving charge (Lorentz force), force on a differential current element, and force between differential current elements (Ampere force law) – Boundary conditions – Potential energy and forces on magnetic materials – Inductance and mutual inductance.

UNIT IV TIME VARYING ELECTRIC AND MAGNETIC FIELDS (9+3)

Faraday‟s law, Displacement current. Maxwell‟s Equation in integral form and Point form. Maxwell‟s four equations in Phasor form. Poynting Vector and the flow of power – Power flow in a co-axial cable – Instantaneous Average and Complex Poynting Vector.

UNIT V ELECTROMAGNETIC WAVES (9+3)

Plane waves in free space, perfect & lossy dielectrics and good conductor‟s .Reflection of a plane wave at normal incidence (both conducting and dielectric boundaries) – Wave polarization: linear, elliptic, and circular polarizations.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Mathew O Sadiku, “Elements of Electromagnetics,” Oxford University press, 5th ed., New York, 2010.
2. William Hayt and John Buck “Engineering Electromagnetics,” 8th ed., Tata McGraw Hill, New Delhi, 2012.

REFERENCES:

1. Jordan & Balmain "Electromagnetic wave Radiating Systems," Prentice Hall of India.
2. D K Cheng, "Field and wave Electromagnetics,"2nd ed., Addison Wesley, 2004.
3. John D Kraus, "Electromagnetics," McGraw Hill, New York, 2003.

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

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

13EC404-MICROPROCESSORS & ITS APPLICATIONS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To learn the architecture, programming, interfacing and system design of microprocessors.
- To introduce the need & use of Interrupt structure 8085 & 8086.
- To develop the programming skill in 8085 & 8086.
- To introduce commonly used peripherals and programmable IC‟s.

COURSE OUTCOMES:

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

CO1 : Learn the fundamentals of 8085 Microprocessor and interrupts.
CO2 : Develop the programming knowledge in 8085 and 8086
CO3 : Acquire the theoretical understanding of 8086 Microprocessor
CO4 : Gain the knowledge about Peripheral devices
CO5 : Apply the gained knowledge to develop the real time applications

UNIT 1 ARCHITECTURE OF 8 BIT MICROPROCESSOR (9)

Evolution of Microprocessor - 8085 Architecture - Pin configuration – Interrupts - Memory Interfacing-Address Decoding techniques - I/O Interfacing.

UNIT II PROGRAMMING OF 8 BIT MICROPROCESSOR (9)

Addressing modes - Instruction formats, Instruction set – Data transfer, Arithmetic, Logical, Branching and Processor control type, Machine cycle - Timing diagram , Assembly language programming.

UNIT III ARCHITECTURE OF 16 BIT MICROPROCESSORS (9)

8086 Microprocessor Architecture – Special function registers, Physical Memory organization - Internal and External Memory Access - Minimum and maximum mode configuration and its timing diagram - Addressing modes - Instruction Set – 8086 Programming.

UNIT 1V PERIPHERAL DEVICES AND THEIR INTERFACING (9)

Architecture and programming of IC‟s- PPI 8255 - 8279 Keyboard & Display Controller - 8253/54 Timer - 8257 DMA Controller - 8259 Interrupt Controller – DAC and ADC Interfacing - Ports To High Power Devices.

UNIT V SYSTEM DESIGN USING MICROPROCESSOR (9)

Interfacing with peripherals - Traffic light control, Washing machine control, DC motor control - stepper motor control - RTC Interfacing using I2C, PWM.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Ramesh S Gaonkar, “Microprocessor Architecture, programming and Applications with the 8085,” Fifth ed., 2002.
2. A.K. Ray, K.M.Bhurchandi, “Advanced Microprocessor and Peripherals,”3rd ed., Tata McGraw-Hill, 2013.
3. Krishna Kant, “Microprocessors and Microcontrollers, Architecture, Programming and System Design,” PHI Learning Pvt. Ltd, 2014.

REFERENCES:

1. Douglas V Hall, "Microprocessors and Interfacing, Programming and Hardware," TMH, 2006.
2. K.Udaya kumar, and B.S.Umashankar, "The 8085 Microprocessor Architecture, Programming and Interfacing," Pearson Education, Fourth Reprint 2012.

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

	POs											
COs	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	
5		X					X	X				X

13EC405 - ELECTRONIC CIRCUITS –II

L	T	P	C
3	0	0	3

OBJECTIVES :

On completion of this course the student will understand

- The method of analysis of feedback amplifiers
- The analog filter design and their applications
- Analysis and design of LC and RC oscillators
- The creation of pulse waveform from different design
- Different types of triggering mechanism
- Wave shaping circuits, multivibrators, blocking oscillators and time base generators.

COURSE OUTCOMES:

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

CO1 : Have knowledge of Negative feedback amplifier.
CO2 : Concept of oscillators and their types.
CO3 : Have knowledge about tuned circuits and Neutralization techniques
CO4 : Know about RC and RL circuits, diode wave shapers and multivibrators
CO5 : Have knowledge about blocking oscillator and time base generators

UNIT I FEEDBACK AMPLIFIERS (9)

Feedback system-Properties of negative feedback – Feedback topologies – series-shunt, series-series, and shunt-shunt and shunt series feedback amplifiers – loop gain – stability problem – Effect of feedback on the amplifier poles- Nyquist criterion for stability of feedback amplifiers.

UNIT II OSCILLATORS (9)

Oscillators- Barkhausen criterion-Design of Oscillators - Colpitts oscillator, Hartley oscillator, clapp oscillator.RC Phase Shift Oscillator, Wein Bridge oscillator and Crystal Oscillators. Quartz Crystal Construction, Electrical equivalent circuit of Crystal, Miller and Pierce Crystal oscillators Frequency stability of oscillator.

UNIT III FILTERS & TUNED AMPLIFIERS (9)

Analog filter design – The second order LCR Resonator – Tuned Amplifiers – Inductor losses – Use of transformers – Amplifier with Multiple Tuned Circuits – Cascade and CC – CB Cascode – Synchronous Tuning. Class C tuned amplifier – Efficiency and applications of Class C tuned amplifier. Neutralization – Hazeltine neutralization method.

UNIT IV WAVE SHAPING AND MULTIVIBRATOR CIRCUITS (9)

RC & RL Integrator and Differentiator circuits – Storage, Delay and Calculation of Transistor Switching Times – Speed-up Capaitor – Diode clippers, Diode comparator – Clampers. Collector coupled and Emitter coupled Astable multivibrator – Monostable multivibrator – Bistable multivibrators – Triggering methods for Bistable multivibrators – Schmitt trigger circuit. UJT sawtooth waveform generator

UNIT V BLOCKING OSCILLATORS AND TIMEBASE GENERATORS (9)

Pulse transformers – equivalent circuit – response – applications, Blocking Oscillator – Free running blocking oscillator – Astable Blocking Oscillators with base timing – Push-pull Astable blocking oscillator with emitter timing, Triggered blocking oscillator – Monostable blocking oscillator with base timing –Time base circuits – Voltage-Time base circuit, Current-Time base circuit – Linearization through adjustment of driving waveform.

TOTAL: 45 PERIODS

Approved by Fourth Academic council

TEXT BOOKS:

1. S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, “Electronic Devices and Circuits,” 3rd ed., TMH, 2012.
2. Sedra and Smith, “Micro Electronic Circuits,” Oxford University Press, New Delhi, 2010.

REFERENCES:

1. Jacob Millman and Taub, “Pulse, Digital and Switching Waveforms,” 2nd ed., 2007.
2. David A. Bell, “Electronic Devices and Circuits,” 4th ed., PHI, 2007.
3. Schilling and Belove, "Electronic Circuits," Third Edition, Tata McGraw- Hill, New Delhi, 2002.
4. Millman and Halkias. C., “Integrated Electronics,” TMH, 1991
5. Robert L. Boylestad and Louis Nasheresky, “Electronic Devices and Circuit Theory,”9th ed., Pearson Education / PHI, 2002.

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

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

13EC411 - ANALOG CIRCUIT DESIGN LABORATORY

L	T	P	C
0	0	3	2

OBJECTIVE:

- To Study the role of analog IC‟s in Practical Applications

LEARNING OUTCOME:

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

CO1 : To Study the role of analog IC‟s in Practical Applications.
CO2 : Design and troubleshoot simple analog circuits using Op amp.
CO3 : Design the different types of filters.
CO4 : Construct Oscillators and perform their characteristics.
CO5 : Design of Timer Circuits using 555 IC.

LIST OF EXPERIMENTS:

1. Design of square wave generator for a specified frequency and duty cycle, using OP-Amp IC741 and Design of triangular wave generator from square wave generator.
2. Design of a sinusoidal oscillator for specified frequency based on Wien bridge and RC phase shift oscillators using IC-741
3. Design and testing of precision rectifier.
4. Design and testing of Active Filters LPF& HPF for specified frequency
5. Application of Timer IC 555

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

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

13EC412 - ELECTRONICS CIRCUITS II & SIMULATION LABORATORY

L	T	P	C
0	0	3	2

OBJECTIVES :

On completion of this course the student will understand

- The method of analysis of feedback amplifiers
- The analog filter design and their applications
- Analysis and design of LC and RC oscillators
- The creation of pulse waveform from different design
- Different types of triggering mechanism
- Wave shaping circuits, Multivibrators, blocking oscillators and time base generators.

COURSE OUTCOMES:

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

CO1 : Design of negative feedback amplifiers.
CO2 : Design different types of oscillator circuits.
CO3 : Design of Multivibrators.
CO4 : Construct the Wave shaping circuits.
CO5 **:** Have knowledge of modern SPICE analysis tools

LIST OF EXPERIMENTS:

1. Design and verify series shunt feedback amplifiers.
2. Design of current series and voltage shunt feedback amplifiers.
3. Design and verify Frequency Response of Tuned Amplifiers.
4. Design and verify Frequency Response of Cascaded Tuned amplifiers.
5. Design of RC Phase Shift Oscillator.
6. Design of Wein Bridge Oscillator.
7. Design of Hartley & Colpitts Oscillators.
8. Design of Schmitt Trigger Circuits.
9. Design of Astable Multivibrators.
10. Design of Monostable Multivibrators.

1. Design of and verify Active filters.
2. Design of Differential Amplifiers.
3. Design of Bistable and Astable Multivibrators.
4. Design of Saw-tooth wave generator using UJT.

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

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

13EC413 – MINI PROJECT

L	T	P	C
0	0	2	1

OBJECTIVES:

- To provide the opportunity to the students to demonstrate independence and originality, to plan and organise a large project over a long period.
- To provide the opportunity to specialise in specific areas of Electronics and Communication.
- To provide opportunity to demonstrate a wide range of skills and knowledge learned, and encourages integration of knowledge gained in the previous course units.

COURSE OUTCOMES:

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

CO1: Formulate a problem definition in the field of Electronics and communication Engineering through literature survey.
CO2: Identify the objectives of the project by thorough understanding of the problem.
CO3: Develop methodology using appropriate tools for the problem.
CO4: Analyze the problem based on the methodology and tabulate the results.
CO5: Conclude the results and submit the project report.

<table>
<tr><td>METHODOLOGY</td><td colspan="2">

Maximum four students per batch.
Faculty guide will be allotted for each batch by the HOD.
By mutual discussion, the faculty guide will assign a title in the general / subject area to the student.
Students have to refer the Journals and magazine and collect the published literature.
Using OHP/Power Point, the student has to make presentation for 15 -20 minutes followed by 10 minutes discussion.
Each batch have to do the project and present the progress of the project by two project reviews ,one at the middle and the other near the end of the semester.
The student batches have to write a Technical Report for about 25 -30 pages (Title page, One page Abstract, Review of Research paper under various subheadings, Concluding Remarks and List of References). The technical report has to be submitted to the HOD one week before the final presentation, after the approval of the faculty guide.

</td></tr>
<tr><td rowspan="11">EXECUTION</td><td>Week</td><td>Activity</td></tr>
<tr><td>I</td><td>Allotment of Faculty Guide by the HoD</td></tr>
<tr><td>II</td><td>Collection of Technical papers</td></tr>
<tr><td>III- IV</td><td>Finalizing the title with the approval of Faculty Guide</td></tr>
<tr><td>V</td><td>First Project Review</td></tr>
<tr><td>VI</td><td>Progress of the Project</td></tr>
<tr><td>VII</td><td>Second Project Review</td></tr>
<tr><td>VIII</td><td>Report Preparation</td></tr>
<tr><td>IX</td><td>Report submission</td></tr>
<tr><td>X-XI</td><td>Demo & Final presentation</td></tr>
<tr><td rowspan="7">EVALUATION</td><td colspan="2">

50% by Continuous Assessment + 50% by end semester examination
2 Hrs/week and 2 credit

</td></tr>
<tr><td>Component</td><td>Weightage</td></tr>
<tr><td>First Project Review</td><td>25%</td></tr>
<tr><td>Second Project Review</td><td>25%</td></tr>
<tr><td>Project Report</td><td>30%</td></tr>
<tr><td>Demo & Final presentation</td><td>20%</td></tr>
<tr><td>Total</td><td>100%</td></tr>
</table>

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

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

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 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 : 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 BOOKS:

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

Continuous Assessment Rubrics:

Sl. No.	Evaluation Activities	Mark Allotment	Metrics		
1	News Presentation	15	Articulation	(a)	Average (a+b+c+d+e)
2	Debate	20	Word Usage	(b)	
3	Class Participation	15	Content Listening Body Language	(c) (d) (e)	
	Internal Total	**50**			

Final Assessment Rubrics:

Sl. No.	Evaluation Activities	Mark Allotment	Metrics		
1	Assessment Centre	20	Role delivery Articulation & Word Usage Content Validity Participation in team	(a) (b) (c) (d)	Average (a+b+c+d)
2	Written Test	30	Objective type		
	Final Total	**50**			

Notes:

- News presentation and debate shall happen in every class. So the final marks will be the average of all the attempts.
  - News presentation and debate will be unconventional where in it will be within the team and not for the whole class at once.
  - On a given hour a faculty can assess two teams so considering that there will 72 students there will 6 teams of 12 each and hence every students would have done presentation and debate at least twice per semester for assessment alone.
- Class participation is based on the student‟s regularity in doing home work.
- Assessment Centre is one where a case shall be given and the students shall be given roles to perform. Language skills, Behavioral skills, General Awareness, Persuasion Skills shall be measured during this exercise.

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

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

SEMESTER V

13EC501 - ANALOG COMMUNICATION

L	T	P	C
3	0	0	3

OBJECTIVES:

- To know the elements and types of communication systems.
- To provide knowledge on complete analysis of analog communications.
- To provide the basic concepts of pulse modulation techniques.

COURSE OUTCOMES:

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

CO1 : Understanding about different types of communication system
CO2 : Acquire mathematical understanding of analog modulation techniques.
CO3 : Gain knowledge about different AM and FM transmitters.
CO4 : Analyze the effects of noise in CW & angle modulation.
CO5 : Identify and compare the different pulse modulation techniques

UNIT-I INTRODUCTION TO COMMUNICATION SYSTEM (9)

Need and Importance of Communication, Elements of Communication System, Generalized block diagram of communication system, Types of communication systems- Simplex and Duplex systems, Analog and digital systems, Applications of Electronic Communications, Electromagnetic Spectrum used in communication and various frequency bands, Concept of bandwidth..

UNIT-II AMPLITUDE MODULATION (9)

Need for modulation – amplitude modulation – frequency spectrum – Power relation –different types of modulators – SSB and VSB modulation and demodulation. AM transmitters – Block diagram – functions of each block.

UNIT-III ANGLE MODULATION (9)

Principle of frequency and phase – modulation – Relation between FM and PM waves – Bandwidth of FM – Narrow band wide band FM – Generation of FM wave – Direct and Indirect methods – FM transmitters.

UNIT-IV NOISE DETECTION AND RECEIVERS (9)

Types of noise in communication systems, Noise temperature. Noise in CW modulation systems: signal to noise ratio (SNR), noise figure, noise in AM & FM receivers, pre-emphasis and de-emphasis.

UNIT-V PULSE MODULATION SYSTEMS (9)

Sampling theorem – Pulse amplitude modulation – Channel bandwidth for PAM – detection of PAM signals – Pulse width modulation – generation of PWM and detection of PWM and PPM.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Simon Haykin, "Communications Systems", 4th Edition, Wiley Education, 2008.
2. T L Singal, "Analog & Digital Communications", Tata McGraw-Hill Education, 2012.

REFERENCES:

1. Taub and Schilling, "Principles of Communication Systems", McGraw Hill, 2007
2. Roddy and Coolen, "Electronic Communication", Prentice Hall of India, 2005
3. Wayne Tomasi, "Electronic Communications Systems – Fundamentals Through advanced", 4th Edition, Pearson Education, 2007.

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

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

13EC502 - MICROCONTROLLER & INTERFACING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To familiarize the student with the architecture, programming and interfacing Microcontroller and architecture.

COURSE OUTCOMES:

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

CO1 : Understand the concepts of internal architecture of Microcontroller.
CO2 : Develop Microcontroller based system.
CO3 : Design real time applications using Microcontrollers.
CO4 : Understand the concepts of RISC based Microcontroller architecture.
CO5 : Acquire knowledge about peripherals and develop the real time applications.

UNIT - I 8051 MICROCONTROLLER (9)

Architecture of 8051 – Signals – Memory Organization- Special Function Registers (SFRs) – Interrupts – Timer/counter – Port operations – Serial communication.

UNIT - II 8051 PROGRAMMING (9)

8051 Addressing mode – Instruction Set – Programming 8051 Timers – Serial Port programming – Interrupt Programming - Assembly language Programming.

UNIT- III 8051 INTERFACING (9)

LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- RTC Interfacing - Stepper Motor Interfacing – Serial Communication Interfacing.

UNIT- IV PIC MICROCONTROLLER (9)

PIC 16F877 Microcontroller Architecture - Signals - Memory organization - SFRs – Interrupts Timer/Counter.

UNIT- V PIC MICROCONTROLLER PERIPHERAL FEATURES (9)

I/O Ports – Compare/Capture/PWM modules (CCP) - Master Synchronous Serial Port module (MSSP) – I^2C bus – Addressing modes - Instruction set – Programming.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", Second Edition, Pearson education, 2011.
2. John B Peatman, "Design with PIC Microcontrollers", Pearson Education Asia, Low price Edition 2002.

REFERENCES:

1. A.K.Ray, K.M.Bhurchandi, " Advanced Microprocessors and Peripherals – Architecture,Programming and Interface", Tata McGrawHill- 2000, 16th Reprint.
2. Myke Predko, "Programming and Customizing the 8051 Microcontroller", Tata McGraw Hill-2000.
3. Micro chip / PIC Microcontroller Data Books -2004.
4. Ajay V Deshmukh, "Microcontrollers: Theory and Applications", Tata McGraw – Hill, 2010, Fifteenth Reprint.

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

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

13ECC02 - DIGITAL SIGNAL PROCESSING
(Common to ECE, EEE and E&I Branches)

	L	T	P	C
OBJECTIVES:	**3**	**0**	**0**	**3**

- To explore the design procedures for digital filters.
- To study the finite word length effects.
- To study the architecture and programming concepts of digital signal processors.

COURSE OUTCOMES:

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

CO1 : Compute DFT using FFT algorithm.
CO2 : Design IIR filter.
CO3 : Design FIR filter.
CO4 : Understand the quantization errors.
CO5 : Understand and write program using DSP processors.

UNIT - I FAST FOURIER TRANSFORMS (9)

Introduction to DFT-Efficient computation of DFT. Properties of DFT. FFT Algorithm-Radix-2- Decimation in Time (DIT)-Decimation in Frequency (DIF).Fast Convolution-Overlap Save method-Overlap Add Method.

UNIT-II DIGITAL IIR FILTER (9)

Review of design techniques for analog low pass filter (Butterworth and Chebyshev approximations), Frequency transformation in Analogue domain, IIR filter design –Different methods of IIR filter Design (Bilinear and Impulse Invariant Techniques).

UNIT - III DIGITAL FIR FILTERS (9)

Design characteristics of FIR filters with linear phase – Frequency response of linear phase FIR filters – Design of FIR filters using window functions(Hamming, Hanning, Blackman)- Comparison of design methods of FIR filters.

UNIT - IVFINITE WORD LENGTH EFFECT (9)

Quantization Noise - Derivation for Quantization noise Power-Binary Fixed Point and Floating Point Number Representation-Comparison-Truncation and Rounding Error-Limit Cycle Oscillation-Dead band-Signal Scaling. Calculation of Noise power.

UNIT - V DIGITAL SIGNAL PROCESSOR (9)

Architectural Features-Harvard Architecture, Von Neumann Architecture, VLIW Architecture, DSP Building Blocks-Multiplier, Shifter, MAC Unit, ALU. Pipelining.

TOTAL: 45 PERIODS

TEXT BOOK:

1. J.G.Proakis, D.G.Manolakis and D.Sharma, "Digital Signal Processing, Algorithms and Applications", Pearson Education, 2012.

REFERENCES:

1. P.RameshBabu, "Digital Signal Processing", 4th Edition, SciTech Publications (India) Pvt Limited, 2007.
2. Oppenheim V.A.V and Schaffer R.W, "Discrete – time Signal Processing", 2nd Edition, Prentice Hall, 2013.
3. S.K.Mitra, Digital Signal Processing, 4rh Edition, TMH, 2010.
4. Lawrence R Rabiner and Bernard Gold, "Theory and Application of Digital Signal Processing", PHI 2010.
5. http://www.ti.com/lit/ds/symlink/tms320c6713.pdf

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

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

13EC503 -TRANSMISSION LINES & WAVEGUIDES

OBJECTIVES:

L	T	P	C
3	1	0	4

- To introduce various types of transmission lines and analyze the lumped circuit model of a transmission line and their characteristics.
- To illustrate the concept of planar transmission lines.
- To find SWR, Reflection Coefficient, Return loss and impedance matching.
- To investigate the propagation of electromagnetic waves in waveguides.

COURSE OUTCOMES:

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

CO1 : Interpret the lumped circuit model of a transmission line with circuit theory and determine characteristic impedance, propagation constant and reflection coefficient.

CO2 : Compute of the SWR, reflection coefficient parameters using smith chart and design single stub matching and double stub matching.

CO3 : Understand E and H field distribution in Microstrip, strip and coplanar lines.

CO4 : Calculate losses and Q-factor of microstrip line

CO5 : Deduce the field configuration of parallel plate, rectangular and circular waveguide

UNIT- I TRANSMISSION LINE THEORY (9+3)

Types of transmission lines, Primary and secondary constants. General solutions. Characteristic impedance, propagation constant, attenuation and phase constants. Open circuited and short circuited lines. The telephone cable, Reflection of line not terminated in Z0- Reflection coefficient- Distortion in transmission lines-Distortion less line.

UNIT - II PLANAR TRANSMISSION LINES (9+3)

Microstrip lines- Characteristic impedance-Losses in Microstrip lines – Q-factor of Microstrip line. Parallel strip lines- distributed parameters- characteristic impedance- Coplanar strip line- shielded strip line- tapered strip line.

UNIT - IIIIMPEDANCE MATCHING AND TUNING (9+3)

Transmission line resonator-standing waves – nodes – standing wave ratio. Impedance matching-single stub matching. Quarter wave transformer. Measurement of VSWR, impedance, single stub and double stub matching problems using Smith chart.

UNIT - IVGUIDED WAVES BETWEEN PARALLEL PLANES (9+3)

Application of the restrictions to Maxwell‟s equations – Transmission of TM waves between Parallel planes – Transmission of TE waves between Parallel planes. Transmission of TEM waves between Parallel planes – Velocities of the waves.

UNIT - V GUIDED WAVES BETWEEN RECTANGULAR PLANES (9+3)

Applications of Maxwell‟s equations to the rectangular waveguide. TM waves in rectangular waveguide. TE waves in rectangular waveguide – The TEM wave coaxial lines. Excitation modes- Resonant cavities

TOTAL: 60 PERIODS

TEXT BOOKS:

1. David M. Pozar, "Microwave Engineering", John Wiley fourth Edition 2011.
2. John D. Ryder, "Network lines and Fields", PHI, 2003.

REFERENCES:

1. E.C.Jordan, K.G. Balmain: "E.M.waves & Radiating systems", Pearson Education, 2006.
2. Simon Ramo, John R. Whinnery "Fields and Waves in Communication Electronics", Wiley student Edition publications, Third Edition 2008.
3. R.K Shevgaonkar, "Electromagnetic Waves", Tata McGraw-Hill Education, 2006.

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

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

13IT503 - OBJECT ORIENTED PROGRAMMING CONCEPTS
(For ECE Branch Only)

L	T	P	C
3	0	1	4

OBJECTIVES:

Student study and understand the concept of object oriented programming and also designing classes in object oriented programming. It makes students to write simple applications using C++.

COURSE OUTCOMES:

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

CO1 : Relate Real world object into entity.
CO2 : Construct real world entity using object initialization.
CO3 : Predict runtime error using Exception handling technology.
CO4 : Examine program scenario in different situations.
CO5 : Employ formatting & storing of real time data.

UNIT- I INTRODUCTION (12)

Introduction to C++ - Object oriented programming concepts- C++ fundamentals – Data types – Access modifier – Classes & Objects - Function and Data members - Default arguments – Friend function- Static members. Case study: Student Management System.

UNIT - II CONSTRUCTORS AND STATIC POLYMORPHISM (12)

Constructors - Default constructor- Parameterized Constructors- Constructors with dynamic allocation-Copy Constructors-Destructors-Static polymorphism – Function overloading –operator overloading-Unary and binary operator overloading – Overloading assignment operator - Overloading through friend functions. Case Study: Library Book Searching.

UNIT - IIITEMPLATES AND EXCEPTION HANDLING (12)

Generic programming – Templates – Class template – Function template – Class template with Multiple Parameters - Function template with Multiple Parameters. Exception handling – try-catch-throw paradigm – Exception specification. Case Study: Multi Agent System.

UNIT - IVINHERITANCE AND RUNTIME POLYMORPHISM (12)

Inheritance – Public, private, and protected derivations – Classification-Multiple inheritance – Virtual base class - Runtime polymorphism – Virtual functions – Virtual destructor. Case Study: Student Mark Analysis.

UNIT - V I/O STREAMS AND FILE HANDLING (12)

Unformatted and formatted I/O – I/O manipulators - Files handling - Binary & ASCII files-Sequential and random access- Standard template library. Case Study: Stock Management System.

TOTAL: 60 PERIODS

TEXT BOOK:

1. B. Trivedi, “Programming with ANSI C++”, Oxford University Press, 2007.

REFERENCES:

1. E.Balagurusamy, “Object Oriented Programming with C++”, Tata McGraw Hill, Third Edition.
2. Ira Pohl, “Object Oriented Programming using C++”, Pearson Education, Second Edition Reprint 2004.

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

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

13EC511 - MICROPROCESSORS & MICROCONTROLLERS INTERFACING LAB

L	T	P	C
0	0	3	2

OBJECTIVES:

- To experimentally understand the operation of 8085, 8086 Microprocessors and 8051 Microcontroller.
- To be familiar with interfacing of Microcontroller to the real time world.

COURSE OUTCOMES:

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

CO1 : Understand the programming concepts in Microprocessor.
CO2 : Develop ALP with minimum instruction and memory.
CO3 : Design Microprocessor based system.
CO4 : Gain programming knowledge in Microcontroller.
CO5 : Integrate and build a working model for real life problems.

LIST OF EXPERIMENTS:

1. Study of 8085 microprocessor, 8086 microprocessor, 8051 microcontroller kit.
2. Programming for 8/16 bit Arithmetic operations Using 8085 (Addition / subtraction / multiplication / division)
3. Programming with control instructions Using 8085 (Increment / Decrement, Ascending / Descending order, Maximum / Minimum of numbers, rotate instructions, Hex. / ASCII / BCD code conversions.)
4. Programming for Arithmetic operations Using 8086 (Addition / subtraction / multiplication / division)
5. Programming with control instructions Using 8086 (Increment / Decrement, Ascending / Descending order, Maximum / Minimum of numbers, rotate instructions, Hex. / ASCII / BCD code conversions.)
6. Interface Experiments (A/D Interfacing, D/A Interfacing, using 8086)
7. Interface Experiments (Simple experiments using 8255, 8251, 8254 using 8086)
8. Programming arithmetic and logical operations using 8051.
9. Interfacing and Programming of DC Motor Speed control using 8051.
10. Interfacing and Programming of Stepper Motor control using 8051.
11. Interfacing and Programming of Traffic light controller using 8051.
12. Interfacing and Programming of 8279 Keyboard & Display controller using 8051.

TOTAL: 45 PERIODS

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

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

13ECC12 - DIGITAL SIGNAL PROCESSING LAB

(Common to ECE and E&I Branches)

L	T	P	C
0	0	3	2

OBJECTIVE:

- To make the students understand the behavior and response of the filter using different methods.
- To compute the output response of the system for FFT spectrum.
- To know the generation of the signals and arithmetic operation using DSP Processor.

COURSE OUTCOMES:

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

CO1 : Design of digital filter.
CO2 : Generation of various signals.
CO3 : Analysis of signals and system properties.
CO4 : Computation of circular and linear convolution.
CO5 : Design of various projects.

LIST OF EXPERIMENTS

MATLAB BASED EXPERIMENTS:

1. Study of Mat lab Function.
2. Calculation of FFT.
3. Implementation of Linear convolution.
4. Implementation of Circular convolution.
5. FIR Filter Design.
6. IIR Filter Design.

DSP PROCESSOR BASED EXPERIMENTS:

1. Waveform Generator.
2. Convolution -Using C coding.
3. FFT Implementation -Using C Coding.
4. Design of FIR filter.
5. Design of IIR filter.

TOTAL: 45 PERIODS

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

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

13EC512 PROGRAMMING TOOLS LAB

OBJECTIVES:

L	T	P	C
0	0	2	1

- To learn the High level Technical Computing language.
  To understand the various applications.

COURSE OUTCOMES:

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

CO1 : Solve the complex problems.
CO2 : Design application software.
CO3 : Write program in their own
CO4 : Design an artificial intelligence system
CO5 : Learn HDL Coder

LIST OF EXPRIMENTS:

1. MATLAB ENVIRONMENT

Defining Variables.
Functions and Script files.
Matrices and Vectors.
Strings and Arrays in MATLAB.
Input and Output statements.
Writing and Reading data from files.

2. PROGRAMMING IN MATLAB

Relational and logical operators.
Conditional and looping statements.
Miscellaneous MATLAB functions & Variables.
Plotting in MATLAB.

3. APPLICATION OF MATLAB

Matrix method for linear equation.
Cramer‟s method –Probability.
Probability and Normal distribution.
Analytical solution to differential equations.

4. TOOL BOXES

Fuzzy Logic toolbox.
Designing of a simple AI system using Fuzzy logic.
Digital Image processing Toolbox.
Exercise on building blocks of Digital image processing.

5. DEPLOYMENT TOOL AND HDL CODER

Graphical User Interface.
Design of a simple Calculator using GUI.
Deployment of windows standalone application.
Conversion of .m files to VHDL/Verilog file.

TOTAL: 15 PERIODS

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

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

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:

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
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)

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

13EC601 - DIGITAL COMMUNICATION

	L	T	P	C
OBJECTIVES:	**3**	**0**	**0**	**3**

- To understand the basic concept of Digital Communication and analyze the performance of various encoding schemes.
- To generate the PN sequence for Spread Spectrum modulation and multiple access techniques.

COURSE OUTCOMES:

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

CO1 : Acquire knowledge about the basic concepts of Digital Communication and Geometric representation of signals

CO2 : Convert analog signal to digital signal for Baseband transmission.

CO3 : Apply proper techniques to retrieve the signal at the receiver.

CO4 : Identify and compare various digital modulation techniques using various parameters.

CO5 : Implement the spread spectrum techniques to get reliable communication.

UNIT I DIGITAL COMMUNICATION SYSTEM (9)

Introduction to Analog Pulse Communication Systems – Digital Communication Systems – Functional block description, Channel classification, Performance Measure; Geometric representation of signals, Bandwidth , Mathematical Models of Communication Channel.

UNIT II BASEBAND FORMATTING TECHNIQUES (9)

Sampling process, Quantization – Uniform and Non-uniform (A-law & μ-law), Encoding techniques for Analog Sources - Temporal waveform encoding, Spectral waveform encoding, Model-based/ parametric encoding, Comparison of speech encoding techniques, Classification of line codes.

UNIT III BASEBAND RECEPTION TECHNIQUES (9)

Matched Filter - Error Rate due to noise – Inter symbol Interference- Nyquist‟s criterion for distortion less base band Binary Transmission- Correlative level coding -Adaptive equalization -Eye patterns-Synchronization Techniques.

UNIT IV PASSBAND DATA TRANSMISSION AND RECEPTION (9)

Introduction – Pass band Transmission model- generation, detection, Signal space diagram, bit error probability and power spectra of ASK,PSK, QPSK, FSK and MSK schemes –Differential phase shift keying –QAM-Comparison of Digital modulation systems .

UNIT V SPREAD SPECTRUM MODULATION AND MULTIPLE ACCESS TECHNIQUES (9)

Pseudo- noise sequences –Direct sequence spread spectrum with coherent binary phase shift keying – Signal space dimensionality and processing gain –Probability of error – Frequency hop spread spectrum –TDMA-FDMA-CDMA-OFDMA.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Simon Haykin, “Digital Communications”, John Wiley, 2006.

REFERENCES:

1. Amitabha Bhattacharya, "Digital Communication", Tata McGraw Hill, 2006.
2. John.G. Proakis, "Fundamentals of Communication Systems", Pearson Education, 2006.
3. Michael. B. Purrsley, "Introduction to Digital Communication", Pearson Education, 2006.
4. Bernard Sklar, "Digital Communication", 2nd Edition, Pearson Education, 2006.
5. Herbert Taub & Donald L Schilling , "Principles of Communication Systems", 3rd Edition, Tata McGraw Hill, 2008.

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

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

13ECC03 - VLSI DESIGN

L	T	P	C
3	0	0	3

OBJECTIVES:

- To learn the basic MOS Technology.
- To learn the MOS Process Technology and its second order effect.
- To understand the concepts of modelling a digital system using Hardware Description Language.
- To understand the basic concept of VLSI implementation strategies based on CMOS and FPGA.

COURSE OUTCOMES:

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

CO1 : Create models of moderately sized CMOS circuits that realize specified digital functions.

CO2 : Apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect.

CO3 : Model the digital system using Hardware Description Language.

CO4 : Complete a significant VLSI design project having a set of objective criteria and design constraints.

CO5 : Analyze the physical design process of VLSI design flow

UNIT- I MOS TECHNOLOGY (9)

Basic MOS Transistors – CMOS Fabrication: n-well – p-well – twin tub – Latch up and prevention (SOI) – BiCMOS Technology – Masks and Layout– MOS Physics – pFET Characteristics – Modeling of small MOSFETs.

UNIT -II MOS CIRCUIT DESIGN PROCESS (9)

Introduction to MOSFET: Symbols, Enhancement mode-Depletion mode transistor operation – Threshold voltage derivation – body effect – Drain current Vs voltage derivation – channel length modulation. NMOS and CMOS inverter – Determination of pull up to pull down ratio –Stick diagrams – VLSI Circuit Design Flow.

UNIT -III CMOS LOGIC GATES DESIGN AND LAYOUT (9)

NAND and NOR Gates – Complex Logic Gates –Tri state circuits – Large FETs- Transmission Gate and Pass Transistor Logic-Standard Cell design: Cell hierarchy- Cell libraries- CMOS Layout Design Rules: Lambda based layout – Types of rules – SCMOS Design Rule set II.

UNIT- IV ADVANCED TECHNIQUES IN CMOS LOGIC CIRCUITS (9)

Mirror Circuits- Pseudo nMOS – Tri-State Circuits – Clocked CMOS- Dynamic CMOS Logic Circuits – Dual Rail Logic Networks – CVSL- CPL.

UNIT- V VLSI SUB SYSTEM DESIGN (9)

Overview of Verilog HDL-Modeling Concepts- Design of Adders: carry look ahead-carry select-carry save-Design of multipliers: Array – Braun array – Baugh-Woolley. Introduction to FPGA – Full custom and Semi custom design, Standard cell design and cell libraries, FPGA building block architectures.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. John P. Uyemura, "Introduction to VLSI Circuits and Systems", John Wiley & Sons, Reprint 2009.
2. Douglas A. Pucknell, "Basic VLSI Systems and Circuits", Prentice Hall of India, Third Edition, reprint 2008.
3. Samir Palnitkar, "Verilog HDL – Guide to Digital Design and Synthesis", Pearson Education, Third Edition, 2003.

REFERENCES:

1. N.Weste, K.Eshraghian, "Principles of CMOS VLSI Design", Second Edition, Addision Wesley 1993.
2. M.J.Smith, "Application Specific Integrated Circuits", Addisson Wesley, 1997.
3. Wayne Wolf," Modern VLSI Design – System On Chip", PHI 2006, Third Edition, New Delhi.

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

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

13EC602 – ANTENNA AND WAVE PROPAGATION

	L	T	P	C
OBJECTIVES:	**3**	**1**	**0**	**4**

- To provide knowledge on the fundamental antenna parameters and the selection of antennas for modern wireless applications.
- To impart knowledge on the mechanism and models of radio wave propagation.

COURSE OUTCOMES:

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

CO1 : Understand the basic antenna parameters and radiation pattern.
CO2 : Design and characterize the various wire and aperture antennas, antenna arrays and broad band antennas.
CO3 : Design antenna array and pattern multiplication
CO4 : Know about the wave propagation mechanisms.
CO5 : Apply knowledge in wireless communication

UNIT I ANTENNA FUNDAMENTALS (9+3)

Radiation mechanism - single wire, two wire, dipole and current distribution on thin wire, Radiated field components - Hertizan dipole, half wave dipole and monopole antenna.

Antenna Parameters- radiation pattern, beam width, radiation power density, directivity and gain, bandwidth, polarization, input impedance, efficiency, antenna effective length and area, antenna temperature, Friss Transmission formula.

UNIT II DESIGN OF ARRAYS (9+3)

Linear Array - Two element array, N-element linear array- Broadside array, End fire array- Directivity, Pattern multiplication, Non-uniform excitation- Binomial, Chebyshev distribution.

UNIT III DESIGN OF ANTENNAS (9+3)

Wire Antennas- Long wire, V-Antenna, Rhombic antenna, Helical antenna and Yagi-Uda antenna, Frequency independent antenna - Spiral and Log periodic antenna, Aperture antennas - Horn antenna, Parabolic reflector antenna, Microstrip antenna, MEMS antenna.

UNIT IV WAVE PROPAGATION (9+3)

Propagation Mechanism- Reflection, refraction and Transmission, Scattering and diffraction, Modes of propagation- Ground wave Propagation, Space wave propagation- Tropospheric- Tropospheric effects, Sky wave Propagation- Multipath propagation – Fading - Ionospheric Effects.

UNIT V ANTENNA APPLICATIONS IN WIRELESS COMMUNICATION (9+3)

Antennas for Terrestrial mobile communication - mobile handsets and base stations, Antenna for Radar systems - Adaptive antenna, Smart antennas, RFID antenna, Ultra wideband antenna.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. J.D.Krauss, “Antenna for all Applications”, TMH, Fourth Edition, 2010.(UNIT 1 to 4)
2. K.D.Prasad, “Antenna and Propagation”, Tech India Publications, 2009.

REFERENCES:

1. Balanis, “Antenna Theory - Analysis and Design”, Third Edition, John Wiley & Sons, 2005. (UNIT 1 to 3)
2. S.R.Saunders, “Antennas and Propagation for Wireless Communication”, Second Edition, John Wiley, 2007.
3. Yi Huang and Kevin Boyle, “Antenna from Theory to Practice”, First Edition, John Wiley, 2008.
4. R.S.Elliot, “Antenna Theory and Design”, IEEE Press, John Wiley, 2005.
5. H. Jasik , “Antenna Engineering Handbook” , Editor, McGraw-Hill, 1961.
6. R.L.Freeman, “Reference Manual for Telecommunication engineering”, Vol. I, John Wiley, 2002.

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

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

13EC603 - DATA COMMUNICATION & NETWORKS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the concepts network devices.
- To understand the concepts of different layers of ISO networks.
- To study the functions of different layers.
- To make Graduates to get idea about the different protocols and network components.

COURSE OUTCOMES:

At the end of this course, the students will 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.
CO4 : Trace the flow of information from one node to another node in the network.
CO5 : Acquire the knowledge of application layer and their services.

UNIT- I DATA COMMUNICATIONS (9)

Components of Network – Data Flow – Types of Connection - Networking devices : hubs , switches, gateways, repeaters, Bridges and routers, Modem and its types - Network Topologies -Categories of Network – Internetwork & Intranet work – Protocols and its standards - ISO / OSI Reference Model -Addressing : Physical, Logical, Port & Specific addresses - Transmission Media : Guided Media and Unguided Media

UNIT-II DATA LINK LAYER (9)

Data Link Layer : Duties of DLL –Types of Error - Error Correction & Detection - Framing - Flow and Error Control - Noisy Channels & Noiseless channels - Wired LAN : Ethernet –LLC and MAC - IEEE standards : 802.3,802.4 & 802.5 – Wireless LAN : IEEE 802.11 – Bluetooth.

UNIT-III NETWORK LAYER (9)

Switching : Packet Switching, Datagram Approach and Virtual Circuit Networks – Logical Addressing : IPv4 – Internet Protocol :Need for Network Layer - IPv4 & IPv6 – Transition from IPv4 to IPv6 – Mapping : ARP,RARP,BOOTP & DHCP - Sub netting –Trace route & Ping - Routing Protocols : Unicast Routing Protocols – Distance Vector Routing – Multicast Routing protocols.

UNIT-IV TRANSPORT LAYER (9)

Duties of Transport Layer - Sockets - Process to process delivery - Concepts of User Datagram Protocol(UDP) - Concepts of Transmission Control Protocol(TCP) – Congestion Control – Quality of service – Techniques to achieve QoS.

UNIT-V APPLICATION LAYER (9)

Domain Name Space (DNS) –Remote Logging - Email: Architecture, User Agent, SMTP - FTP – HTTP - WWW – Security basic.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Behrouz A. Forouzan, "Data Communication and Networking", 5th Edition, Tata McGraw-Hill, 2012.

REFERENCES:

1. Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Third Edition, Morgan Kauffmann Publishers Inc., 2003.
2. James F. Kuros, Keith W. Ross, "Computer Networking, A Top-Down Approach Featuring the Internet", Third Edition, Addison Wesley, 2004.

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

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

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 Edition..
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)

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		
4			X	X		X		X				X
5			X	X				X	X	X		

13EC611-COMMUNICATION SYSTEM LAB

L	T	P	C
0	0	3	2

OBJECTIVES:

- To demonstrate the concepts of generation and detection of analog and digital modulation schemes.
- To apply the error control coding techniques in communication.

COURSE OUTCOMES:

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

CO1 : Transmit and receive data using Amplitude & frequency modulation and demodulation schemes.

CO2 : Transmit and receive data using pulse modulation.

CO3 : Transmit and receive data using digital modulation and demodulation schemes.

CO4 : Analysis the response of pre-emphasis and de-emphasis.

CO5 : Improve performance of communication system using error control coding techniques.

LIST OF EXPERIMENTS:

1. Generation and Detection of Amplitude modulation signals.
2. Generation and Detection of Frequency Modulation Sampling process.
3. Generation of Pulse Modulation waveforms– PAM / PWM / PPM.
4. Implementation of Pulse Code Modulation and Time Division Multiplexing for digital input.
5. Generation of Delta Modulation, Adaptive Delta Modulation waveforms.
6. Generation and detection of ASK, PSK, FSK waveforms.
7. Implementation of Quadrature phase Shift keying for digital signals.
8. Generation of Line Coding and Decoding techniques.
9. Response of Pre-Emphasis / De-emphasis Circuits.
10. Implementation of Frequency Division Multiplexing for digital transmission.
11. Analysis of PLL and Frequency Synthesizer.
12. Implementation of Error Control Coding using MATLAB.

TOTAL: 45 PERIODS

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

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

13ECC13- VLSI DESIGN LAB

L	T	P	C
0	0	3	2

OBJECTIVES:

- To gain expertise in design, development and simulation of digital circuits with Verilog HDL.
- To apply concepts and methods of digital system design techniques through hands-on experiments.
- To develop skills, techniques and learn state-of-the-art engineering tools (such as HDL, Xilinx tools) to design, implement and test digital systems on FPGAs.

COURSE OUTCOMES:

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

CO1 : Design and simulate of Combinational Logic Circuit using Verilog HDL
CO2 : Design and simulation of Sequential logic circuit using Verilog HDL
CO3 : Design, Simulate and Extract the layouts of Analog IC Blocks using Tanner spice.
CO4 : Analyze transient characteristics
CO5 : Import the logic modules into FPGA boards

LIST OF EXPERIMENTS

I. Design and simulation of Combinational Logic Circuit using Verilog HDL

1. Adder- Carry Select & Carry Save
2. Multiplexer and Demultiplexer
3. Encoder and Decoder
4. Multiplier- Array, Braun Array & Baugh wooley

II. Design and simulation of Sequential logic circuit using Verilog HDL

5. Flip-flops
6. Counters
7. Shift Registers
8. Frequency Dividers

III. CMOS Circuit design using SPICE (DC and Transient Analysis)

9. CMOS Inverter
10. CMOS NAND and NOR Gates
11. CMOS Latch

IV. FPGA Implementation

12. 4 bit Adder
13. 4x4 Multiplier
14. ALU Design

TOTAL: 45 PERIODS

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

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

13EC612 – DATA COMMUNICATION & NETWORKS LAB

L	T	P	C
0	0	3	2

OBJECTIVES:

- To understand the concepts of computer networks and data transmission.
- To understand the peer to peer communication application using different protocols.
- To learn the socket programming to build a network application.
- To learn the various routing algorithms and simulation tools.

COURSE OUTCOMES:

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

CO1 : Obtain the working knowledge of computer hardware, software and networking skills.

CO2 : Understand the concept of network simulators (NS2, OPNET) tools for network design.

CO3 : Build some simple networking models using the Network simulator modeling tool and perform. simulations that help them evaluate their design approaches and expected network performance.

CO4 : Implement and compare the various routing algorithms for wire/wireless networks

CO5 : Acquire the basic knowledge of network security by data encryption and decryption.

LIST OF EXPERIMENTS:

1. Verify the PC to PC communication using
   a) Serial Communication using RS232
   b) Parallel Communication using 8 bit parallel cable
2. Implementation of Ethernet and fast Ethernet LAN protocol.
3. To create scenario and study the performance of CSMA/CD protocol through simulation.
4. To create scenario and study the performance of token bus and token ring protocols through simulation.
5. To create scenario and study the performance of network with CSMA / CA protocol and compare with CSMA/CD protocols.
6. Implementation and study of stop and wait protocol.
7. Implementation and study of Go back-N and selective repeat protocols.
8. Implementation of distance vector routing algorithm.
9. Implementation of Link state routing algorithm.
10. Implementation of Data encryption and decryption.
11. Simulation and performance comparison of Wireless LAN protocols.
12. To create scenario Transfer of files from PC to PC using Windows socket processing.
13. Study of open source Network simulator tools (NS2, OPNET).
14. Simulation of TCP Protocol using NS-2
15. Designing a simulation model using NS-2 to analyze various aspects of the Internet Protocol.

TOTAL: 45 PERIODS

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

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

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, 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)**

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.

REFERENCE BOOKS:

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	

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 the course, student will be able to

CO1: Understand and comprehend any given problem related to communication Engineering field.

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 COS AND POS												
COS	POS											
	1	2	3	4	5	6	7	8	9	10	11	12
1					X			X			X	X

13EC701 – MICROWAVE ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand and gain complete knowledge about microwave devices.
- To provide knowledge on microwave components and its S parameters.
- To provide the basic concepts of microwave networks.

COURSE OUTCOMES:

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

CO1 : Calculate the power distribution in microwave components.
CO2 : Measure the characteristics of optical diodes.
CO3 : Compute impedance and frequency.
CO4 : Design the microchip circulator / isolator.
CO5 : Demonstrate microwave measurements.

UNIT-I MICROWAVE NETWORK CHARACTERIZATION AND PASSIVE COMPONENTS (9)

Circuit and S parameter representation of N ports- Reciprocity Theorem- Lossless networks and unitary conditions- ABCD parameters-Cascaded networks-Relations between S- Y and ABCD parameters- Effect of changing the reference planes in the S matrix- S Matrix of a Directional Coupler- waveguide tees and rat race coupler-Qualitative discussion on: Waveguide Corners- Bends- Twists- Matched loads and movable shorts.

UNIT-II MICROWAVE TUBES (9)

Transit time effect- Velocity modulation –current modulation-bunching-Two cavity Klystron amplifier- Reflex Klystron- Slow-Wave structures -Helix Traveling-Wave Tubes- Convection Current- Axial Electric Field-Wave Modes- Bandwidth, Power and Gain Considerations – cross field device –Magnetron-power and frequency considerations.

UNIT-III MICROWAVE MEASUREMENTS (9)

Slotted line VSWR measurement- impedance measurement- insertion loss and attenuation measurements-measurement of scattering parameters - Return loss measurement using directional coupler-Introduction to vector network analyzer and its uses- return loss and insertion loss.

UNIT-IV MICROWAVE SEMICONDUCTOR DEVICES (9)

Gunn-Effect – Gunn Diode- Differential Negative Resistance- Modes of Operation- Amplification- Microwave Generation- Read Diode- Physical Description- Avalanche Multiplication- IMPATT Diodes- TRAPATT Diode-BARITT Diode- Principles of Operation- Physical Structures- Parametric Amplifiers- Nonlinear Reactance and Manley – Rowe Power Relations.

UNIT-V APPLICATIONS OF MICROWAVE SYSTEMS (9)

Wireless Communications:- Radio receiver Architecture- Noise characterization of receiver- Digital Modulation and Bit Error Rate- Radar Systems:- The Radar Equation- Pulse Radar- Doppler Radar- Radar Cross Section- Radiometer Systems:- Theory and applications of Radiometry- Total Power Radiometer- The Dicke Radiometer.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Samuel Y-LIAO, "Microwave Devices and Circuits", Pearson/Prentice Hall of India, 3rd Edition Reprint 2011
2. Annapurna Das and Sisir K-Das,"Microwave Engineering" Tata McGraw-Hill 2009.

REFERENCES:

1. R-E- Collin, "Foundations for Microwave Engineering", IEEE Press Second Edition, 2002
2. David M Pozar, " Microwave Engineering" , John Wiley & Sons, 2nd Edition, 2003

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

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

13EC702 - OPTICAL COMMUNICATION

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce the various optical fiber modes, configurations and various signal degradation factors associated with optical fiber.
- To establish the knowledge on optical sources and receivers.
- To provide the knowledge on digital transmission systems.

COURSE OUTCOMES:

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

CO1 : Understand the structure of optical fibers and types.
CO2 : Obtain the knowledge on the losses occurred in the optical cable.
CO3 : Classify the Optical sources and detectors and to discuss their principles.
CO4 : Identify and rectify the errors occurred in the optical receiver section.
CO5 : Familiar with design considerations of fiber optic systems.

UNIT-I OPTICAL FIBERS - STRUCTURE (9)

Evolution of Fiber Optic Systems , Elements of an Optical fiber Transmission link , Basic laws and definitions, ray optics , Optical fiber modes and configurations , Mode theory of circular waveguides - Overview of modes, Key modal concepts , Linearly Polarized waves , Single Mode and Multi Mode Fibers, Graded Index Fiber Structure.

UNIT-II SIGNAL DEGRADATION (9)

Attenuation - absorption loss , Scattering loss , Bending loss , Core and Cladding loss , Signal distortion in optical wave guides - Information capacity determination , Group delay , material dispersion , Wave Guide dispersion , Signal distortion in single mode fibers – Polarization mode dispersion , RI profile and cut – off wavelength.

UNIT-III OPTICAL SOURCES (9)

LED‟s - Surface and Edge emitters, Modulation of LED, LASER Diodes - Fabry-Perot Lasers , Distributed Feedback (DFB) Lasers , Modulation of LASER diodes , Power Launching and Coupling - Source to fiber power launching , Lensing Schemes for Coupling improvement , LED coupling to single mode fibers, Fiber connectors.

UNIT-IV OPTICAL RECEIVERS (9)

PIN Photo detector, Avalanche Photodiodes, Photodetector noise - Detector response time, Avalanche multiplication of Noise, Temperature effects on Photo detectors, Fundamental Receiver operation-preamplifiers, Error sources, Receiver configuration, Probability of error, Quantum limit.

UNIT-V DIGITAL TRANSMISSION SYSTEMS (9)

Point to point link systems considerations - Link Power budget, Rise time budget , Noise effects on system performance , Operational principles of WDM, Solitons, EDFA‟s, Basic concepts of SONET/SDH.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Gerd Keiser, "Optical Fiber Communications", 5th Edition, McGraw-Hill Education, 2013.

REFERENCES:

1. John M. Senior, "Optical Fiber Communications", 3rd Edition, Pearson Education, 2009.
2. Govind P.Agrawal, "Fiber-optic Communication Systems", 3rd Edition, A John Wiley & Sons, 2004.
3. R.P.Khare, "Fiber Optics and Optoelectronics", Oxford University, 2007.

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

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

13EC703 - EMBEDDED AND REAL TIME SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVES:

- Learn the architecture and programming of ARM processor.
- Be familiar with the embedded computing platform design and analysis.
- Be exposed to the basic concepts of real time Operating system.
- Learn the system design techniques and networks for embedded systems.

COURSE OUTCOMES:

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

CO1 : Describe the architecture of different ARM processor cores.
CO2 : Understand the instruction set and Assembly Language Programming in ARM.
CO3 : Categorize and understand the recent trends in Embedded Systems.
CO4 : Outline the concepts of embedded systems and explain the basic concepts of real time Operating system design.
CO5 : Develop real time solutions in different RTOS environment.

UNIT-I THE ARM RISC ARCHITECTURE (9)

The Reduced Instruction Set Computer – Architectural inheritance-The ARM programmers model-ARM organization and implementation: 3 stage and 5 stage pipeline ARM organization-ARM instruction execution--ARM processor cores-ARM7 TDMI-ARM8 TDMI-ARM9 TDMI-ARM Development Tools.

UNIT-II ARM INSTRUCTION AND ASSEMBLY LANGUAGE PROGRAMMING (9)

Exceptions-Conditional execution-Branch and branch with link and exchange-Software interrupt-Data processing instructions-Single word and unsigned byte data transfer and half word and signed byte data transfer instructions-Multiple register transfer instructions-Swap instructions-The thumb instruction set - Thumb applications-Writing simple assembly language programs.

UNIT- III ARCHITECTURE OF EMBEDDED SYSTEMS (9)

Categories of Embedded Systems-Specifications of Embedded systems-Resent trends in Embedded Systems-Hardware Architecture-Software Architecture-Communication software-Process of generation of executable image-development/testing tools.

UNIT-IV REAL-TIME OPERATING SYSTEM CONCEPTS (9)

Architecture of the Kernel-task and task scheduler-Interrupt Service Routines-Semaphores-Mutex- Mailboxes-Message Queues-Event Registers-Pipes-Signals-Timers-Memory Management – Priority Inversion Problem.

UNIT-V REAL-TIME OPERATING SYSTEMS AND CASE STUDIES (9)

Off-the-Shelf Operating Systems-Embedded Operating Systems- Real Time Operating Systems-Handheld Operating Systems - Case study of coding for an Automatic Chocolate Vending Machine using MUCOS RTOS-Case study of an Embedded system for an Adaptive Cruise Control Systems in a Car- Case study of an Embedded Systems for a Smart Card.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. K.V.K.K.Prasad, "Embedded Real-Time Systems: Concepts, Design & Programming", Dream Tech Press, 2005.
2. Steve Furber, "ARM System-on-Chip Architecture", 2nd Edition, Addison-Wesley Professional, 2000.

REFERENCES:

1. Raj Kamal "Embedded Systems Architecture Programming and Design" 2nd Edition TMH, 2010.
2. Wayne Wolf, "Computers as Components - Principles of Embedded Computer System Design", Morgan Kaufmann Publisher, 2006.
3. David. E. Simon, "An Embedded Software Primer", 1st Edition, Fifth Impression, Addison-Wesley Professional, 2007.

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

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

13EC711 - MICROWAVE AND OPTICAL LAB

L	T	P	C
0	0	3	2

OBJECTIVES:

- To obtain a broad understanding of the emerging technologies
- To provide knowledge on optical communication and optical fiber characteristics.
- To provide knowledge about the basic microwave experiments.

COURSE OUTCOMES:

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

CO1 : Apply knowledge of optical communication to various application areas.
CO2 : Implement and maintain the various microwave components.
CO3 : Solve problems in maintaining the optical and microwave components.
CO4 : Obtains knowledge to calculate the numerical aperture of a fiber.
CO5 : Understand the characteristics of Gunn diode and Reflex Klystron.

Microwave Lab Experiments:

1. To determine the mode Characteristics of Reflex Klystron.
2. To determine the standing wave ratio and reflection coefficient using Reflex Klystron.
3. To determine the V-I characteristics of Gunn diode.
4. To determine the frequency & wavelength in a rectangular waveguide Working on TE_{10} mode
5. To measure an unknown impedance with Smith Chart.

Optical Experiments:

1. To measure the Numerical Aperture of Optical Fiber.
2. To plot the DC Characteristics of LED and VI characteristics of LASER Diode.
3. To measure the Bending Loss of Optical Fiber.
4. To plot the Characteristics of optical signal using analog and digital link
5. To determine the system bandwidth by intensity modulation using optical fiber.
6. To measure the BER (Bit Error Rate) and Eye pattern in optical communication

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

	POs											
COs	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
5				X			X				X	

13EC712 - EMBEDDED SYSTEMS LAB

L	T	P	C
0	0	3	2

OBJECTIVES:

- To obtain a broad understanding of the emerging technologies in embedded system.
- To acquire knowledge on 8bit Microcontroller and interfacing.
- To gain knowledge about automation using embedded systems.

COURSE OUTCOMES:

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

CO1 : Develop applications using I/O ports in Microcontrollers

CO2 : Design embedded systems with wireless applications

CO3 : Design system for real world applications using peripherals.

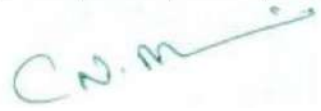
CO4 : Design embedded systems using wired protocols.

CO5 : Made automation and provide solution to problems in various industriesThe following programs have to be tested on 89C51 Development board/equivalent using Embedded C Language on

1. Program to toggle all the bits of Port P1 continuously with 250 ms delay using
2. Program to toggle only the bit P1.5 continuously with some delay. Use Timer 0 in mode 0, mode 1, mode 2 and mode 3 to create delay using 89C51.
3. Program to transmit and receive a message serially with GPS/Modem/RF using 89C51 Microcontroller.
4. Program to interface 7 segment display to display a message on it using 89C51.
5. Program to interface keypad. Whenever a key is pressed, it should be displayed on LCD using 89C51.
6. Program to get analog input from Temperature sensor and display the temperature Value on LCD using ADC with 89C51 Microcontroller.
7. Program to control the speed of a DC motor using DAC with 89C51 Microcontroller.
8. Program to interface Stepper Motor with 89C51 Microcontroller and rotate the motor in clockwise and anticlock wise directions.
9. Program to handle external interrupt, timer interrupts and serial communication interrupt with 89C51 Microcontroller.
10. Program to send and receive a data between I/O device and Microcontroller using I^2C / SPI.

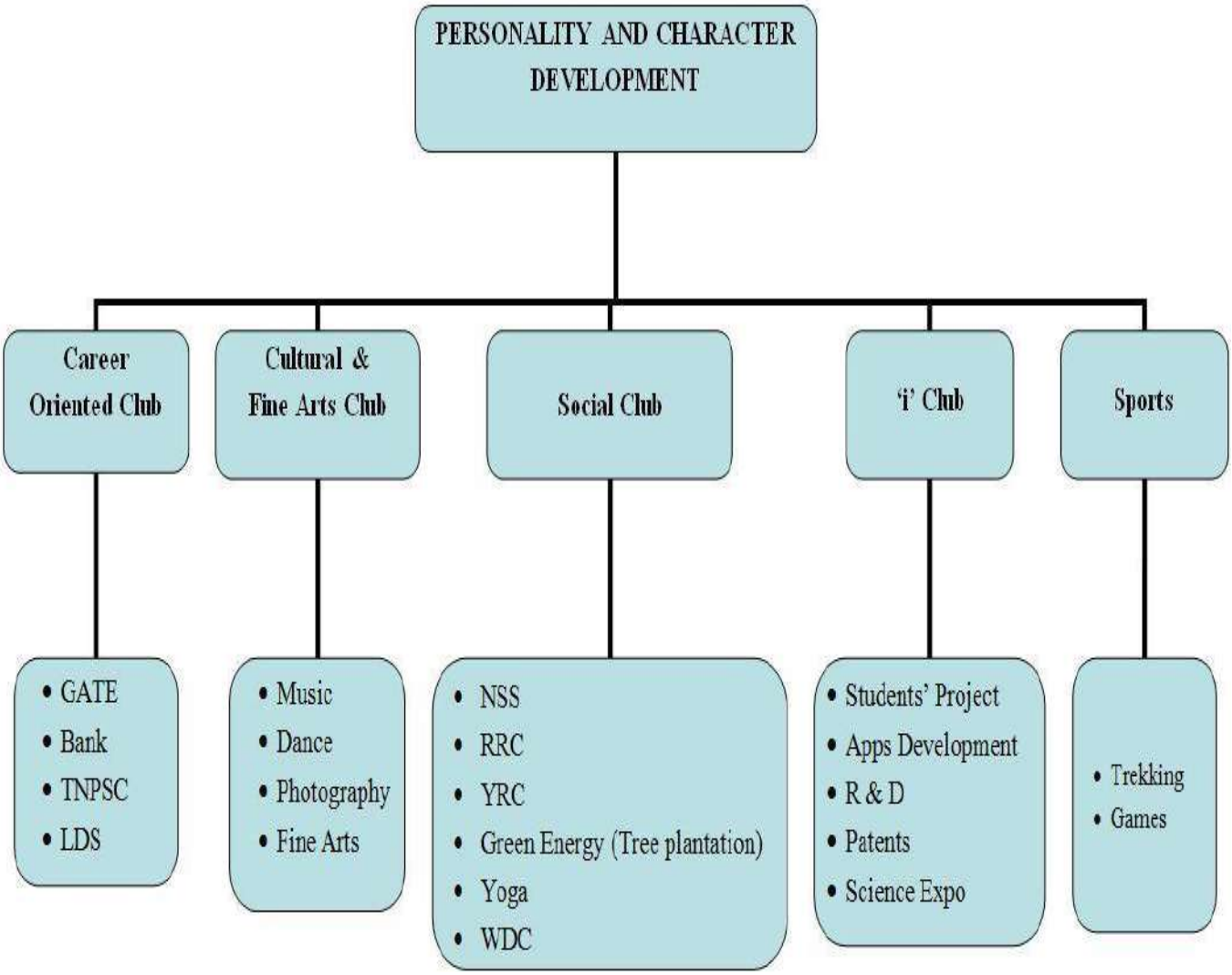
Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

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



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. **Trekking:** 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)

13EC831 PROJECT WORK

L	T	P	C
0	0	20	10

OBJECTIVES:

- To practice the fundamental concepts of basic sciences and mechanical engineering concepts and principles in addressing a real time situation autonomously or in a team.
- To enhance the management skills to achieve the project goal by working as a team and also improve technical writing skills.
- To apply the technical skills to provide feasible solutions for real-life problems.

COURSE OUTCOMES:

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

CO1 : Formulate a problem definition in the field of Electronics and communication Engineering through literature survey.
CO2 : Identify the objectives of the project by thorough understanding of the problem.
CO3 : Develop methodology using appropriate tools for the problem.
CO4 : Analyze the problem based on the methodology and tabulate the results.
CO5 : Conclude the results and submit the project report.

The students in a group of maximum 4 students per batch 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.

TOTAL: 300 PERIODS

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		X	X	X		
4	X		X	X	X	X		X	X	X		
5			X	X	X	X			X	X		

ELECTIVE I

13ECX01 - MEDICAL ELECTRONICS

	L	T	P	C
OBJECTIVES:	**3**	**0**	**0**	**3**

- This course will enable the students to learn the basic principles of different instruments/equipments used in the health care industry.

COURSE OUTCOMES:

At the end of this course, the students will be able to
CO1 : Gain knowledge about the Bio potential recording systems and its signal characteristics.
CO2 : Learn the various diagnostic and therapeutic equipments.
CO3 : Know about Recent Trends in Medical Instrumentation.
CO4 : About the various imaging modalities in the hospital.
CO5 : About the types of assist devices.

UNIT-I ELECTRO-PHYSIOLOGY AND BIO-POTENTIAL RECORDING (9)

Anatomy of Human body, Origin of Bio-potentials; Bio-potential electrodes, Biological amplifiers, ECG, EEG, EMG, EOG, lead systems and recording methods, typical waveforms and signal characteristics.

UNIT-II NON ELECTRICAL PARAMETER MEASUREMENT (9)

Colorimeter, Auto analyzer, Blood flow meter, Cardiac output, Respiratory measurement, Blood pressure, Temperature and Pulse measurement, Blood Cell Counters.

UNIT-III DIAGNOSTIC EQUIPMENTS (9)

Ultrasound and MRI machines, Positron Emission Tomography, CT scanner-Applications, X-ray machine-Production of X-ray, Types and Uses.

UNIT-IV THERAPEUTIC EQUIPMENTS (9)

Defibrillator, Cardiac pacemaker, Dialyzer, Heart lung machine, Diathermies- Shortwave, Ultrasonic, Microwave, Surgical Diathermy and their applications.

UNIT-V ADVANCED TECHNIQUES IN MEDICAL INSTRUMENTATION (9)

Telemetry principles, Frequency selection, Biotelemetry, Radio pill, Endoscopy unit, Remote sensing-Continuous patient monitoring system, Lasers in medicine, Electrical safety in medical devices.

TOTAL: 45 PERIODS

TEXT BOOK:

1. John G.Webster, "Medical Instrumentation Application and Design",3rd Edition, Wiley India Edition, 2007.

REFERENCES:

1. Khandpur, R.S., "Handbook of Biomedical Instrumentation", Tata Mc Graw-Hill, New Delhi, 2003.
2. Joseph J.Carr and John M.Brown, "Introduction to Biomedical Equipment Technology", John Wiley and Sons, New York, 2004.

3. www.rch.org.au/bme_rch/electrical_safety/
4. omicsonline.org/a-hospital-healthcare-monitoring-system-using-wireless-
5. http://europepmc.org/backend/ptpmcrender.fcgi?accid=PMC1413324&blobtype=pdf

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

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

13ECX02 - DIGITAL IMAGE PROCESSING

	L	T	P	C
OBJECTIVES:	**3**	**0**	**0**	**3**

- To understand the image fundamentals and mathematical transforms necessary for image processing and to study the image enhancement techniques.
- To acquire the basic knowledge on image enhancement and restoration.
- To analyze image compression procedures.

COURSE OUTCOMES:

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

CO1 : Understand image formation and the role human visual system plays in perception of gray and color image data.
CO2 : Understand transform-domain representation of images.
CO3 : Perform image analysis by designing spatial and frequency domain filters.
CO4 : Describe how digital images are represented and stored efficiently depending on the desired quality.
CO5 : Detect/Extract regions of interest from an image using various thresholding and segmentation Techniques.

UNIT I DIGITAL IMAGE FUNDAMENTALS (9)

Elements of digital image processing systems- Elements of visual perception-psycho visual model-brightness-contrast-hue-saturation-mach band effect- Image sampling-Quantization-Basic relationship between pixels-Color image fundamentals-RGB-HSI models.

UNIT II IMAGE TRANSFORMS (9)

2D transforms-DFT-DCT-Discrete Sine, Walsh-Hadamard, Slant-Haar, Hough transform, KL transforms-properties of all transforms.

UNIT III IMAGE ENHANCEMENT AND RESTORATION (9)

Spatial Domain enhancement: gray level transformations–histogram equalization-Image averaging-Spatial filtering: Smoothing, Sharpening filters- Frequency domain filters: Smoothing-Sharpening filters-Homomorphic filtering-Color image enhancement. Image Restoration: Degradation model-Unconstrained and Constrained restoration-Inverse filtering-Wiener filtering.

UNIT IV IMAGE COMPRESSION (9)

Need for data compression-Error free compression-Variable length coding-Bit-Plane coding-Lossless and Lossy Predictive coding, JPEG and MPEG Compression Standards.

UNIT V IMAGE SEGMENTATION AND REPRESENTATION (9)

Point- Line and edge detection- Thresholding – Region based segmentation: Region splitting and merging. Image representation: chain codes-polygonal approximations-signatures-boundary segments-skeletons-Regional descriptors.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Rafael C. Gonzales, Richard E. Woods, “Digital Image Processing”, Third Edition, Pearson Education, 2010.

REFERENCES:

1. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, “Digital Image Processing Using MATLAB”, Third Edition Tata McGraw Hill Pvt. Ltd., 2011.
2. Anil Jain K. “Fundamentals of Digital Image Processing”, PHI Learning Pvt. Ltd., 2011.
3. William K Pratt, “Digital Image Processing”, JohnWilley, 2002.

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

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

13ECX03 - CONSUMER ELECTRONICS

	L	T	P	C
OBJECTIVES:	**3**	**0**	**0**	**3**

- To study the basics of audio and video technology.
- To understand the electronic gadgets and telecommunication systems.
- To analyze and design consumer appliances.

COURSE OUTCOMES:

At the end of this course, the students will be able to
CO1 : Understanding the concepts of audio system.
CO2 : Understanding the concepts of video system.
CO3 : Analysis different techniques involved in audio and video processing.
CO4 : Identification of new developments in office equipment and domestic appliances.
CO5 : Perform Menstruation and Calculation.

UNIT - I AUDIO SYSTEM COMPONENTS (9)

Introduction to wave motion – Interference and superposition of waves – Beats, Resonance, Echos – characteristics of microphones – types of microphone – wireless microphones – types of headphones – Types of loudspeakers – Multispeaker systems – Acoustiic Insulation and acoustic design. Stereo systems and multiway systems.

UNIT-II AUDIO PROCESSING (9)

Audio Filters, Types of AGC – Loudspeaker Impedance matching – Pre-emphasis and De-emphasis noise reduction – Optical recording and reproduction – stereophony, Quadraphony – Stereo controls – Active tone control, filtering, bass and treble control – Integrated Stereo amplifier – Equalizers – Codecs – LPC, Sub-band Coding, CELP. MPEG-1, MPEG-2, MPEG-4 and Dolby Digital

UNIT - IIIVIDEO STANDARDS AND SYSTEMS (9)

Elements of a TV system, scanning process – resolution, interlacing, composite signal – Types of TV camera – compatibility between monochrome and colour TV – TV standards – NTSC, PAL, SECAM, CCIR-B – TV Broadcasting – video recording formats – Video2000, 8mm format – video optical recording methods – Laser Vision video disc system. Interactive video systems.

UNIT - IVCOMMUNICATION AND CONSUMER GADGETS (9)

Radio system – VHF and UHF – Types of mobile phones – Facsimile machine – electronic calculators – digital clocks – Automobile computers – Anti locking Breaking Systems, Electronically Controlled Suspension, Safety Belt System, Navigation System – Microwave Ovens. Dish washers and TV Remote.

UNIT - V CONSUMER APPLICATIONS (9)

Washing Machines – electronic controller, fuzzy logic, Hardware and Software development – Air Conditioners – Components, Remote Controls, Unitary and central air conditioner systems – Bar Coders – Bar codes, scanner and decoder – Set Top Box – Types, firmware development, Interactive program guides. Video on demand.

TOTAL: 45 PERIODS

TEXT BOOK:

1. S.P.Bali, Consumer Electronics, Pearson Education, 2005.

REFERENCES:

1. C.A. Schuler and W.L.Mc Namee, Modern Industrial Electronics, McGraw Hill, 2002.
2. D.J. Shanefield, Industrial Electronics for Engineers, Chemists and Technicians, Jaico Publishing House, 2007.

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

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

13ECX04 - ELECTRONIC TESTING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the basics of testing and the testing
- equipments To understand the different testing methods

COURSE OUTCOMES:

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

CO1 : Explain different testing equipments.
CO2 : Design the different testing schemes for a circuit.
CO3 : Discuss the need for test process.
CO4 : An understanding of how electrons, photons and phonons interact in materials.
CO5 : A basic understanding of the operation of elementary solid-state electronic devices.

UNIT I INTRODUCTION (9)

Test process and automatic test equipment, test economics and product quality, fault modeling

UNIT II DIGITAL TESTING (9)

Logic and fault simulation, testability measures, combinational and sequential circuit test generation.

UNIT III ANALOG TESTING (9)

Memory Test, DSP Based Analog and Mixed Signal Test, Model based analog and mixed signal test, delay test, IIDQ test.

UNIT IV DESIGN FOR TESTABILITY (9)

Built-in self-test, Scan chain design, Random Logic BIST, Memory BIST, Boundary scan test standard, Analog test bus, Functional Microprocessor Test, Fault Dictionary, Diagnostic Tree, Testable System Design, Core Based Design and Test Wrapper Design, Test design for SOCs.

UNIT V LOADED BOARD TESTING (9)

Unpowered short circuit tests, unpowered analog tests, Powered in-circuit analog, digital and mixed Signal tests, optical and X-ray inspection procedures, functional block level design of in-circuit test Equipment

TOTAL: 45 PERIODS

TEXT BOOK:

1. Michael L. Bushnell and Vishwani D. Augural, “Essentials of Electronic Testing for Digital, Memory & Mixed-Signal VLSI Circuits”, Springer, 2006.

REFERENCE:

1. Dimitris Gizopouilos, “Advances in Electronic Testing”, Springer 2006.

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

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

ELECTIVE II

13ECX05 - COMPUTER HARDWARE INTERFACING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce issues related to CPU and memory.
- To study the concept of components on the motherboard.
- To understand different storage media.
- To learn the features of different I/O peripheral devices and their interfaces

COURSE OUTCOMES:

At the end of this course, the students will be able to
CO1 : Design the CPU and memory.
CO2 : Analyze the storage devices and peripherals.
CO3 : Solve the hardware problems in real time.
CO4 : Understanding of CPU functioning and computer arithmetic.
CO5 : Learning various methods and techniques of memory organization.

UNIT- I CPU AND MEMORY (9)

CPU essentials – processor modes – modern CPU concepts – Architectural performance features – the Intel,,s CPU – CPU over clocking – over clocking requirements – over clocking the system – over clocking the Intel processors – Essential memory concepts – memory organizations – memory packages – modules – logical memory organizations – memory considerations – memory types – memory techniques – selecting and installing memory

UNIT- II MOTHERBOARDS (9)

Active motherboards – sockets and slots – Intel D850GB – Pentium4 mother board – expansion slots – form factor – upgrading a mother board – chipsets – north bridge – south bridge – CMOS – CMOS optimization tactics – configuring the standard CMOS setup – motherboard BIOS – POST – BIOS features – BIOS and Boot sequences – BIOS shortcomings and compatibility issues – power supplies and power management – concepts of switching regulation – potential power problems – power management.

UNIT- III STORAGE DEVICES (9)

The floppy drive – magnetic storage – magnetic recording principles – data and disk organization – floppy drive – hard drive – data organization and hard drive – sector layout – IDE drive standard and features – Hard drive electronics – CD-ROM drive – construction – CDROM electronics – DVD-ROM – DVD media – DVD drive and decoder.

UNIT- IV I/O PERIPHERALS (9)

Parallel port – signals and timing diagram – IEEE1284 modes – asynchronous communication - serial port signals – video adapters – graphic accelerators – 3D graphics accelerator issues – DirectX – mice – modems – keyboards – sound boards – audio bench marks

UNIT -V BUS ARCHITECTURE (9)

Buses – Industry standard architecture (ISA), peripheral component Interconnect (PCI) – Accelerated Graphics port (AGP) – plug-and-play devices – SCSI concepts – USB architecture.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Stephen J.Bigelow, ―Trouble Shooting, maintaining and Repairing PCs, Tata McGraw-Hill, NewDelhi, 2001.
2. Craig Zacker & John Rourke, ―The complete reference: PC hardware, Tata McGraw-Hill, New Delhi, 2012.

REFERENCES:

1. Mike Meyers, Introduction to PC Hardware and Troubleshooting, Tata McGraw-Hill, New Delhi, 2003.
2. B.Govindarajulu, ―IBM PC and Clones hardware trouble shooting and maintenance, Tata McGraw-Hill, New Delhi, 2011.

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

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

13ECX06 – CONTROL SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To acquire a clear exposition of the classical methods of control engineering, physical system modeling and basic principles of frequency and time domain design techniques.
- To learn the practical control system design with realistic system specifications.
- To provide knowledge of state variable models and state feedback design.

COURSE OUTCOMES:

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

CO1 : Calculate the transfer function of a system.
CO2 : Determine the stability of linear systems.
CO3 : Design compensator from design specifications.
CO4 : Apply frequency domain methods to determine stability.
CO5 : Formulate state-space models.

UNIT - I SYSTEMS AND THEIR REPRESENTATIONS (9)

Basic elements in control systems – open loop & closed loop – Transfer functions of mechanical and electrical analogous systems. Block diagram reduction and signal flow graphs.

UNIT - II TIME RESPONSE ANALYSIS (9)

Time response – Time domain specifications – Types of test inputs – I and II order system response – Steady state error, error constants, generalized error coefficient – Introduction to P,PI,PID controllers.

UNIT-III FREQUENCY RESPONSE ANALYSIS AND DESIGN (9)

Bode plots –Nyquist stability criterion – Correlation between frequency domain and time domain specifications – stability analysis using frequency response methods.

UNIT - IV STABILITY ANALYSIS AND COMPENSATION (9)

Stability-Concept and definition- Characteristic equation – Location of poles – Routh Hurwitz criterion – Root locus techniques: construction -Realization of basic compensators-Lag, Lead and Lag-Lead compensators.

UNIT - V STATE-SPACE ANALYSIS (9)

State equation – Solutions – Realization – Controllability – Observability – State space to transfer function conversion.

TOTAL: 45 PERIODS

TEXT BOOK:

1. I.J. Nagrath and M.Gopal, “Control Systems Engineering”, New Age International, 3rd Edition, 2004.

REFERENCES:

1. Smarajit Ghosh, "Control System (Theory and Applications)", Pearson Education, 2005.
2. M. Gopal, "Control Systems-Principles and Design", Tata McGrawhill-3rd Edition. 2002.
3. K. Ogata, "Modern Control Engineering", Pearson 4th Edition. 2005.
4. I. J Norman S. Nise, "Control System Engineering", John Wiley & Sons, 4th Edition, 2004.

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

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

13ECX07 - NANO ELECTRONICS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To learn the basic concepts of nano electronics and nano technologies.
- To learn about silicon MOSFETS, quantum transport devices, carbon nano tubes and its applications.
- To study about molecular electron devices and its applications.

COURSE OUTCOMES:

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

CO1 : Know the basics of nano electronics.
CO2 : Demonstrate transport devices and nano tubes.
CO3 : Discuss the various methods to fabricate and measure nanoscale features.
CO4 : Describe the electrical properties of silicon devices as they are scaled below 100nm.
CO5 : Summarize how carbon based nanoelectronic devices can impact the future electronics.

UNIT- I INTRODUCTION (9)

Nanotechnology and nanomachines – atomic structure – molecules and phases – energy – molecular and atomic size –surface and dimensional space –top down and bottom up; Molecular Nanotechnology: Electron microscope – scanning electron microscope – atomic force microscope –scanning tunneling microscope – nanomanipulator –nanotweezers – atom manipulation– nanodots – self assembly – dip pen nanolithography. Nanomaterials: preparation –plasma arcing – chemical vapor deposition – electro deposition & Ball mining.

UNIT- II FUNDAMENTALS OF NANOELECTRONICS (9)

Fundamentals of logic devices – dynamic properties – threshold gates; physical limits to computations; concepts of logic devices:- classifications – two terminal devices – field effect devices –coulomb blockade devices – performance of information processing systems; Measure of performance processing capability of biological neurons – performance estimation for the human brain. Ultimate computation- power dissipation limit – dissipation in reversible computation

UNIT- III SILICON MOSFETS & QUANTUM TRANSPORT DEVICES (9)

Silicon MOSFETS - Novel materials and alternate concepts:- fundamentals of MOSFET Devices scaling rules – silicon-dioxide based gate dielectrics – metal gates – junctions,& contacts – advanced MOSFET concepts. Quantum transport devices based on resonant tunneling - Electron tunneling – resonant tunnelling diodes – resonant tunnelling devices; Single electron devices for logic applications.

UNIT- IV CARBON NANOTUBES (9)

Carbon Nanotube: Fullerenes - types of nanotubes – formation of nanotubes –assemblies – purification of carbon nanotubes – electronic propertics – synthesis of carbon nanotubes – carbon nanotube interconnects – carbon nanotube FETs –Nanotube for memory applications

UNIT- V MOLECULAR ELECTRONICS (9)

Electrodes & contacts – functions – molecular electronic devices – first test systems –simulation and circuit design – fabrication; Future applications: MEMS – robots – random access memory – mass storage devices .

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Michael Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons and Burkhard Raguse, Nanotechnology: Basic Science and Emerging Technologies, Chapman & Hall / CRC, 2002.

2. T. Pradeep, NANO: The Essentials – Understanding Nanoscience and Nanotechnology, TMH, 2008.
3. Rainer Waser (Ed.), Nanoelectronics and Information Technology: Advanced Electronic Materials and Novel Devices, Wiley-VCH, 2012.

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

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

13ECX08 - MEMS AND ITS APPLICATION

	L	T	P	C
OBJECTIVES:	**3**	**0**	**0**	**3**

- To acquire basic knowledge about application of MEMS in RF communications.
- To study about MEMS physical modeling and reconfigurable elements.
- To understand MEMS Inductors and Capacitors.

COURSE OUTCOMES:

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

CO1 : Understand the fabrication methodology used in MEMS.
CO2 : Construct and analyze the various models of MEMS.
CO3 : Use the reconfigurable design implementation in MEMS.
CO4 : Consider recent advancements in the field of MEMS and devices.
CO5 : Use materials for common micro components and devices.

UNIT- I MICRO ELECTROMECHANICAL SYSTEMS (9)

Introduction, MEMS Overview, Micro fabrication of MEMS: Surface Micromachining, Bulk Micromachining, LIGA, micromachining of polymeric MEMS devices

UNIT- II FUNDAMENTALS MEMS DEVICE PHYSICS (9)

Actuation: Electrostatic Actuation, Piezoelectric Actuation, Thermal Actuation ,Magnetic Actuation, Mechanical Vibrations ,The single degree of Freedom System ,The many Degrees of freedom system, Micro sensing for MEMS: Piezo resistive sensing, Capacitive sensing, Piezoelectric sensing, Resonant sensing, Surface Acoustic Wave sensors.

UNIT- III MEMS MATERIALS AND FABRICATION PROCESS MODELLING (9)

Metals, semiconductors, thin films for MEMS and their deposition techniques, materials for polymer MEMS. Solid modeling: Numerical Simulation of MEMS, Mechanical Simulation, Electrostatic Simulation.

UNIT- IVMEMS SWITCHES (9)

Switch parameters, basics of switching, Switches for RF and microwave applications, actuation mechanisms for MEMS devices, dynamics of switch operation, MEMS switch design considerations, Microwave Considerations, Material Consideration, Mechanical Considerations Modeling and evaluation.

UNIT- V MEMS INDUCTORS AND CAPACITORS (9)

MEMS Inductors: self and mutual inductance, micro machined inductors, , modeling and design issues of planar inductors, variable inductor and polymer based inductor. MEMS Capacitors: MEMS gap tuning capacitor, MEMS area tuning capacitor, Dielectric Tunable capacitors.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. RF MEMS & Their Applications by Vijay K. Varadan, K. J. Vinoy and K. A. Jose John Wiley & Sons, 2003.
2. Introduction to Micro electromechanical Microwave Systems(2nd Edition) by Hector J.De Los Santos,Artech house,2004
3. RF MEMS: Theory, Design, and Technology, Gabriel M. Rebeiz, John Wiley & Sons, 2004.

REFERENCES:

1. Tai-Ran Hsu, "MEMS and Microsystems: Design and Manufacture," McGraw-Hill, 1st edition, ISBN: 0072393912. , 2002.
2. Mems Mechanical Sensors Micro electromechanical system series Stephen Beeby/Artech House.

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

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

ELECTIVE III

13ECX09 – HIGH SPEED NETWORKS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To provide the basic concepts of frame relay and ATM networks.
- To know about the end to end performance parameters and techniques used by TCP.
- To update knowledge about the development in high speed networks.

COURSE OUTCOMES:

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

CO1 : Understand the knowledge about Asynchronous transfer protocol and TCP/IP.
CO2 : Identify different extents of quality of service to different applications.
CO3 : Understand the advancement in protocols.
CO4 : Analyze the different queuing techniques.
CO5 : Acquire the knowledge about the progress of high speed networks.

UNIT- I HIGH SPEED NETWORKS (9)

Frame Relay Networks – Asynchronous transfer mode: ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories, AAL, High Speed LANs: Fast Ethernet, Gigabit Ethernet, Fiber Channel – Wireless LANs: applications, requirements, Architecture of 802.11

UNIT- II CONGESTION AND TRAFFIC MANAGEMENT (9)

Queuing Analysis: Queuing Models, Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

UNIT- III TCP AND ATM CONGESTION CONTROL (9)

TCP Flow control – TCP Congestion Control: Retransmission Timer Management, Exponential RTO back off, KARN‟s Algorithm, Window management – Performance of TCP over ATM -Traffic and Congestion control in ATM – Requirements, Attributes, Traffic Management Frame work, Traffic Control .

UNIT- IV INTEGRATED AND DIFFERENTIATED SERVICES (9)

Integrated Services Architecture: Approach, Components, Services- Queuing Discipline: FQ, PS, BRFQ, GPS, WFQ – Random Early Detection - Differentiated Services.

UNIT -V PROTOCOLS FOR QOS SUPPORT (9)

RSVP: Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching: Operations, Label Stacking – RTP – Protocol Architecture, Data Transfer Protocol, RTCP.

TOTAL: 45 PERIODS

TEXT BOOK

1. William Stallings, “HIGH SPEED NETWORKS AND INTERNET”, Pearson Education, Second Edition, 2010.

REFERENCES

1. Warland, Pravin Varaiya, “High performance communication networks”, Second Edition, Jean Harcourt Asia Pvt. Ltd., , 2001.
2. Irvan Pepelnjk, Jim Guichard, Jeff Apcar, “MPLS and VPN architecture”, Cisco Press, Volume 1 and 2, 2003.
3. Abhijit S. Pandya, Ercan Sea, “ATM Technology for Broad Band Telecommunication Networks”, CRC Press, New York, 2004.
4. https://en.wikipedia.org/wiki/Multiprotocol_Label_Switching
5. http://www.cse.wustl.edu/~jain/cis788-95/ftp/atm_cong.pdf

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

	POs											
COs	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		X						X
5		X		X			X				X	X

13ECX10-ADVANCED MICROPROCESSORS AND MICROCONTROLLERS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To acquire the basic knowledge about Memory and instruction management.
- To study about Pentium Processor and its programming.
- To learn Motorola Microcontroller, MSP 430 Microcontroller and its programming.

COURSE OUTCOMES:

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

CO1 : Acquire knowledge about memory hierarchy, Paging, Segmentation and Pipelining.
CO2 : Gain knowledge and design a system using Pentium Processor.
CO3 : Develop programming and system design using Pentium Processor.
CO4 : Build up programming and system design using Motorola Microcontroller.
CO5 : Gain programming and design knowledge in MSP 430 Microcontroller.

UNIT- I MICROPROCESSOR ARCHITECTURE (9)

Instruction Set – Data formats –Addressing modes – Memory hierarchy –register file –Cache – Virtual memory and paging – Segmentation- pipelining –the instruction pipeline– pipeline hazards – instruction level parallelism – reduced instruction set –Computer principles – RISC versus CISC**.**

UNIT- II HIGH PERFORMANCE CISC ARCHITECTURE – PENTIUM (9)

CPU Architecture- Bus Operations – Pipelining – Brach predication – floating point unit-Operating Modes – Paging – Segmentation – Multitasking.

UNIT- III PENTIUM- PROGRAMMING AND ADVANCED PROCESSORS (9)

Exception - Interrupts – Instruction set –addressing modes – Programming the Pentium processor-Advanced Pentium processors: Intel Core 2, Core i3, Core i5 and Corei7 Microprocessors.

UNIT- IV MOTOROLA 68HC11 MICROCONTROLLERS (9)

Instruction set addressing modes – operating modes- Interrupt system- RTC-Serial Communication Interface – A/D Converter PWM and UART.

UNIT- V MSP430 MICROCONTROLLER (9)

Architecture of the MSP430: Central Processing unit-Addressing modes –Constant generator and emulated instruction –Instruction Set–Resets–Clock System Function and subroutine–Interrupts–Low Power modes of Operation –Watch dog timer -Serial peripheral Interface.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Daniel Tabak , „‟ Advanced Microprocessors” McGraw Hill.Inc., 1995
2. James L. Antonakos , “ The Pentium Microprocessor „‟ Pearson Education , 1997.
3. Gene .H.Miller .” Micro Computer Engineering,” Pearson Education, 2004.
4. John davies ” MSP430 MICROCONTROLLER basics”Elsevier,2008.

REFERENCES:

1. James L.Antonakos ," An Introduction to the Intel family of Microprocessors „" Pearson Education 1999.
2. Barry.B.Breg," The Intel Microprocessors Architecture , Programming and Interfacing " , PHI,2009.
3. https://en.wikipedia.org/wiki/Intel_Core_2
4. http://www.expertreviews.co.uk/pcs/cpus/1400962/whats-the-difference-between-core-i3-i5-and-i7-processors.
5. http://www.brighthub.com/computing/hardware/articles/65861.aspx
6. https://www.youtube.com/watch?v=GLSPub4ydiM.

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

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

13GEC03- PROFESSIONAL ETHICS AND HUMAN VALUES

L	T	P	C
3	0	0	3

OBJECTIVES:

- To know the theory of engineering ethics.
- To enable the students to create an awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values and Loyalty and to appreciate the rights of others.

COURSE OUTCOMES:

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

CO1 : Realize the responsibilities and rights in the society.
CO2 : Discuss the ethical issues related to engineering. .
CO3 : Realize the safety in Intellectual Property Rights.
CO4 : Exposed awareness on professional ethics and human values.
CO5 : Known their role in technological development

UNIT-I HUMAN VALUES (9)

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT-II ENGINEERING ETHICS (9)

Senses of „Engineering Ethics – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg‟s theory – Gilligan vs theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT-III ENGINEERING AS SOCIAL EXPERIMENTATION (9)

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT-IV SAFETY, RESPONSIBILITIES AND RIGHTS (9)

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

UNIT-V GLOBAL ISSUES (9)

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Mike W. Martin and Roland Schinzinger, “Ethics in Engineering”, Tata Mc Graw Hill, New Delhi, 2003.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.

REFERENCES:

1. Charles B. Fleddermann, “Engineering Ethics”, Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, “Engineering Ethics – Concepts and Cases”, Cengage Learning, 2009
3. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003
4. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001
5. Laura P. Hartman and Joe Desjardins, “Business Ethics: Decision Making for Personal Integrity and Social Responsibility” Mc Graw Hill education, India Pvt. Ltd.,New Delhi 2013.
6. World Community Service Centre, “Value Education”, Vethathiri publications, Erode, 2011

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

	POs											
COs	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		

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, the students will be able to

CO 1 : Adopt various concepts of quality management
CO 2 : Implement various principles of quality management
CO 3 : Impart quality using statistical process
CO 4 : Use the various tools to maintain quality
CO 5 : 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

TEXT BOOK:

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 ed.,
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)

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

ELECTIVE VI

13ECX11 - PROTOCOLS AND ARCHITECTURES FOR WIRELESS SENSOR NETWORKS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To obtain a broad understanding of the sensor networks and emerging technologies.
- To provide knowledge on network architecture of sensor nodes and the concept of MAC and routing protocols.
- To provide knowledge about topology control, Clustering networks Sensor node hardware and software platform.

COURSE OUTCOMES:

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

CO1 : Apply knowledge of wireless sensor networks to various application areas.
CO2 : Design, implement and maintain wireless sensor networks.
CO3 : Formulate and solve problems creatively.
CO4 : Self paced learning using reference material as a guide.
CO5 : Laboratory based assignments and a mini project to explore specific topics in depth.

UNIT-I OVERVIEW OF WIRELESS SENSOR NETWORKS (9)

Introduction to wireless sensor network- Sensor network applications, Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks.

UNIT-II ARCHITECTURES (9)

Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments, Network Architecture - Sensor Network Scenarios, Service interfaces of WSNs.

UNIT-III NETWORKING SENSORS (9)

Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC , Assignment of MAC Addresses, Routing Protocols-Energy-Efficient Routing, Geographic Routing.

UNIT-IV INFRASTRUCTURE ESTABLISHMENT (9)

Topology Control- Controlling topology in flat networks, Hierarchical networks by dominating sets, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.

UNIT-V ROUTING PROTOCOL (9)

Introduction to routing protocol, Broadcast and multicast, Geographic routing, Mobile nodes, Energy efficient unicast, Advanced application support- Network processing, WSN security.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Holger Karl & Andreas Willig, “Protocols And Architectures for Wireless Sensor Networks” , John Wiley, 2007
2. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information Processing Approach”, Elsevier, 2007.

REFERENCES:

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks- Technology, Protocols, And Applications", John Wiley, 2007
2. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003

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

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

13ECX12 - TELECOMMUNICATION SWITCHING AND NETWORKS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To provide fundamental functions of a telecom switching office, digital multiplexing, digital switching and digital subscriber access.
- To learn the concepts of Frequency division multiplexing, Time division multiplexing, Space switching, time switching and Combination switching.
- To obtain the knowledge of ISDN, DSL / ADSL, and fiber optic systems in subscriber loop.

COURSE OUTCOMES:

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

CO1 : Learn the different multiplexing methods and SONET optical standards.
CO2 : Identify digital multiplexing and digital switching.
CO3 : Recognize the need for network synchronization issues and management
CO4 : Learn the local loop systems in digital environment
CO5 : Acquire the knowledge about telephone traffic and statistical modeling.

UNIT- I MULTIPLEXING (9)

Transmission Systems - Frequency Division Multiplexing -Time Division Multiplexing- Line coding-Loops and Rings-SONET/SDH: SONET Multiplexing Overview-SONET Frame Formats- SONET Operations-Administration and Maintenance- SONET Optical Standards- SONET Networks- SONET Rings: Unidirectional Path-Switched Ring- Bidirectional Line-Switched Ring.

UNIT-II DIGITAL SWITCHING (9)

Switching Functions- Time Division Switching -Space Division Switching- two dimensional Switching: STS Switching- TST Switching- No.4 ESS Toll Switch- Digital Cross-Connect Systems- Digital Switching in an Analog Environment- Elements of SS7 signaling-CBT switches.

UNIT- IIINETWORK SYNCHRONIZATION CONTROL AND MANAGEMENT (9)

Timing Recovery: Phase-Locked Loop-Clock Instability- Jitter Measurements- Systematic Jitter- Timing Inaccuracies: Slips- Asynchronous Multiplexing- Network Synchronization- U.S. Network Synchronization-Network Control- Network Management.

UNIT- IV DIGITAL SUBSCRIBER ACCESS (9)

ISDN Basic Rate Access Architecture- High-Data-Rate Digital Subscriber Loops: Asymmetric Digital Subscriber Line-VDSL- Digital Loop Carrier Systems- Next-Generation Digital Loop Carrier-Fiber in the Loop-Hybrid Fiber Coax Systems-Voice band Modems: PCM Modems- Local Microwave Distribution Service-Digital Satellite Services.

UNIT-V TRAFFIC ANALYSIS (9)

Traffic Characterization: Arrival Distributions-Holding Time Distributions- Loss Systems- Network Blocking Probabilities: End-to-End Blocking Probabilities- Overflow Traffic-Delay Systems: Exponential service Times-Constant Service Times- Finite Queues.

TOTAL: 45 PERIODS

TEXT BOOK:

1. John.C. Bellamy, “Digital Telephony”, John Wiley, 2003, 3rd Edition, Reprint 2011.

REFERENCES:

1. J.E. Flood, “Telecommunications Switching, Traffic and Networks”, Pearson Publication, Fourth impression 2008.
2. R.A.Thomson, “Telephone switching Systems”, Artech House Publishers, 2000.
3. Viswanathan. T., “Telecommunication Switching System and Networks”, Prentice Hall of India Ltd., 1994.

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

	POs											
COs	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			
5			X			X					X	

13ECX13 – TELEVISION AND VIDEO ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To know the elements and fundamentals of television systems.
- To provide knowledge on TV standards, transmission and reception systems.
- To provide the basic concepts of advanced TV techniques.

COURSE OUTCOMES:

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

CO1 : Understand the complete knowledge of basics of television and camera tubes.
CO2 : Acquire the television standard systems.
CO3 : Study the operation and working of various televisions transmission techniques.
CO4 : Know the architecture of television receiver systems .
CO5 : Identify the advanced television systems.

UNIT-I FUNDAMENTALS OF TELEVISION (9)

Television System and scanning Principles: Sound and picture transmission- scanning process, video signals, characteristics of human eye, brightness perception and Photometric qualities, Aspect ratio and Rectangular scanning, persistence of vision and flicker, vertical resolution, Kell factor, Horizontal Resolution and video bandwidth, Interlaced scanning. Camera tubes: vidicon - plumbicon- silicon diode array vidicon –CCD-solid state image scanners -Comparison of Camera tubes.

UNIT-II TELEVISION STANDARDS AND STUDIO EQUIPMENTS (9)

Composite video signal- scanning standards- Horizontal and vertical syn - blanking standards- video modulation and video signal standard - sound modulation and Inter carrier system - standard channel characteristics – Reception of VSB signals,-TV Broadcast channels- CCIR-B standards. Various TV broadcast systems: NTSC, PAL and SECAM system- comparison. Television studio system- production and master control Rooms.

UNIT-III TELEVISION TRANSMISSION SYSTEM, PROPAGATION AND ANTENNA (9)

Requirements of TV Broadcast Transmission- Design principle of TV Transmitters- Block diagram of TV transmitters - Transmitting antennas- Radio wave Characteristics- propagation phenomena- space wave propagation- Line of sight range- space wave reception over smooth terrain- distance reception- Shadow zones- co channel interference- Ghost images interference problems-parasitic elements- Yagi aerials- Feeders- matching- booster amplifiers.

UNIT-IV TELEVISION RECEIVER SYSTEM (9)

Block diagram for monochrome and colour receivers-Specifications - Picture Tube- Electron Gun-Deflection system characteristics-colour picture tubes- shadow mask- Trinitron- PIL picture tubes- purity- convergence- automatic degaussing, pincushion correction- flat panel displays- plasma displays: LCD- CCD techniques.

UNIT-V ADVANCED TELEVISION SYSTEMS (9)

Wobbuloscope-Cam corders-Cable TV –Types, processors, scrambling and conditional access systems-Satellite Television system - digital TV system- HDTV- 3DTV – OLED TV.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. A-M-Dhake-" Television and video Engineering" second Edition TMH 2003.
2. R-R-Gulati-"Modern Television Practice -Technology and servicing - fourth edition – New age International publishes -2012.

REFERENCES:

1. Bernard Grob," Basic Television Principles and servicing"- second edition, New age International Publisher -2004.
2. R.G.Gupta, "Television Engineering and Video systems," First Edition, TMH India 2007.
3. S-P-Bali-" Colour Television -Theory and practice "- TMH 1994

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

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

13ECX14- SATELLITE COMMUNICATION

L	T	P	C
3	0	0	3

OBJECTIVES:

- To know the elements of satellite communication and orbits.
- To provide knowledge on earth and space segment of the satellite.
- To provide the basic concepts of Accessibility and Applications of satellite.

COURSE OUTCOMES:

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

CO1 : Learn the different satellite orbits and launching procedures.
CO2 : Design & Analysis of various parameters in earth segments.
CO3 : Understand the satellite communication system and access.
CO4 : Design & Analysis of various parameters in space segments
CO5 : Understand the satellite communication system and its applications.

UNIT- I SATELLITE ORBITS (9)

Kepler‟s Laws, Newton‟s law, orbital parameters, orbital perturbations, station keeping, LEO, MEO -geo stationary and non Geo-stationary orbits: Look Angle Determination- Limits of visibility –Eclipse-Sub satellite point –Sun transit outage, Launching Procedures -launch vehicles and propulsion.

UNIT- II SPACE CRAFT AND SATELLITE LINK DESIGN (9)

Spacecraft Technology- Structure, Primary power, Attitude and Orbit control, Thermal control and Propulsion, Payload, Telemetry, Tracking and command, Satellite uplink and downlink: Analysis and Design, link budget, E/N calculation- performance impairments-system noise, inter modulation and interference.

UNIT- III SATELLITE ACCESS (9)

Modulation and Multiplexing: Voice, Data, Video, Analog – digital transmission system, Digital video Broadcast, Satellite modulation schemes, multiple access: FDMA, TDMA, CDMA, Assignment Methods, Spread Spectrum modulation.

UNIT- IV EARTH SEGMENT (9)

Earth Station Technology-- Terrestrial Interface, Transmitter and Receiver, Antenna Systems TVRO, MATV, CATV, Test Equipment Measurements on G/T, C/No, EIRP, Antenna Gain.

UNIT- V SATELLITE APPLICATIONS (9)

INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM, GPS, INMARSAT, Satellite Navigational System. Direct Broadcast satellites (DBS) - Direct to home Broadcast (DTH), Digital audio broadcast (DAB).

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Dennis Roddy, „Satellite Communication", McGraw Hill International, 4th Edition, 2006.
2. Wilbur L. Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, „Satellite Communication Systems Engineering", Prentice Hall/Pearson, 2007.

REFERENCES:

1. M.Richharia, „Satellite Communication Systems-Design Principles",Macmillan, 2nd Edition, 2003.
2. Bruce R. Elbert, „The Satellite Communication Applications" Hand Book, Artech HouseBostan London, 1997.
3. Brian Ackroyd, „World Satellite Communication and earth station Design", BSP professional Books, 1990.
4. N.Agarwal, „Design of Geosynchronous Space Craft, Prentice Hall, 1986.

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

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

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. .

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.

13EIZ02 FIBRE OPTIC SENSORS

(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.

.

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 DEVELOPING 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

Approved by third Academic council

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.

1

113GEZ07 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: Understand energy management concepts

CO3: Analyze 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, requirement and maximization of system efficiencies - Fuels and energy substitution optimization of energy.

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
OBJECTIVE	**2**	**0**	**0**	**2**

- 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 (5^{th} 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

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.