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 - Electrical and Electronics Engineering [R13]

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

JUN 2016

Approved by Fourth Academic council

VISION

To produce professionally competent Electrical and Electronics Engineers to meet out the national and global needs in inter/multi disciplinary domains.

MISSION

- To equip the students with knowledge and skills to cater to the industrial needs.
- To engineer them to develop innovative, competent and ethical qualities to contribute technical advancements.
- To enable them to become responsible citizens of the country with a willingness to serve the society.

State the Program Educational Objectives (PEOs)

PEO1. To provide fundamental knowledge to the students in Basic Sciences for the efficient practice of Engineering.

PEO2. To equip the students with the necessary subject knowledge in the design and analysis of Electrical and Electronic Systems.

PEO3. To prepare students for the modern work environment that emphasizes the need for lifelong learning so as to bring out innovative applications.

PEO4. To enrich the students with the necessary skills for prospective careers in the industry, government, pursuit of higher education and entrepreneurship.

PEO5. To enable students to communicate effectively, both individually and within teams, demonstrating ethical, respectful, and professional behavior so as to take up leadership positions in the society.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

1. Demonstrate knowledge and competence in the application of basic sciences, mathematics and fundamentals of electrical and electronics systems
2. Ability to explore complex engineering problems
3. Demonstrate the ability to communicate correctly, effectively work in a team and develop good personality
4. Apply appropriate techniques and modern engineering tools in core areas to engage in lifelong learning.

PROGRAMME OUTCOMES (POs):

The graduates of Electrical and Electronics Engineering will

1. Apply knowledge of mathematics, science and engineering to domain specific applications.
2. Identify, analyze and formulate Electrical and Electronics Engineering problems based on the knowledge of basic sciences and engineering.
3. Design and develop Electrical and Electronic Engineering based solutions to meet the desired requirements.
4. Investigate complex problems in the areas of power, control and energy to provide suitable solutions.
5. Use the techniques, skills and modern engineering tools necessary for real world applications within realistic constraints.
6. Apply engineering solutions in societal and global contexts.
7. Understand the impact of the solutions on the environment to ensure sustainability.
8. Understanding of professional and ethical responsibility.
9. Function as an individual and as a part of multidisciplinary team to accomplish a common goal.
10. Communicate effectively in both verbal and written forms.
11. Ability to use engineering and management principles, to manage projects and in multidisciplinary environments
12. Recognition of the need for and ability to engage in lifelong learning.

NANDHA ENGINEERING COLLEGE
REGULATIONS 2013 (R-13)
I & VIII SEMESTER CURRICULUM
B.E. Electrical and Electronics 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
13CE201	Basics of Civil and Mechanical Engineering	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
13EE211	Electric Circuits Laboratory	0	0	3	2
13IT212	UNIX Programming Laboratory	0	0	3	2
TOTAL		**18**	**3**	9	**27**

SEMESTER III

THEORY

Course Code	Course Title	L	T	P	C
13GE301	Transforms and Partial Differential Equations	3	1	0	4
13EE301	Semiconductor Devices and Circuits	3	0	0	3
13EE302	DC Machines and Transformers	3	1	0	4
13EE303	Engineering Electromagnetics	3	0	0	3
13CS304	Data Structures and Algorithms	3	0	0	3
13EE304	Network Theory	3	0	0	3

PRACTICAL

Course Code	Course Title	L	T	P	C
13EE311	Semiconductor Devices and Circuits Laboratory	0	0	3	2
13EE312	DC Machines and Transformers Laboratory	0	0	3	2
13CS313	Data Structures and Algorithms Laboratory	0	0	3	2
13PT311	Language Competency Development - I	0	0	2	0
	TOTAL	**18**	**2**	**11**	**26**

SEMESTER IV

THEORY

Course Code	Course Title	L	T	P	C
13GE401	Numerical Methods	3	1	0	4
13EE401	AC Machines	3	1	0	4
13IT405	Object Oriented Programming	3	0	0	3
13EE402	Analog Electronic Circuits	3	0	0	3
13EE403	Digital logic System Design	3	0	0	3
13EE404	Control Systems	3	1	0	4

PRACTICAL

Course Code	Course Title	L	T	P	C
13EE411	Analog and Digital Circuits Laboratory	0	0	3	2
13EE412	AC Machines Laboratory	0	0	3	2
13IT413	Object Oriented Programming Laboratory	0	0	3	2
13PT411	Language Competency Development – II	0	0	2	0
	TOTAL	**18**	**3**	**11**	**27**

SEMESTER V

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EE501	Power Transmission and Distribution	3	2	0	4
13EE502	Microprocessor and Microcontroller	3	0	0	3
13EE503	Electrical Measurements and Instrumentation	3	0	0	3
13GEC01	Principles of Management	3	0	0	3
13IT504	Computer Architecture	3	0	0	3
E1	Elective I (PE)	3	0	0	3
PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EE511	Control Systems Laboratory	0	0	3	2
13EE512	Electrical Measurements and Instrumentation Laboratory	0	0	3	2
13PT511	Verbal Aptitude and Reasoning – I	0	0	2	0
	TOTAL	**18**	**2**	**8**	**23**

SEMESTER VI

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EE601	Power System Analysis	3	2	0	4
13EE602	Design of Electrical Machines	3	2	0	4
13ECC02	Digital Signal Processing	3	0	0	3
13EE603	Power Electronics	3	0	0	3
13EE604	High Voltage Engineering	3	0	0	3
E2	Elective II (PE)	3	0	0	3
PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EEC11	Microprocessor and Microcontroller Laboratory	0	0	3	2
13EE611	Power Electronics Laboratory	0	0	3	2
13GE611	Comprehension	0	0	2	1
13PT611	Verbal Aptitude and Reasoning – II	0	0	2	0
	TOTAL	**18**	**4**	**10**	**25**

SEMESTER VII

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EE701	Electric Drives and Control	3	0	0	3
13EE702	Power System Operation and Control	3	0	0	3
13EE703	Power System Protection and Switch Gear	3	0	0	3
E3	Elective III (PE)	3	0	0	3
E4	Elective IV (OE)	3	0	0	3
E5	Elective V (OE)	2	0	0	2

PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EE711	Power System and Simulation Laboratory	0	0	3	2
13GE711	Personality and Character Development	0	0	2	0
	TOTAL	**17**	**0**	**5**	**19**

SEMESTER VIII

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
E6	Elective VI (PE)	**3**	**0**	**0**	**3**
E7	Elective VII (OE)	**2**	**0**	**0**	**2**
PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EE831	Project Work	0	0	20	10
	TOTAL	**5**	**0**	**20**	**15**

PROFESSIONAL ELECTIVES

LIST OF ELECTIVES FOR E1

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EEX01	Computer Communication Networks	3	0	0	3
13EEX02	Advanced Control System	3	0	0	3
13EEX03	Semiconducting Materials and Devices	3	0	0	3
13EEX04	Fiber Optics and Laser Instruments	3	0	0	3

LIST OF ELECTIVES FOR E2

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13GEC04	Total Quality Management	3	0	0	3
13EEX05	Microcontroller Based System Design	3	0	0	3
13EEX06	Solid State Relays	3	0	0	3
13GEC08	Industrial Management and Economics	3	0	0	3

LIST OF ELECTIVES FOR E3

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EEX07	Power Quality	3	0	0	3
13EEX08	Cryptography	3	0	0	3
13EEX09	Energy Management and Auditing	3	0	0	3
13EEX10	Special Electrical Machines	3	0	0	3

LIST OF ELECTIVES FOR E6

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13GEC03	Professional Ethics and Human Values	3	0	0	3
13EEX11	Fundamentals of Electric Power Utilization	3	0	0	3
13EEX12	Solar Energy Utilization	3	0	0	3
13EEX13	Flexible AC Transmission Systems	3	0	0	3

LIST OF OPEN ELECTIVES (OE)

GROUP – I

LIST OF THREE CERDIT 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

LIST OF OPEN ELECTIVES (OE)

GROUP - II

LIST OF TWO CERDIT OPEN ELECTIVES

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

GROUP - III

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 fourth semester onwards

TOTAL CREDITS =27+27+26+27+23+25+19+15=189 CREDITS

***PE- Professional Elective, *OE – Open Elective.**

Approved by Fourth Academic council

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

L	T	P	C
3	1	0	4

COURSE 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.

REFEENCES:

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)

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

Approved by Fourth Academic council

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

COURSE OBJECTIVES:

- Identify, formulate and solve Engineering problems.
- Use the techniques, Skills and Engineering tools necessary for Engineering practice.
- Learn further topics of Mathematics in higher semesters in a graded manner.
- Appreciate the important role of Mathematical concepts in Engineering applications.

COURSE OUTCOMES:

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

CO1: Be capable of identifying algebraic Eigen value problems from practical areas and obtain the Eigen 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)

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		
3	X	X			X	X	X	X		X	X	
4			X	X			X		X			
5		X			X	X				X		

Approved by Fourth Academic council

13GE103 - ENGINEERING PHYSICS - I (Common to All B.E/ B.Tech. Programmes)	L	T	P	C
	3	0	0	3

COURSE OBJECTIVE:

- 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 & ULTRASONCIS **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	X	X	X	X	
2		X	X	X	X	X			X		X	
3	X	X	X	X		X	X			X		X
4	X		X		X					X		
5	X	X			X			X		X	X	

Approved by Fourth Academic council

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

L	T	P	C
3	0	0	3

COURSE OBJECTIVES :

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

COURSE OUTCOMES:

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

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

UNIT-I: WATER TECHNOLOGY **9**

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

UNIT-II: ELECTROCHEMISTRY AND BATTERIES **9**

Introduction – cell terminology - electrode potential -Nernst equation and problems-reference electrode - standard hydrogen electrode (SHE) and calomel electrode - emf series and its applications-measurement of emf – reversible and irreversible cells- potentiometric titration (redox & precipitation)- conductometric titration (acid-base).
Batteries -definition-characteristics and types-lead acid battery-nickel cadmium battery- fuel cells-flow battery.

UNIT-III: POLYMERS AND NANOMATERIALS **9**

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

UNIT-IV: CORROSION AND CORROSION CONTROL **9**

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

UNIT-V: FUELS AND COMBUSTION **9**

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

TOTAL : 45 PERIODS

TEXT BOOKS:

1. P.C.Jain and Monica Jain, "Engineering Chemistry, "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)

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

13GE105 - ENGINEERING GRAPHICS

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

L	T	P	C
3	1	0	4

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

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

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

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

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

CO1: Acquire the basic knowledge of computer hardware and software.
CO2: Implement software development tools like algorithms, flowcharts, etc.
CO3: Design programs involving decision structures, loops and functions.
CO4: Solution for various problems using the features of C language.
CO5: Study the simple structures, pointers, memory allocation and file handling.

UNIT I INTRODUCTION TO COMPUTERS 9

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

UNIT II PROBLEM SOLVING & PROGRAMMING 9

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

UNIT III LOOP & CASE LOGIC STRUCTURES AND FUNCTIONS 9

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

UNIT IV POINTERS & ARRAYS 9

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

UNIT V STRUCTURES, UNIONS AND FILES 9

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

TOTAL : 45 PERIODS

Approved by Fourth Academic council

TEXT BOOKS :

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

REFERENCES:

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

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

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											
4	X										X	
5	X		X								X	

Approved by Fourth Academic council

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

L	T	P	C
0	0	3	2

COURSE 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

COURSE OUTCOMES:

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

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

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

CO3. Analyze the properties of matter with sound waves.

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

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

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					
3		X	X	X			X					
4	X	X			X		X					
5	X		X	X			X					

Approved by Fourth Academic council

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)

COURSE OBJECTIVE:

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

COURSE OUTCOMES:

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

CO1: 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 - CIVIL ENGINEERING PRACTICE **9**

Buildings:

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

Plumbing Works:

(a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.

(b) Study of pipe connections requirements for pumps and turbines.

(c) Preparation of plumbing line sketches for water supply and sewage works.

(d) Hands-on-exercise:

Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.

(e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

(a) Study of the joints in roofs, doors, windows and furniture.

(b) Hands-on-exercise: Wood work, joints by sawing, planing and cutting.

II- MECHANICAL ENGINEERING PRACTICE **13**

Welding:

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

(b) Gas welding practice

Basic Machining:

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

Sheet Metal Work:

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

Machine assembly practice:

(a) Study of centrifugal pump
(b) Study of air conditioner

Demonstration on:

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

GROUP-B (ELECTRICAL AND ELECTRONICS)

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

Approved by Fourth Academic council

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

L	T	P	C
0	0	3	2

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

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

CO2: Draw flowchart using open source tool.

CO3: Develop program using basic C constructs.

CO4: Write program using arrays and functions.

CO5: Create program using pointer, structure and files.

a) Word Processing

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

.

b) Spread Sheet

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

c) RAPTOR –Tool

6. Drawing - flow Chart

d) C-Programming

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

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS

Hardware

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

Software

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

TOTAL: 45 PERIODS

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	

13GE201 - ENGLISH FOR ENGINEERS - II | **L T P C**
(Common to All B.E/B.Tech Programmes) | **3 1 0 4**

COURSE OBJECTIVES :

- To enable students to convert the conceptual understanding of communication into everyday practice
- To create a learner-language interface enabling students to exercise control over language use
- To make students reflect and improve their use of body language – posture, gesture, facial expression, tone
- To build students understand the concept and components of personality, thereby to apply the acquired knowledge to themselves and to march towards excellence in their respective academic careers.

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

REFEENCES:

1. M .Raman and Sangeetha Sharma, "Technical Communication", Oxford University Press, USA, 2005.
2. S.P. Dhanavel, "English and Communication Skills for Students of Science and Engineering", Orient Blackswan, Chennai, 2011.
3. S.P Dhanavel, "English and Soft skill", Orient Blackswan Private Limited, 2010
4. Gerson, J. Sharon and Steven M.Gerson, "Technical Writing –Process and Product", Pearson Education, 2001.
5. Aeda Abidi and Ritu Chowdary, "English For Engineers Made Easy", Cengage India Learning Limited, New Delhi, 2010.
6.

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)

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

Approved by Fourth Academic council

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

L	T	P	C
3	1	0	4

COURSE OBJECTIVES:

- Apply knowledge of Mathematics in Engineering.
- Communicate problem solutions using correct Mathematical terminology.
- Apply rigorous and analytic approach to analyze and solve differential equations.

COURSE OUTCOMES:

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

CO1: 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 2nd order with constant co-efficients.

TOTAL : 60 PERIODS

TEXT BOOKS:

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

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	
3	X	X	X	X	X		X		X	X	X	X
4	X		X	X						X	X	
5	X	X			X					X		X

Approved by Fourth Academic council

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

L	T	P	C
3	0	0	3

COURSE 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.

COURES 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

Approved by Fourth Academic council

TEXT BOOKS:

1. V.Rajendran, "Engineering Physics", Tata McGraw-Hill.New Delhi, 2011.
2. P.K. Palanisamy, "Materials science", 2nd ed., Scitech publications (India) private limited, Chennai, 2007.

REFERENCES:

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

Approved by Fourth Academic council

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

L	T	P	C
3	0	0	3

COURSE 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.

REFERENCES:

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)

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
3	X	X					X		X	X		
4	X				X	X						
5	X	X			X	X	X	X	X			

Approved by Fourth Academic council

L	T	P	C
3	0	0	3

CE201- BASICS CIVIL & MECHANICAL ENGINEERING

(Common to branches under EEE, EIE)

COURSE OBJECTIVES:

- To demonstrate a basic level of professional skills needed to practice civil or construction engineering. To solve fundamental civil or construction engineering problems
- To provide a solid background on the pertinent mathematical, physical, a chemical and engineering concept that makes up the foundations of the discipline of mechanical engineering and it‟ s closely associated fields.
- To understand basics on energy sources, IC engines, refrigeration and air conditioning.

COURSE OUTCOMES:

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

CO1: Gain fundamental knowledge in Surveying and Civil Engineering materials Building Components.

CO2: Identify appropriate surveying tools in the construction sites and select masonry for various structures.

CO3: Gain fundamental knowledge in Power Plants, IC engines

CO4: Capable of knowing the sources of energy and selection of appropriate source for the given specifications.

CO5: Understand the Principles of Refrigeration and Air Conditioning System

A - CIVIL ENGINEERING

UNIT I SURVEYING AND CIVIL ENGINEERING MATERIALS 15

Surveying: Objects - types - classification - principles - measurements of distances - angles - leveling - determination of areas - illustrative examples. Civil Engineering Materials: Bricks - stones - sand - cement - concrete - steel sections.

UNIT II BUILDING COMPONENTS AND STRUCTURES 15

Foundations: Types, Bearing capacity - Requirement of good foundations.
Superstructure: Brick masonry - stone masonry - beams - columns - lintels - roofing - flooring - plastering - Mechanics - Internal and external forces - stress - strain - elasticity. Roads-Classification of Rural and urban Roads- Pavement Materials.

TOTAL: 30 PERIODS

B - MECHANICAL ENGINEERING

UNIT III ENERGY ENGINEERING 10

Introduction, Classification of Power Plants - Working principle of steam, Gas, Diesel, Hydro-electric and Nuclear Power plants - Working principles of impulse and reaction turbines - Non conventional energy sources - working principle of Solar, Wind, Tidal and Geothermal power plant.

UNIT IV IC Engines 10

Internal combustion engines - Working principle of Petrol and Diesel Engines - Four stroke and two stroke cycles - Comparison of four stroke and two stroke engines.

UNIT V REFRIGERATION AND AIR CONDITIONING SYSTEM 10

Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption system - Layout of typical domestic refrigerator - Window and Split type room Air conditioner.

TOTAL: 30 PERIODS

TEXT BOOK:

1. G .Shanmugam and M.S. Palanichamy, "Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Co., New Delhi, 2009.

REFERENCES:

1. K. Venugopal and V. Prahu Raja, "Basic Mechanical Engineering", Anuradha Publishers, Kumbakonam, 2009.
2. S. Ramamrutham, "Basic Civil Engineering", 2nd ed., Dhanpat Rai Publishing Co. Pvt Ltd., 2009.
3. S.Seetharaman, "Basic Civil Engineering", Anuradha Agencies, 2005.
4. S.R.J.Shantha Kumar, "Basic Mechanical Engineering", Hi-tech Publications, Mayiladuthurai, 2000.

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					
				X	X	X	X					

	L	T	P	C
13EE201 - CIRCUIT THEORY **(For ECE, EEE & EIE Branches)**	**3**	**1**	**0**	**4**

COURSE OBJECTIVE:

To introduce the concepts and investigate the behavior of electric circuits by analytical techniques.

COURSE OUTCOMES:

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

CO1: To understand the basic concepts of single phase AC and DC Electrical circuits

CO2: Analyze and solve problems involving Electrical networks by using various network theorems.

CO3: To understand the basic concepts of resonance and coupled circuits

CO4: Identify transient and steady state response of the circuits subjected to step and sinusoidal excitations and also understand the structure of 2-port networks.

CO5: To understand the basic concepts of three phase networks

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. S.R. Paranjothi, "Electric Circuits Analysis," New Age International Ltd., New Delhi, 1996.
2. A. Sudhakar and S.P. Shyam Mohan, "Circuits and Network Analysis and Synthesis",Tata McGraw Hill, 2007.
3. A. Chakrabati, "Circuits Theory (Analysis and synthesis)", Dhanpath Rai & Sons, New Delhi, 1999.
4. Charles K. Alexander and Mathew N.O. Sadiku, "Fundamentals of Electric Circuits", 2nd 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	X		X		X	X	X	
2	X	X	X	X	X	X	X		X	X	X	X
3	X	X	X		X	X			X	X		X
4	X		X		X		X		X	X	X	X
5	X	X	X	X	X		X		X	X	X	

Approved by Fourth Academic council

13GE211-PHYSICS AND CHEMISTRY LABORATORY- II

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

L	T	P	C
0	0	3	2

COURSE 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 spectrophotometer.

COURSE OUTCOMES:

At the end 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)

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

Approved by Fourth Academic council

13EE211 – ELECTRIC CIRCUITS LABORATORY

(Common to branches under EEE, EIE)

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To train the students to impart basic practical knowledge of electric circuits
- To train the students to practically verify basic laws of electric circuits.
- To make students learn the basic Network theorem
- Learn to design and simulate resonance circuits

COURSE OUTCOMES:

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

CO1: Verify the Ohm's law and Kirchhoff's laws.
CO2: Evaluate sinusoidal voltage, frequency and power factor.
CO3: Simulate the filter and network circuits
CO4: Determine two port network parameters
CO5: Demonstrate the various network theorems

LIST OF EXPERIMENTS:

1. Experimental verification of Kirchhoff's voltage and current laws
2. Experimental verification of network theorems (Thevenin, Norton, Superposition and maximum power transfer Theorem).
3. Study of CRO and measurement of sinusoidal voltage, frequency and power factor.
4. Experimental determination of time constant of series R-C electric circuits.
5. Experimental determination of frequency response of RLC circuits.
6. Design and Simulation of series resonance circuit.
7. Design and Simulation of parallel resonant circuits.
8. Simulation of low pass and high pass passive filters.
9. Simulation of three phase balanced and unbalanced star, delta networks circuits.
10. Experimental determination of power in three phase circuits by two-watt meter method.
11. Calibration of single phase energy meter.
12. Determination of two port network parameters.

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	X	X	X
2	X		X	X	X	X			X	X		
3	X		X		X		X		X	X	X	X
4	X		X	X	X	X			X	X		X
5	X	X	X		X	X	X		X	X	X	

Approved by Fourth Academic council

13IT211 UNIX PROGRAMMING LABORATORY

	L	T	P	C
(Common to branches under EEE, EIE)	**0**	**0**	**3**	**2**

COURSE OBJECTIVES:

- To learn about UNIX operating system.
- To know about basic shell commands.
- To learn about shell programming and C programming on UNIX.

COURSE OUTCOMES:

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

CO1: Understand about UNIX operating system and vi editor.
CO2: Understands about implementation of shell programming and c programming on UNIX.

LIST OF EXPERIMENTS:

1. Study of Unix OS
2. Basic Shell commands in UNIX
3. vi editor introduction- directory management in UNIX
4. Simple Shell Programs
5. Shell Programs to evaluate arithmetic expressions
6. Shell Programs using conditional statements
7. Shell Programs using Testing and Loops
8. Shell program to copy files
9. C Programming on Unix - Dynamic Storage Allocation
10. C Programming on Unix - Pointers
11. C Programming on UNIX – Functions
12. C Programming on UNIX – File Handling

HARDWARE / SOFTWARE REQUIREMENTS FOR A BATCH OF 30 STUDENTS

HARDWARE

1 UNIX Clone Server

33 Nodes (thin client or PCs) Printer– 3 Nos.

SOFTWARE

OS– UNIX Clone (33 user license or License free Linux)
Compiler - C

TOTAL: 45 PERIODS

Approved by Fourth Academic council

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							

Approved by Fourth Academic council

13GE301 - TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS

L	T	P	C
3	1	0	4

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

COURSE 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 the course the students would

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 **12**

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 **12**

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

UNIT III BOUNDARY VALUE PROBLEMS **12**

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

UNIT IV FOURIER TRANSFORM **12**

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

UNIT V Z -TRANSFORM AND DIFFERENCE EQUATIONS 12

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

TOTAL : 60 PERIODS

TEXT BOOKS:

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

REFERENCES:

1. Goyal. Manish and N.P. Bali, "A Textbook of Engineering mathematics", 6th ed., Laxmi Publication Ltd., New Delhi, 2012.
2. B.S. Grewal, "Higher Engineering Mathematics", 42nd ed., Khanna publishers, New Delhi, 2012.
3. Kreyszig. Erwin, "Advanced Engineering Mathematics", 9th ed., Wiley Publications, New Delhi, 2006.

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

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

Approved by Fourth Academic council

13EE301 - SEMICONDUCTOR DEVICES AND CIRCUITS **L T P C**

(Common to EEE and EIE) **3 0 0 3**

COURSE OBJECTIVE:

To understand the concept of movement of electrons, structure of basic electronic devices and its applications.

COURSE OUTCOMES:

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

CO1: Learn about uncontrolled devices

CO2: Acquire knowledge about current controlled device

CO3: Analyze various configurations of BJT Amplifiers

CO4: Study the voltage controlled devices and its applications

CO5: Analyze various configurations of FET Amplifiers

UNIT I DIODE CIRCUITS 9

Diodes - Rectifier circuits - Zener diode circuits - Clipper and Clamper circuits - Multiple diode circuits- Photodiode and LED Circuits.

UNIT II BIPOLAR JUNCTION TRANSISTOR 9

Basic bipolar junction transistor - DC analysis of transistor circuits - Basic transistor applications - Bipolar transistor biasing - Multistage circuits.

UNIT III BASIC BJT AMPLIFIERS 9

Analog signals and linear amplifiers - Bipolar linear amplifier - Basic transistor amplifier configurations: CE amplifiers - AC load line analysis - CC (Emitter Follower) amplifier - CB amplifier - Summary and comparison of the three basic amplifiers.

UNIT IV FIELD EFFECT TRANSISTOR 9

MOS Field Effect Transistor - MOSFET DC circuit analysis - Basic MOSFET applications –Junction Field Effect Transistor: NMOS, PMOS – CMOS – BiCMOS.

UNIT V BASIC FET AMPLIFIERS 9

MOSFET amplifier - Basic transistor amplifier configuration: Common source amplifier - Source follower amplifier - Common gate configuration - Three basic amplifier configurations: Summary and comparison.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. S.Salivahanan and N.Suresh Kumar, “Electron Devices and Electronic Circuits”, Tata McGraw-

Hill, New Delhi, 2011.
2. R. L. Boylestad and L. Nashelsky, "Electronic Devices and Circuit Theory", 9th ed., Pearson Education, Delhi, 2007.

REFERENCES:

1. D. A. Neamen, "Electronic Circuit Analysis and Design", 2nd ed., Tata McGraw-Hill, New Delhi, 2002.
2. D. A. Bell, "Electronic Devices and Circuits", Prentice Hall of India, New Delhi, 2003.
3. T. F. Boghert, "Electronic Devices and Circuits", 6th ed., Pearson Education, Delhi, 2003.
4. B. G. Streetman and S. Banerjee, "Solid State Electronic Devices", Pearson Education, Delhi, 2002.

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					X	X	X
3					X	X		X		X		
4			X		X							X
5			X	X			X	X			X	

13EE302 - DC MACHINES AND TRANSFORMERS

L	T	P	C
3	1	0	4

COURSE OBJECTIVE:

To realize the concepts of electromechanical energy conversions, various characteristics of DC Machines, applications and constructions, parameters of transformer.

COURSE OUTCOMES:

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

CO1: Understand the concepts of electro mechanical energy conversion principle
CO2: Analyze the characteristics of various types of Generators
CO3: Explicate the various characteristics and speed control methods of DC motors
CO4: Acquire the knowledge about the construction, working principle of single phase transformer and autotransformer
CO5: Identify the various losses and testing methods of both DC machines and transformers.

UNIT I BASIC CONCEPTS OF ROTATING MACHINES (9+3)

Principles of eletromechanical energy conversion- Single and multiple excited systems- Concept of co-energy- Generated voltage- Torque in DC Machines.

UNIT II DC GENERATORS (9+3)

Constructional details- emf equation- Methods of excitation- Self and separately excited generators- Characteristics of series, shunt and compound generators- Armature reaction and commutation- Parallel operation of DC shunt and compound generators.

UNIT III DC MOTORS (9+3)

Principle of operation- Back emf and torque equation- Characteristics of series, shunt and compound motor- Starting of DC motors- Types of starters- Speed control of DC shunt motors.

UNIT IV TRANSFORMERS (9+3)

Constructional details of core and shell type transformers- Types of windings- Principle of operation- emf equation- Transformation ratio- Transformer on no load- Parameters referred to HV/LV windings- Equivalent circuit- Transformer on load- Regulation- Parallel operation of single phase transformers- Auto transformer- Three phase transformer- Vector group.

UNIT V TESTING OF DC MACHINES AND TRANSFORMERS (9+3)

Losses and efficiency in DC machines and transformers- Condition for maximum efficiency- Testing of DC machines- Brake test, swinburne's test, Retardation test and hopkinson's test- Testing of transformers- Polarity test, Load test, open circuit and short circuit tests- All day efficiency

TOTAL: 60 PEROIDS

TEXT BOOK:

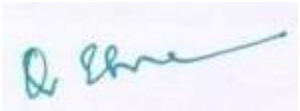
1. A.E.Fitzgerald, C.Kingsly and S.D.Umans, "Electrical Machinery", 6th ed., McGraw Hill International Edition, New York, 2003.

REFERENCES:

1. I. J. Nagrath and D. P. Kothari, "Electric Machines", Tata McGraw Hill Publishing Company Ltd, 2010.
2. H .Cotton, "Advanced Electrical Technology", CBS Publishers and distributors, 1967.

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	X			X		
2	X	X	X	X	X	X	X	X			X	
3	X	X	X	X	X	X	X				X	
4	X	X	X	X	X	X	X				X	
5	X	X	X	X	X	X	X					



Approved by Fourth Academic council

13EE303-ENGINEERING ELECTROMAGNETICS

L	T	P	C
3	0	0	3

COURSE OBJECTIVE:

IG5To impart fundamentals of vector algebra, electric and magnetic field (both static and time varying) applicable to electrical engineering and to expose the students to learn the concept of capacitance, inductance, magnetic materials and its boundary conditions in the electromagnetic fields and to know the fundamentals of waves and its applications.

COURSE OUTCOMES:

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

CO1: Learn the fundamentals of vector algebra and electromagnetic fields.
CO2: Acquire knowledge about electrostatics, electrical potential, energy density and their applications.
CO3: Get a wide knowledge about concepts of magneto statics, magnetic flux density, scalar and vector potential and its applications.
CO4: Emphasize the ideas about faradays laws, induced emf and their applications.
CO5: Understand the concepts of antenna and its functions

UNIT I BASICS FOR ELECTROMAGNETIC THEORY 9

Vector Fields – Co-ordinate systems-Vector Calculus: Gradient of scalar, Divergence of Vector, Curl of Vector, Laplace of Scalar- Divergence theorem- Stokes Theorem.

UNIT II ELECTROSTATICS 9

Coulomb's law – Electric field intensity – Field due to continuous volume charge, line charge, sheet of charge – Electric flux density – Gauss's law – Application of gauss law –Potential – Potential gradient – Dipole – Energy Density in a Electrostatic field - Current and current density – Metallic conductors – Properties– Method of images – Boundary conditions – Capacitance – Poisson's and Laplace's equation.

UNIT III MAGNETOSTATICS 9

Biot-Savart law – Ampere's circuital law –Magnetic flux and flux density – Scalar and vector magnetic potentials – Force - Torque– Nature of magnetic materials – Magnetization and permeability – Boundary conditions – Inductance.

UNIT IV TIME VARYING ELECTROMAGNETIC FIELDS 9

Faraday's law – Displacement current – Maxwell's equation in point form and integral form –Wave motion in free space – Pointing vector and power calculations – Standing wave ratio.

UNIT V ANTENNA 9

Radiation integral/wave equation- Small dipole- Small loop- Antenna feed and input impedance- Antenna gain- Directivity- Polarization - Receiving antenna- Antenna measurements- Types of antennas.

TOTAL : 45 PEROIDS

TEXT BOOKS:

1. William H Hayt, “Engineering Electromagnetics”, Tata McGraw Hill, New Delhi, 2002.
2. Mathew O Sadiku, “Elements of Electromagnetics”, Oxford University press, New York, 2003.

REFERENCES:

1. David J Griffith, “Introduction to Electrodynamics”, 3rd ed., Pearson Education, 2002.
2. John D Kraus, “Electromagnetics”, McGraw Hill, NewYork, 2003.
3. D.K. Cheng, “Field and wave Electromagnetics”, Addison Wesley, 2001.
4. Fawwaz. T.Ulaby, "Electromagnetics for Engineers", Pearson Education, 2005.

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

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

Approved by Fourth Academic council

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

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To know the Abstract Data Type and Hashing techniques
- To know the concepts of Trees, Graphs and Sorting
- To know the basic algorithm design techniques

COURSE OUTCOMES:

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

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

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, 2004.

REFERENCES:

1. E. Balagurusamy, "Programming in Ansi C", 2nd ed., Tata McGraw Hill Publication, 2003.
2. Robert L. Kruse, Bruce P. Leung and Clovis L.Tondo, "Data Structures and Program Design in C", Pearson Education, 2000.

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	

Approved by Fourth Academic council

13EE304-NETWORK THEORY

L	T	P	C
3	0	0	3

COURSE OBJECTIVE:

To provide knowledge on various linear Networks and their analysis.

COURSE OUTCOMES:

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

CO1: Analyze and solve problems involving Electrical networks by using various network theorems.

CO2: Analyze the Electrical networks in the s-domain.

CO3: Understand the structure of 2-port networks.

CO4: Analyze circuits involving inputs of different wave forms using Fourier Analysis.

CO5: Design networks using passive filters

UNIT I SINUSOIDAL STEADY-STATE ANALYSIS 9

Nodal and Mesh analysis for AC circuits - Network Theorems for AC circuits: Compensation, Milliman's, Substitution, Tellegen's.

UNIT II CIRCUIT ANALYSIS IN THE S-DOMAIN 9

Reviews of Laplace transform - Notations of Impedance and admittance - Poles, zeros driving point functions - Transfer functions and its necessary conditions – Complex, frequency plane - Circuits in the s-domain.

UNIT III TWO- PORT NETWORKS 9

One port Networks - Two port admittance parameters - Admittance parameter analysis of terminated two ports - Two port Impedance parameters - Impedance and gain calculations of terminated two ports modeled by z parameters - Hybrid parameters - Generalized two port parameters - Transmission parameters - Parallel and series connection of two ports.

UNIT IV FOURIER METHOD OF WAVEFORM ANALYSIS 9

Trigonometric Fourier series - Exponential Fourier series - Waveform symmetry - Effective values and power - Applications in circuit analysis - Fourier transform of Non periodic waveforms - Properties of the Fourier transform.

UNIT V PRINCIPLES OF BASIC PASSIVE FILTERING 9

First order and second order filters: low pass filters, high pass filters.

TOTAL: 45 PEROIDS

TEXT BOOKS:

1. J. Edminister and M. Nahvi, "Electric Circuit", 4th ed., Tata McGraw Hill, New Delhi, 2003.
2. R. A. DeCarlo and Pen-Min Lin, "Linear Circuit Analysis", 2nd ed., Oxford University Press, New Delhi, 2001.

REFERENCES:

1. W. H. Hayt, J.E. Kemmerly and S. M. Durbin, "Engineering Circuit Analysis", 6th ed., Tata McGraw Hill, New Delhi, 2002.
2. Charles K Alexander and Mathew N O Sadiku, "Fundamentals of Electric Circuits", Tata McGraw Hill, 2008.
3. James W.Nilsson and Susan A. Riedel, "Electric Circuits", 8th ed., Pearson Prentice Hall, 2008.

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	X		X		
2	X	X	X	X	X	X	X	X		X	X	X
3	X		X			X	X					
4	X		X	X			X					
5	X	X			X	X	X	X		X	X	X

Approved by Fourth Academic council

13EE311- SEMICONDUCTOR DEVICES AND CIRCUITS LABORATORY

L	T	P	C
0	0	3	2

(Common to EEE and EIE)

COURSE OBJECTIVE:

To know about the various circuit devices and its characteristics.

COURSE OUTCOMES:

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

CO1: Analyze about the characteristics of uncontrolled devices
CO2: Know the applications of Diode
CO3: Acquire knowledge about the various configuration of BJT
CO4: Understand the various types of FET
CO5: Attain information about regulators

LIST OF EXPERIMENTS:

1. PN & Zener Diode Characteristics.
2. Design of diode circuits (clipper, clamper, rectifiers, filters, regulators) and obtain their device characteristics and Concept of Load lines.
3. Design of transistor biasing circuits for common emitter, common collector, common base.
4. Design of Biasing networks for JFET and MOSFET.
5. Design of amplifier circuits using BJT and
   i. Find Q point and study its effects on amplification.
   ii. Study the effect of RE, CE on gain and response of an amplifier.
   iii. Study of effect of swamp resistance on gain.

TOTAL: 45 PERIODS

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			X					

Approved by Fourth Academic council

13EE312-DC MACHINES AND TRANSFORMERS LABORATORY

L	T	P	C
0	0	3	2

COURSE OBJECTIVE:

The laboratory experiments offered to the student to verify the theory studied under dc machines and transformers and understand the concepts of the subjects thoroughly.

COURSE OUTCOMES:

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

CO1: Acquire knowledge on load characteristics of DC Generators and DC motors.
CO2: Know the characteristics of the DC machines independently.
CO3: Familiar to control and test the speed of DC motor under various loads.
CO4: Analyze the performance of single phase transformer under load.
CO5: Understand the various tests performed on transformer to acquire its efficiency.

LIST OF EXPERIMENTS:

EXPERIMENTS ON DC MACHINES:

1. Open circuit characteristics of DC separately excited generator.
2. Load characteristics of DC compound generators
3. Load characteristics of DC series motors
4. Speed control of DC shunt motors
5. Swinburne's test.

EXPERIMENTS ON TRANSFORMERS:

1. Load test on single phase transformer.
2. Open circuit and short circuit test on single phase transformer.
3. Parallel operation of single phase transformer.
4. Study of scott connection of transformer.

TOTAL: 45 PERIODS

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

Approved by Fourth Academic council

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

L	T	P	C
0	0	3	2

COURSE OBJECTIVES:

- Develop skills to design and analyze simple linear and non linear data structures
- To strengthen the ability to identify and apply the suitable data structure for the given real world problem
- To gain knowledge in practical applications of data structures

COURSE OUTCOMES:

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

CO1: Understand the concepts of ADT for all data structures.
CO2: Learn Object Oriented way of solving problems.
CO3: Learn different algorithm design techniques
CO4: Learn the techniques of modern engineering tools.
CO5: Learn different algorithm design techniques

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	
3		X			X							X
4					X							X
5	X											

Approved by Fourth Academic council

13PT311 LANGUAGE COMPETENCY DEVELOPMENT – I

L	T	P	C
0	0	2	0

(COMMON TO ALL B.E/B.TECH PROGRAMMES)

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

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

UNIT I : AUXILIARIES **(7)**

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

UNIT II : TENSE **(10)**

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

UNIT III : MODALS **(7)**

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

TOTAL: 24 PERIODS

TEXT BOOK:

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

REFERENCES:

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

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

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

Approved by Fourth Academic council

13GE401- NUMERICAL METHODS
(Common to All B.E/B.Tech Programmes)

L	T	P	C
3	1	0	4

COURSE OBJECTIVE:

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

COURSE OUTCOMES:

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

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

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

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

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

CO5: Apply numerical methods to obtain approximate solutions of the boundary value problems.

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

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

UNIT II INTERPOLATION AND APPROXIMATION (9 + 3)

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

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION (9 + 3)

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

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS (9 + 3)

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

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS (9 + 3)

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

TOTAL : 60 PERIODS

TEXT BOOKS:

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

REFERENCES:

1. C.F .Gerald and P.O.Wheatley, "Applied Numerical Analysis", 7th ed., Pearson Education Asia, New Delhi, 2006.
2. K. Sankar Rao, "Numerical Methods for Scientists and Engineers", 3rd ed., Prentice Hall of India, New Delhi, 2007.
3. E. Balagurusamy, "Numerical Methods", Tata McGraw-Hill, New Delhi, 1999.
4. M.K. Venkatraman, "Numerical Methods", National Publication, New Delhi, 2000.

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	
3	X	X			X				X		X	
4	X	X			X	X		X	X	X	X	
5	X		X					X	X	X	X	

Approved by Fourth Academic council

13EE401-AC MACHINES

L	T	P	C
3	1	0	4

COURSE OBJECTIVES:

- Identify the different types of construction and performance of salient and non-salient type synchronous generator.
- Identify the construction, principle of operation and performance of induction machines.

COURSE OUTCOMES:

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

CO1: Analyze the voltage regulation of alternator by different methods and parallel operation of alternator.

CO2: Understand the concepts of synchronous motor.

CO3: Acquire the knowledge about the construction, working principle of three phase induction motor and special type of induction motor.

CO4: Explicate the various starters and speed control methods of induction motor.

CO5: To impart knowledge about single phase induction motor and special machines.

UNIT I SYNCHRONOUS GENERATOR (9+3)

Constructional details – Types of rotors – emf equation – Synchronous reactance – Armature reaction – Voltage regulation – EMF, MMF, ZPF and A.S.A methods – Synchronizing and parallel operation – Synchronizing torque - Change of excitation and mechanical input – Two reaction theory – Determination of direct and quadrature axis synchronous reactance using slip test – Operating characteristics - Capability curves.

UNIT II SYNCHRONOUS MOTOR (9+3)

Principle of operation – Torque equation – Operation on infinite bus bars - V-curves – Power input and power developed equations – Starting methods – Current loci for constant power input, constant excitation and constant power developed.

UNIT III THREE PHASE INDUCTION MOTOR (9+3)

Constructional details – Types of rotors – Principle of operation – Slip – Equivalent circuit – Sliptorque characteristics - Condition for maximum torque – Losses and efficiency – Load test - No load and blocked rotor tests - Circle diagram – Separation of no load losses – Double cage rotors – Induction generator – Synchronous induction motor.

UNIT IV STARTING AND SPEED CONTROL OF THREE PHASE INDUCTION MOTOR (9+3)

Need for starting – Types of starters – Rotor resistance, Autotransformer and Star-delta starters –Speed control – Change of voltage, torque, number of poles and slip – Cascaded connection – Slip power recovery scheme.

UNIT V SINGLE PHASE INDUCTION MOTORS AND SPECIAL MACHINES (9+3)

Constructional details of single phase induction motor – Double revolving field theory and operation – Equivalent circuit – No load and blocked rotor test – Performance analysis – Starting methods of single-phase induction motors - Shaded pole induction motor - Linear reluctance motor – Repulsion motor - Hysteresis motor - AC series motor.

TOTAL = 60 PEROIDS

TEXT BOOK:

1. A.E.Fitzgerald, Charles Kingsly and Stephen D.Umans, "Electrical Machinery", 6th ed., McGraw Hill International Edition, New York, 2003.

REFERENCES:

1. I. J Nagrath and D. P. Kothari, "Electric Machines", Tata McGraw Hill Publishing Company Ltd, 2010.
2. H .Cotton, "Advanced Electrical Technology", CBS Publishers and distributors, 1967.
3. P.S. Bhimbhra, "Electrical Machinery", Khanna Publishers, 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	X		X				X
2	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				X	

Approved by Fourth Academic council

13IT405-OBJECT ORIENTED PROGRAMMING **L T P C**

(Common to EEE and EIE) **3 0 0 3**

COURSE OBJECTIVE:

To introduce the salient features of Object Oriented Programming, with focus on generic programming with templates and Exception Handling.

COURSE OUTCOMES:

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

CO1: Apply object oriented paradigm to design software.
CO2: Analyze polymorphic behavior of objects.
CO3: Implement oops concepts in developing simple applications.
CO4: Understand algorithmic thinking and apply it to programming.
CO5: Formulate real life problem in terms of objects and classes.

UNIT I INTRODUCTION TO FUNDAMENTAL CONCEPTS **9**

Object oriented fundamentals- Structured versus object-oriented development - elements of object oriented programming - fundamentals of OO-class - object and abstraction and its importance – encapsulation – polymorphism - benefits of OOP - structure of object oriented program.

UNIT II CLASSES AND OBJECT **9**

Working with classes- Classes and Objects- Class specification - class objects - accessing class members - defining member functions - inline functions - accessing member functions within class - data hiding - class member accessibility - empty classes – constructors - parameterized constructors - constructor overloading - copy constructor – new and delete operators, -"this" pointer - friend classes and friend functions.

UNIT III OVERLOADING **9**

Function overloading– Operator overloading- Non- overloadable operators-unary operator overloading- operator keyword- limitations of increment/decrement operators-binary operator overloading- Generic programming with templates-Function templates- class templates.

UNIT IV INHERITANCE **9**

Inheritance- Base class and derived class relationship - derived class declaration - Forms of inheritance - inheritance and member accessibility - constructors in derived class - destructors in derived class - constructor invocation and data member initialization - data conversion - abstract classes - virtual base classes - virtual functions.

UNIT V EXCEPTION HANDLING AND FILES **9**

Files and Streams-Opening and Closing a file - file modes - file pointers and their manipulation - sequential access to a file - ASCII and binary files - random access to a file - error handling during file manipulations - Exception handling - exception handling model - exception handling constructs - lists of exceptions - catching exceptions - handling exceptions.

TOTAL : 45 PERIODS

TEXT BOOK:

1. K.R.Venugopal, Rajkumar and T.Ravishankar, "MasteringC++",4th ed., TataMcGraw Hill, 2008.

REFERENCES:

1. Herbert Schildt, "Java: The complete reference J2SE", 5th ed., Tata McGraw-Hill, 2005.
2. Bjarne stroustrup, "The C++ programming Language", 3rd ed., Addison Wesley, 1988.
3. Cay S.Horstmann and Gray Carnell, "Core Java Volume I –Fundamentals", the sun Microsystems Press Java Series, 2000.

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

Approved by Fourth Academic council

13EE402-ANALOG ELECTRONIC CIRCUITS | **L T P C**
(Common to EEE and EIE) | **3 0 0 3**

COURSE OBJECTIVES:

To acquire the knowledge of various types of amplifiers with its applications.

COURSE OUTCOMES:

At the end of the course the students would

CO1: Understand the concepts of frequency response of various transistors.
CO2: Gain the knowledge about power amplifiers and its types.
CO3: Acquire the knowledge about operational amplifiers and its applications.
CO4: Analyze the various topologies of feedback amplifiers.
CO5: Identify the various parameters of operational amplifiers.

UNIT I FREQUENCY RESPONSE **9**

Amplifier frequency response - System transfer functions - Frequency response: Transistor amplifier with circuit capacitors - Frequency response: Bipolar transistor - Frequency response of the FET.

UNIT II POWER AMPLIFIERS **9**

Power amplifier - Power transistors - Classes of amplifiers: Class A power amplifiers - Class AB push-pull complementary output stages.

UNIT III OPERATIONAL AMPLIFIER AND ITS APPLICATIONS **9**

Operational amplifier - Inverting amplifier - Summing amplifier - Non-inverting amplifier - I/V & V/I converters - Difference Amplifier - Instrumentation Amplifier - Integrator and Differentiator - Precision rectifiers - First and second order active filters - A/D converter - D/A converter.

UNIT IV NEGATIVE FEEDBACK AMPLIFIERS **9**

Introduction to feedback amplifiers - Basic feedback concepts - Ideal feedback topologies: Voltage amplifiers - Current amplifiers - Transconductance amplifiers - Transresistance amplifiers.

UNIT V OPERATIONAL AMPLIFIER INTERNALS **9**

Bipolar and FET current sources - Circuits with active loads - Differential amplifier - Basic BJT differential pair - Basic FET differential pair - Differential amplifier with active load - Darlington circuit - Op-Amp Parameters - Frequency response - Offset voltage - Input bias current – Differential amp frequency response.

TOTAL = 45 PEROIDS

Approved by Fourth Academic council

TEXT BOOKS:

1. D. A. Neamen, "Electronic Circuit Analysis and Design", 2nd ed., Tata McGraw-Hill, New Delhi, 2002.
2. Ramakant A.Gayakward, "Op-amps and Linear Integrated Circuits", 4th ed., Pearson Education, 2003.
3. Robert F.Coughlin and Fredrick F.Driscoll, "Op-amp and Linear ICs", 4th ed., Pearson Education, 2002.

REFERENCES:

1. D. A. Bell, "Electronic Devices and Circuits", Prentice Hall of India, New Delhi, 2003.
2. T. F. Boghert, "Electronic Devices and Circuits", 6th ed., Pearson Education, Delhi, 2003.
3. B G. Streetman and S. Banerjee, "Solid State Electronic Devices", Pearson Education, Delhi, 2002.
4. R. L. Boylestad and L. Nashelsky, "Electronic Devices and Circuit Theory", 9th ed., Pearson Education, Delhi, 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**	**X**			**X**	**X**	**X**
3	**X**	**X**	**X**	**X**	**X**	**X**	**X**			**X**	**X**	**X**
4	**X**	**X**	**X**	**X**	**X**	**X**	**X**			**X**	**X**	**X**
5	**X**	**X**	**X**	**X**	**X**		**X**			**X**	**X**	**X**

Approved by Fourth Academic council

13EE403-DIGITAL LOGIC SYSTEM DESIGN

L	T	P	C
3	0	0	3

(Common to EEE and EIE)

COURSE OBJECTIVES:

- To understand different methods used for the simplification of Boolean functions
- To design and implement combinational circuits
- To design and implement synchronous sequential circuits
- To study the fundamentals of VHDL / Verilog HDL

COURSE OUTCOMES:

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

CO1: Study various number systems and to simplify the mathematical expressions using Boolean functions
CO2: Illustrate the applications of combinational circuits
CO3: Analyze and design various synchronous and asynchronous circuits
CO4: Expose the concept of memory devices
CO5: Write the VHDL/Verilog code for combinational and sequential circuits

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES 9

Binary number systems - Binary arithmetic – Binary codes – Boolean algebra and theorems - Boolean functions – Canonical and Standard Forms-Simplifications of Boolean functions using Karnaugh map and tabulation methods – Logic gates.

UNIT II COMBINATIONAL CIRCUITS 9

Combinational circuits –Circuits for arithmetic operations – Code conversion - Decoders and encoders - Multiplexers and demultiplexers.

UNIT III SYNCHRONOUS SEQUENTIAL LOGIC 9

Sequential circuits – Flip flops – Shift registers – Counters - Analysis and design procedures - State reduction and state assignment- Shift registers and counters.

UNIT IV PROGRAMMABLE LOGIC DEVICES, MEMORY AND LOGIC FAMILIES 9

Memories: ROM,EPROM- PLA, PAL, FPGA – TTL, ECL

UNIT V TRODUCTION TO VERILOG 9

Verilog as HDL - Levels of Design Description – Concurrency - Gate level modelling - Data flow Modeling - Behavioral Modeling - Test benches.

TOTAL: 45 PEROIDS

Approved by Fourth Academic council

TEXT BOOKS:

1. Raj Kamal, "Digital systems-Principles and Design", 2nd ed., Pearson Education, 2007.
2. M.Morris Mano, "Digital Design", 3rd ed., Pearson Education, 2013.
3. Floyd, "Digital Fundamentals", 8th ed., Pearson Education, 2003.

REFERENCES:

1. Charles H.Roth, Jr. "Fundamentals of Logic Design", 4th ed., Jaico Publishing House, 2000.
2. Stephen Brown and Zvonko G Vranesic, "Fundamentals of Digital Logic with Verilog Design", 2nd ed., McGraw- Hill, 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	X	X				
2	X	X	X	X	X	X	X	X		X		
3	X	X	X	X	X	X	X	X		X		
4	X	X	X	X	X	X	X	X	X		X	
5	X	X	X	X	X	X	X	X	X		X	

Approved by Fourth Academic council

13EE404-CONTROL SYSTEMS

(Common to EEE and EIE)

L	T	P	C
3	1	0	4

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

CO1: Identify the closed loop transfer functions of mechanical and electrical systems
CO2: Analyze the time response of second order system
CO3: Estimate phase margin and gain margin of a system using Bode plot
CO4: Design a suitable Lead compensator using bode plot
CO5: Justify whether the given system is controllable and observable

UNIT I SYSTEMS AND THEIR REPRESENTATIONS (9+3)

Basic elements in control systems - open loop & closed loop - Transfer functions of mechanical, electrical, thermal and analogous systems - Block diagram reduction - and signal flow graphs - Control System Components: DC Servo motor - AC Servo motor- Synchro - Stepper motor.

UNIT II TIME RESPONSE ANALYSIS (9+3)

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

UNIT III FREQUENCY RESPONSE ANALYSIS AND DESIGN (9+3)

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

UNIT IV COMPENSATOR AND CONTROLLER DESIGN (9+3)

Realization of basic compensators - cascade compensation in time domain and frequency domain - feed back compensation - Design of lag, lead, lag-lead series compensator (using Bode plot) – Design of P, PI and PID controllers in frequency and time domain.

UNIT V STATE-SPACE ANALYSIS (9+3)

State equation – Solutions – Realization – Controllability – Observability – State space to transfer function conversion – Pole placement. **TOTAL = 60 PEROIDS**

TEXT BOOK:

1. Norman S. Nise, "Control System Engineering", 4th ed., John Wiley & Sons, 2004.

REFERENCES:

1. Smarajit Ghosh, "Control Systems (Theory and Applications)", Pearson Education, 2005.
2. Graham C.Goodwin, Stefan F.Graebe and Mario E.Sagado, "Control System Design", Phi, 2003.
3. M. Gopal, "Digital Control And State Variable Methods", Tata McGraw Hill, 2003.
4. J. Nagarth and M. Gopal, "Control Systems Engineering", 3rd ed., New Age International, 2004.
5. K. Ogata, "Modern Control Engineering", 4th ed., Pearson Education, 2005.
6. Benjamin C Kuo. "Automatic Control System", 8th ed., John Wiley &Sons, 2003.
7. R.C. Dorf and R.H. Bishop, "Modern Control Systems (Examples and Design Problems)", Pearson Education, 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	X	-	-	-	X	-	X
2	X	X	X	X	X	X	X	-	-	X	X	X
3	X	X	X	X	X	X	-	X	X	X	X	X
4	X	X	X	X	X	X	X	-	-	-	X	X
5	X	X	X	X	X	X	X	-	-	X	-	X

Approved by Fourth Academic council

13EE411-ANALOG AND DIGITAL CIRCUITS LABORATORY

(Common to EEE and EIE)

L	T	P	C
0	0	3	2

COURSE OBJECTIVE:

The laboratory experiments offered to the student to verify the theory studied in analog and digital circuits and understand the fundamentals thoroughly.

COURSE OUTCOMES:

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

CO1: Analyze about the characteristics of OP-AMP
CO2: Know the applications of OP-AMP and 555 IC
CO3: Acquire knowledge about the various types of logic gates
CO4: Understand about the code converters
CO5: Acquire knowledge about checker and generator

LIST OF EXPERIMENTS:

1. Design and testing of RC coupled transistor amplifier.
2. Design and testing of Transformer coupled audio power amplifier.
3. Design and testing of a push-pull power amplifier.
4. Design and testing of Hartley and Colpitts Oscillators.
5. Design and testing of Wein bridge Oscillator.
6. Design and testing of Sawtooth wave generator.
7. Characteristics of IC 741
8. Design of Inverting and Non-Inverting amplifier using OP-AMP
9. Truth table Verification logic gates.
10. Design and verification of half subtractor and full subtractor
11. Design and verification of BCD to EX-3 code converter.
12. Logic design using Multiplexer.
13. Design and verification of Magnitude comparator and Parity generator.

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	X	X		X		X	X
3	X	X	X		X	X	X			X	X	X
4	X	X	X	X	X	X	X		X		X	X
5	X		X	X	X		X		X	X	X	X

Approved by Fourth Academic council

13EE412-AC MACHINES LABORATORY

L	T	P	C
0	0	3	2

COURSE OBJECTIVE:

The laboratory experiments offered to the student to verify the theory studied in AC machines and understand the concepts of the subjects thoroughly.

COURSE OUTCOMES:

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

CO1: Acquire knowledge on load characteristics of alternators.
CO2: Know the performance of the AC machines independently.
CO3: Control the speed of synchronous motor under various loads.
CO4: Acquire knowledge on load characteristics of induction motors.
CO5: Analyze the performance of three phase induction motor under load.

LIST OF EXPERIMENTS:

1. Regulation of Alternator by EMF and MMF Methods.
2. Regulation of Alternator by ZPF Method.
3. Regulation of Salient Pole Alternator.
4. Load Test on three phase alternator.
5. V and inverted V curve of three phase synchronous motor.
6. Load Test on three phase Squirrel cage induction motor.
7. Load Test on three phase Slip ring induction motor.
8. Performance evaluation of three phase induction motor from circle diagram.
9. Separation of no load losses of three phase induction motor.
10. Load Test on three phase induction generators.
11. Load Test on three phase induction motors.

TOTAL: 45 PERIODS

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

Approved by Fourth Academic council

13IT413- OBJECT ORIENTED PROGRAMMING LABORATORY

(Common to EEE and EIE)

L	T	P	C
0	0	3	2

COURSE OBJECTIVE:

To design, implement, test, and debug simple programs in an object-oriented programming

COURSE OUTCOMES:

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

CO1: Write programs using an Object-Oriented programming language (C++)
CO2: Apply the object oriented technology for application development
CO3: Demonstrate the underlying principles and concepts of Object-Oriented Programming
CO4: Apply software problem in terms of objects and entities
CO5: Design and employ real life systems using C++ in Object Oriented Model.

LIST OF EXPERIMENTS

1. Program illustrating function overloading feature.
2. Programs illustrating the overloading of various operators.

   Ex: Binary operators, Unary operators, New and delete operators etc.
3. Programs illustrating the use of following functions:

   a)Friend functions b)Inline functions c)Static Member functions d)Functions with default arguments.
4. Programs illustrating the use of destructor and the various types of constructors (no arguments, constructor, constructor with arguments, copy constructor etc).
5. Programs illustrating the various forms of inheritance: Ex. Single, Multiple, multilevel, hierarchical inheritance etc.
6. Write a program having student as on abstract class and create many derived classes Such as Engg. Science, Medical, etc. from students class. Create their objects and process them.
7. Write a program illustrating the use of virtual functions.
8. Write a program which illustrates the use of virtual base class.
9. Write programs to illustrating file handling operations:

   Ex. a)Copying a text files ,b)Displaying the contents of the file etc.
10. Write programs illustrating how exceptions are handled (ex: division-by-zero, overflow and underflow in stack etc)

TOTAL: 45 PERIODS

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		
3					X							
4	X		X				X					
5			X				X				X	X

Approved by Fourth Academic council

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

L	T	P	C
0	0	2	0

COURSE 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.

REFERENCES:

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

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

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

Approved by Fourth Academic council

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 - Electrical and Electronics Engineering [R13]

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

JUNE 2016

Approved by Fourth Academic council

VISION

To produce professionally competent Electrical and Electronics Engineers to meet out the national and global needs in inter/multi disciplinary domains.

MISSION

- To equip the students with knowledge and skills to cater to the industrial needs.
- To engineer them to develop innovative, competent and ethical qualities to contribute technical advancements.
- To enable them to become responsible citizens of the country with a willingness to serve the society.

State the Program Educational Objectives (PEOs)

PEO1. To provide fundamental knowledge to the students in Basic Sciences for the efficient practice of Engineering.

PEO2. To equip the students with the necessary subject knowledge in the design and analysis of Electrical and Electronic Systems.

PEO3. To prepare students for the modern work environment that emphasizes the need for lifelong learning so as to bring out innovative applications.

PEO4. To enrich the students with the necessary skills for prospective careers in the industry, government, pursuit of higher education and entrepreneurship.

PEO5. To enable students to communicate effectively, both individually and within teams, demonstrating ethical, respectful, and professional behavior so as to take up leadership positions in the society.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

1. Demonstrate knowledge and competence in the application of basic sciences, mathematics and fundamentals of electrical and electronics systems
2. Ability to explore complex engineering problems
3. Demonstrate the ability to communicate correctly, effectively work in a team and develop good personality
4. Apply appropriate techniques and modern engineering tools in core areas to engage in lifelong learning.

PROGRAMME OUTCOMES (POs):

The graduates of Electrical and Electronics Engineering will

1. Apply knowledge of mathematics, science and engineering to domain specific applications.
2. Identify, analyze and formulate Electrical and Electronics Engineering problems based on the knowledge of basic sciences and engineering.
3. Design and develop Electrical and Electronic Engineering based solutions to meet the desired requirements.
4. Investigate complex problems in the areas of power, control and energy to provide suitable solutions.
5. Use the techniques, skills and modern engineering tools necessary for real world applications within realistic constraints.
6. Apply engineering solutions in societal and global contexts.
7. Understand the impact of the solutions on the environment to ensure sustainability.
8. Understanding of professional and ethical responsibility.
9. Function as an individual and as a part of multidisciplinary team to accomplish a common goal.
10. Communicate effectively in both verbal and written forms.
11. Ability to use engineering and management principles, to manage projects and in multidisciplinary environments
12. Recognition of the need for and ability to engage in lifelong learning.

NANDHA ENGINEERING COLLEGE
REGULATIONS 2013 (R-13)
I & VIII SEMESTER CURRICULUM
B.E. Electrical and Electronics 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
13CE201	Basics of Civil and Mechanical Engineering	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
13EE211	Electric Circuits Laboratory	0	0	3	2
13IT212	UNIX Programming Laboratory	0	0	3	2
TOTAL		**18**	**3**	9	**27**

SEMESTER III

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13GE301	Transforms and Partial Differential Equations	3	1	0	4
13EE301	Semiconductor Devices and Circuits	3	0	0	3
13EE302	DC Machines and Transformers	3	1	0	4
13EE303	Engineering Electromagnetics	3	0	0	3
13CS304	Data Structures and Algorithms	3	0	0	3
13EE304	Network Theory	3	0	0	3

PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EE311	Semiconductor Devices and Circuits Laboratory	0	0	3	2
13EE312	DC Machines and Transformers Laboratory	0	0	3	2
13CS313	Data Structures and Algorithms Laboratory	0	0	3	2
13PT311	Language Competency Development - I	0	0	2	0
	TOTAL	**18**	**2**	**11**	**26**

SEMESTER IV

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13GE401	Numerical Methods	3	1	0	4
13EE401	AC Machines	3	1	0	4
13IT405	Object Oriented Programming	3	0	0	3
13EE402	Analog Electronic Circuits	3	0	0	3
13EE403	Digital logic System Design	3	0	0	3
13EE404	Control Systems	3	1	0	4
PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EE411	Analog and Digital Circuits Laboratory	0	0	3	2
13EE412	AC Machines Laboratory	0	0	3	2
13IT413	Object Oriented Programming Laboratory	0	0	3	2
13PT411	Language Competency Development – II	0	0	2	0
	TOTAL	**18**	**3**	**11**	**27**

SEMESTER V

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EE501	Power Transmission and Distribution	3	2	0	4
13EE502	Microprocessor and Microcontroller	3	0	0	3
13EE503	Electrical Measurements and Instrumentation	3	0	0	3
13GEC01	Principles of Management	3	0	0	3
13IT504	Computer Architecture	3	0	0	3
E1	Elective I (PE)	3	0	0	3
PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EE511	Control Systems Laboratory	0	0	3	2
13EE512	Electrical Measurements and Instrumentation Laboratory	0	0	3	2
13PT511	Verbal Aptitude and Reasoning – I	0	0	2	0
	TOTAL	**18**	**2**	**8**	**23**

SEMESTER VI

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EE601	Power System Analysis	3	2	0	4
13EE602	Design of Electrical Machines	3	2	0	4
13ECC02	Digital Signal Processing	3	0	0	3
13EE603	Power Electronics	3	0	0	3
13EE604	High Voltage Engineering	3	0	0	3
E2	Elective II (PE)	3	0	0	3
PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EEC11	Microprocessor and Microcontroller Laboratory	0	0	3	2
13EE611	Power Electronics Laboratory	0	0	3	2
13GE611	Comprehension	0	0	2	1
13PT611	Verbal Aptitude and Reasoning – II	0	0	2	0
	TOTAL	**18**	**4**	**10**	**25**

SEMESTER VII

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EE701	Electric Drives and Control	3	0	0	3
13EE702	Power System Operation and Control	3	0	0	3
13EE703	Power System Protection and Switch Gear	3	0	0	3
E3	Elective III (PE)	3	0	0	3
E4	Elective IV (OE)	3	0	0	3
E5	Elective V (OE)	2	0	0	2

PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EE711	Power System and Simulation Laboratory	0	0	3	2
13GE711	Personality and Character Development	0	0	2	0
	TOTAL	**17**	**0**	**5**	**19**

SEMESTER VIII

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
E6	Elective VI (PE)	**3**	**0**	**0**	**3**
E7	Elective VII (OE)	**2**	**0**	**0**	**2**
PRACTICAL					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EE831	Project Work	0	0	20	10
	TOTAL	**5**	**0**	**20**	**15**

PROFESSIONAL ELECTIVES

LIST OF ELECTIVES FOR E1

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EEX01	Computer Communication Networks	3	0	0	3
13EEX02	Advanced Control System	3	0	0	3
13EEX03	Semiconducting Materials and Devices	3	0	0	3
13EEX04	Fiber Optics and Laser Instruments	3	0	0	3

LIST OF ELECTIVES FOR E2

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13GEC04	Total Quality Management	3	0	0	3
13EEX05	Microcontroller Based System Design	3	0	0	3
13EEX06	Solid State Relays	3	0	0	3
13GEC08	Industrial Management and Economics	3	0	0	3

LIST OF ELECTIVES FOR E3

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13EEX07	Power Quality	3	0	0	3
13EEX08	Cryptography	3	0	0	3
13EEX09	Energy Management and Auditing	3	0	0	3
13EEX10	Special Electrical Machines	3	0	0	3

LIST OF ELECTIVES FOR E6

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
13GEC03	Professional Ethics and Human Values	3	0	0	3
13EEX11	Fundamentals of Electric Power Utilization	3	0	0	3
13EEX12	Solar Energy Utilization	3	0	0	3
13EEX13	Flexible AC Transmission Systems	3	0	0	3

LIST OF OPEN ELECTIVES (OE)

GROUP – I

LIST OF THREE CERDIT 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

LIST OF OPEN ELECTIVES (OE)

GROUP - II

LIST OF TWO CERDIT OPEN ELECTIVES

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

GROUP - III

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 fourth semester onwards

TOTAL CREDITS =27+27+26+27+23+25+19+15=189 CREDITS

***PE- Professional Elective, *OE – Open Elective.**

Approved by Fourth Academic council

13EE 501 POWER TRANSMISSIONS AND DISTRIBUTION

L	T	P	C
3	2	0	4

COURSE OBJECTIVE:

To understand the importance and the functioning of transmission and distribution of the electric power in a modern electrical utility (or) a power system

COURSE OUTCOMES:

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

CO 1: To understand and analyze the various structure of power system operation and distribution schemes under various load conditions

CO 2: To develop expressions for the computation of transmission line parameters

CO 3: To obtain the equivalent circuits for the transmission lines based on distance and operating voltage for determining voltage regulation and efficiency. Also to improve the voltage profile of the transmission system

CO 4: To analyze the voltage distribution in insulator strings and cables and methods to improve the same

CO 5: To design the transmission line and tower structure, modern substation layout with grounding techniques

UNIT I STRUCTURE OF POWER SYSTEM 12

Structure of electric power system: generation, transmission and distribution– EHVAC and HVDC transmission- distributed and concentrated loads – Interconnection – Types of AC and DC distributors – Introduction to Smart Grid Technology.

UNIT II TRANSMISSION LINE PARAMETERS 12

Parameters of single and three phase transmission lines with single and double circuits – Resistance, inductance and capacitance of solid, stranded and bundled conductors, Symmetrical and unsymmetrical spacing and transposition - Application of self and mutual GMD - Skin and proximity effects - Interference with neighboring communication circuits – Typical configurations, conductor types and electrical parameters of EHV lines, corona discharges.

UNIT III MODELLING AND PERFORMANCE OF TRANSMISSION LINES 12

Classification of lines - Short line, medium line and long line - Equivalent circuits, phasor diagram, attenuation constant, phase constant, surge impedance -Transmission efficiency and voltage regulation, real and reactive power flow in lines, surge impedance loading, methods of voltage control - Ferranti effect.

UNIT IV INSULATORS AND CABLES 12

Insulators - Types, voltage distribution in insulator string, improvement of string efficiency. Underground cables - Types of cables - Capacitance of Single-core cable and 3- core belted cable - Grading of cable - Power factor and heating of cables - D.C cables.

UNIT V MECHANICAL DESIGN OF LINES AND GROUNDING 12

Mechanical design of transmission line – Sag and tension calculations for different weather conditions- Tower spotting - Types of towers - Substation Layout (AIS, GIS) - Methods of grounding.

TOTAL: 60 PERIODS

TEXT BOOK:

1. B.R.Gupta, , S.Chand, "Power System Analysis and Design", New Delhi, 7th Revised ed., 2014.

REFERENCES:

1. V.K.Mehta, Rohit Mehta, "Principles of Power System", S.Chand Publication, 2005.
2. D.P.Kothari, I.J. Nagarath, "Power System Engineering", Tata McGraw-Hill Publishing Company limited, New Delhi, 2nd ed., 2008.
3. C.L.Wadhwa, "Electrical Power Systems", New Academic Science Ltd, 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	X	X	X
2	X		X	X	X		X	X	X	X	X	X
3	X	X	X	X	X				X		X	X
4	X		X	X	X		X	X	X	X	X	X
5	X				X		X	X	X	X	X	X

Approved by Fourth Academic council

13EE502 MICROPROCESSOR AND MICROCONTROLLER

L	T	P	C
3	0	0	3

COURSE OBJECTIVE:

To impart the knowledge on functional blocks, addressing modes, instruction sets and also to acquire skills in programming of 8085 & 8051.

COURSE OUTCOMES:

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

CO1: Understand and analyze the internal operations of processor and controller

CO2: Realize the need & use of Interrupt structure 8085 & 8051

CO3: The students will interface the peripherals for different engineering applications

CO4: Develop skills in writing assembly language program

CO5: Apply computing platform and software for engineering problems

UNIT I 8085 PROCESSOR 9

Functional Building Blocks - Signals – Memory organization – I/O & data transfer concepts - Timing Diagram – Interrupts.

UNIT II PROGRAMMING OF 8085 PROCESSOR 9

Instruction format - Addressing modes – Instruction set - Need for assembly language - Development of assembly language programs.

UNIT III PERIPHERAL INTERFACING 9

Architecture and interfacing: 8255, 8259, 8253, 8251- A/D and D/A converters - Interfacing with 8085.

UNIT IV 8051 MICRO CONTROLLER 9

Architecture – Memory Organization – I/O ports – Addressing modes – Instruction set – Interrupt structure.

UNIT V MICRO CONTROLLER PROGRAMMING & APPLICATIONS 9

Simple programming exercises – Key board and display interface – Closed loop control of servo motor- Stepper motor control –Washing Machine Control.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Krishna Kant, "Microprocessors and Microcontrollers: Architecture, Programming and System Design 8085, 8086, 8051, 8096", Eastern Company Edition, Prentice Hall of India, New Delhi, 2nd Edition 2010.

2. Soumitra Kumar Mandal, Microprocessor & Microcontroller Architecture, Programming & Interfacing using 8085, 8086, 8051, McGraw Hill Edu, 2013.

REFERENCES:

1. Muhammad Ali Mazidi,J.G.Mazidi,R.D.Mckinlay, "The 8051 Microcontroller and Embedded Systems" Prentice Hall, Second Edition 2007.
2. R.S. Gaonkar, 'Microprocessor Architecture Programming and Applications with the 8085', Wiley Eastern Ltd., New Delhi, 5th Edition 2013.

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

Approved by Fourth Academic council

13EE503	ELECTRICAL MEASUREMENTS AND INSTRUMENTATION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

To provide adequate knowledge in electrical instruments and measurements techniques and to learn the principle of working and applications of CRO and other electronic measuring devices

COURSE OUTCOMES:

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

CO1 : Know the basic measurement concepts
CO2 : Emphasis on analog and digital techniques used to measure voltage, current, energy and Power
CO3 : Analyze the comparison methods of measurements
CO4 : Learn the importance of function generators and transducers in measurement
CO5 : Learn about the modern measurement techniques

UNIT I INTRODUCTION 9

Functional elements of an instrument - Static and dynamic characteristics - Errors in measurement - Statistical evaluation of measurement data - Standards and calibration.

UNIT II ELECTRICAL AND ELECTRONICS INSTRUMENTS 9

Principle and types of analog and digital voltmeters, ammeters, multimeters - Single and three phase wattmeter and energy meters - Magnetic measurements - Determination of B-H curve and measurements of iron loss - Instrument transformers - Instruments for measurement of frequency and phase.

UNIT III COMPARISON METHODS OF MEASUREMENTS 9

D.C & A.C potentiometers, D.C & A.C bridges, transformer ratio bridges, self-balancing bridges Interference & screening - Multiple earth and earth loops - Electrostatic and electromagnetic interference - Grounding techniques.

UNIT IV SIGNAL GENERATORS AND TRANSDUCERS 9

Function generators - RF signal generators - Sweep generators - Frequency synthesizer - Harmonic distortion analyzer - Spectrum analyzer - Digital storage oscilloscopes - Classification of transducers - Selection of transducers - Resistive, capacitive and inductive transducers - Piezoelectric, optical and digital transducers.

UNIT V MODERN MEASUREMENT TECHNIQUES 9

Elements of data acquisition system - A/D, D/A converters - Computer controlled instrumentation - Fiber optic measurements for power and system loss - Optical time domain Reflect meter- Smart meters Wireless measurement techniques.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. A.K. Sawhney, "A Course in Electrical & Electronic Measurements & Instrumentation", Dhanpat Rai and Co, 2012.
2. Ernest O.Doebelin, Dhanesh N Manik, "Measurement systems", McGraw Hill education (P) Ltd., New Delhi, 2012.

REFERENCES:

1. J. B. Gupta, "A Course in Electronic and Electrical Measurements and Instrumentation", S.K. Kataria & Sons, Delhi, 2012.
2. H.S. Kalsi, "Electronic Instrumentation", Tata McGraw Hill Company, New Delhi, 2012.
3. David A. Bell, "Electronic Instrumentation and Measurements", Oxford University Press, 3rd ed., New Delhi, 2013.

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	X				X	
3	X	X	X	X	X			X				
4	X	X	X	X		X	X					
5	X		X	X	X		X	X	X	X	X	

Approved by Fourth Academic council

13GEC01	PRINCIPLES OF MANAGEMENT	L	T	P	C
		3	0	0	3

COURSE 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

CO1: Have a comprehensive knowledge on management concepts
CO2: Plan under different conditions and situations
CO3: Do organizing of the human resources
CO4: Motivate employees and manage the projects
CO5: Do budgetary and non-budgetary control of projects

UNIT I OVERVIEW OF MANAGEMENT **9**

Organization - Management - Role of managers - Evolution of Management thought - Organization and the environmental factors - Managing globally - Strategies for International Business.

UNIT II PLANNING **9**

Nature and purpose of planning - Planning process - Types of plans – Objectives – Managing by objective (MBO) Strategies - Types of strategies - Policies - Decision Making - Types of decision - Decision Making Process - Rational Decision Making Process - Decision Making under different conditions.

UNIT III ORGANIZING **9**

Nature and purpose of organizing - Organization structure - Formal and informal groups *I* organization - Line and Staff authority - Departmentation - Span of control - Centralization and Decentralization - Delegation of authority - Staffing - Selection and Recruitment - Orientation -Career Development - Career stages – Training - Performance Appraisal.

UNIT IV DIRECTING **9**

Creativity and Innovation - Motivation and Satisfaction - Motivation Theories Leadership - Leadership theories - Communication - Hurdles to effective communication – Organization Culture - Elements and types of culture - Managing cultural diversity.

UNIT V CONTROLLING **9**

Process of controlling - Types of control - Budgetary and non-budgetary control techniques - Managing Productivity - Cost Control - Purchase Control - Maintenance Control – Quality Control - Planning operations.

TOTAL: 45 PERIODS

TEXT BOOKS:

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

REFERENCES:

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

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

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

Approved by Fourth Academic council

13IT504 **COMPUTER ARCHITECTURE**

L	T	P	C
3	0	0	3

COURSE OBJECTIVE:

To understand the architecture of different processor and its associative units.

COURSE OUTCOMES:

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

CO1: Study Computer ALU and CPU functioning
CO2: Study Pipeline architecture and vector processing
CO3: Study Input and output organizations and interfacing
CO4: Study Various memories and their organization
CO5: Understand the various communication methods and interrupts

UNIT I BASIC STRUCTURE OF COMPUTERS 9

Functional units - Basic operational concepts - Bus structures - Performance and Metrics - Instruction and instruction sequencing - Addressing modes - Instruction set: RISC, CISC - ALU design.

UNIT II DATA PATH DESIGN 9

Fixed Point Arithmetic - Addition, Subtraction - Multiplication and Division - Combinational and Sequential ALUs - Robertson algorithm - Booth's algorithm - Non-restoring division algorithm - Floating Point Arithmetic.

UNIT III CONTROL DESIGN 9

Hardwired Control - Micro programmed Control - Multiplier Control Unit - CPU Control Unit - Pipeline Control - Instruction Pipelines - Pipeline Performance - Superscalar Processing - Nano Programming

UNIT IV MEMORY ORGANIZATION 9

Memory organization - Memory hierarchy - Main memory - Auxiliary memory - Associative memory - Cache memory - Virtual memory - Memory management hardware - RAID

UNIT V SYSTEM ORGANIZATION 9

Communication methods - System Bus Control - IO Interfacing – Arbitration - IO interface circuits – Handshaking -DMA and interrupts - Vectored interrupts - PCI interrupts - Pipeline interrupts

TOTAL: 45 PERIODS

Approved by Fourth Academic council

TEXT BOOKS:

1. William Stallings, "Computer Organization and architecture", 9th ed., Pearson Education, 2013.
2. Morris Mano, "Computer system architecture", 3rd ed., Pearson education, 2002.

REFERENCES:

1. V.Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky, "Computer Organization",5th ed., McGraw-Hill Inc, 1996.
2. John P.Hayes, 'Computer architecture and Organisation', Tata McGraw-Hill, 3rd ed., 1998.
3. Behrooz Parhami, 'Computer Architecture', Oxford University Press, 2005.
4. John L. Hennessy, David A. Patterson, 'Computer Architecture: A Quantitative Approach', 4th ed., Elsevier Inc, 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				
2	X	X				X						
3	X	X				X		X		X		
4	X	X						X		X		
5	X	X						X		X		

Approved by Fourth Academic council

13EE511 **CONTROL SYSTEMS LABORATORY**

L	T	P	C
0	0	3	2

COURSE OBJECTIVE:

To provide knowledge on analysis and design of control system and digital simulation of first and second order system and P, PI, PID controllers.

COURSE OUTCOMES:

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

CO1: To determination transfer function of DC motor and AC servo motor
CO2: To study the simulation of first and second order system and stability
CO3: To know about Characteristics of synchros and position control
CO4: To design Stepper motor control system
CO5: To study Simulation of P, PI and PID controllers

LIST OF EXPERIMENTS:

1. Determination of transfer function of armature controlled DC motor
2. Determination of transfer function of separately excited DC generator
3. Determination of transfer function of AC servo motor
4. Digital simulation of first order system
5. Digital simulation of second order system
6. Stability analysis of linear systems simulation
7. AC position control systems
8. Stepper motor control system
9. Digital simulation of compensation network
10. Simulation of P, PI and PID controllers

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		X	X		X
3	X					X	X			X	X	
4		X		X	X		X	X	X		X	
5	X	X	X	X	X	X		X	X		X	X

Approved by Fourth Academic council

15EE512	ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LABORATORY	L	T	P	C
		0	0	3	2

COURSE OBJECTIVE:

To learn the use of DC and AC bridges for measuring R, L, C and different types of analog meters for measuring electrical quantities such as current, voltage, power, energy, power factor and frequency

COURSE OUTCOMES:

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

- **CO1:** Analyze the functions of displacement and pressure transducers
- **CO2:** Acquire knowledge in designing various bridges
- **CO3:** Understand basic knowledge of measurements, including error analysis, interpretation, calibration, etc.
- **CO4:** Demonstrate the A/D and D/A conversions
- **CO5:** Evaluate the methodologies for minimizing measurement errors and to identify measurement uncertainty components

LIST OF EXPERIMENTS:

1. Study of displacement transducers
2. Study of pressure transducers
3. Measurement of Resistance using Whetstone's bridge
4. Measurement of Inductance using Maxwell's bridge
5. Measurement of Resistance using Kelvin's Double bridge
6. Measurement of Inductance using Anderson's bridge
7. Measurement of Capacitance using Schering bridge
8. Instrumentation amplifiers.
9. A/D converters
10. D/A converters
11. Calibration of single-phase energy meter

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											
4			X				X					
5			X									

Approved by Fourth Academic council

13PT511 VERBAL APTITUDE AND REASONING -I

L	T	P	C
0	0	2	0

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

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

UNIT I VERBAL 10

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

UNIT II REASONING 10

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

UNIT III APTITUDE 10

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

TOTAL: 30 PERIODS

TEXT BOOKS:

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

REFERENCES:

1. Quantitative Aptitude by Dinesh Khattar
2. Objective English by Hari Mohan Prasad & Uma Rani Sinha.
3. A Modern approach to verbal & non verbal reasoning by R.S.Aggarwal.
4. High school English Grammar & Composition by Wren & Martin

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									
3								X		X		X

Approved by Fourth Academic council

13EE601	POWER SYSTEM ANALYSIS	L	T	P	C
		3	2	0	4

COURSE OBJECTIVE:

To learn the power system modeling and algorithms for the analysis of electrical power systems and to know the recent developments in power flow analysis.

COURSE OUTCOMES:

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

CO1: Learn about power system components
CO2: Solve the load flow problems using efficient numerical methods
CO3: Analyze the power system transients and faults and select the rating for protective devices
CO4: Study the dynamics of power systems and know about the task of maintaining a reliable electric power system
CO5: Analyze the power system fault in symmetrical and unsymmetrical components

UNIT I POWER SYSTEM MODELING 12

Structure of electric power system – Need for system analysis in planning and operation of power system - Modeling of synchronous generator and motor, transformer and transmission lines – Per unit calculation - Impedance and Reactance diagrams – Formulation of Z bus matrix and Y bus matrix.

UNIT II LOAD FLOW ANALYSIS 12

Load flow equations and methods of solution – Slack bus concept – Gauss Seidal, Newton Raphson, Fast decoupled methods for load flow studies – Comparison.

UNIT III SYMMETRICAL FAULT ANALYSIS 12

Need for short circuit study - Approximations in modeling – Fault MVA - Symmetrical short circuit analysis – KVL, KCL Methods and Thevenin's equivalent representation - Symmetrical Fault calculations using bus impedance matrix.

UNIT IV UNSYMMETRICAL FAULT ANALYSIS 12

Unsymmetrical Fault Analysis - Symmetrical component transformation – Sequence impedances – Sequence networks – Types of unsymmetrical fault - Unsymmetrical fault analysis on an unloaded generator - Unsymmetrical fault analysis on power system.

UNIT V STABILITY STUDIES 12

Steady state and transient stability - Swing equation and its solution by modified Euler and Runge - Kutta methods - Equal area criterion – Applications - Methods of improving transient stability - Voltage stability limit – PV and VQ curves.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. P. Venkatesh, B.V. Manikandan, S. Charles Raja and A. Srinivasan, "Electrical Power Systems Analysis, Security and Deregulation", PHI Learning Pvt Ltd., New Delhi, 2012.
2. Hadi Saadat, "Power System Analysis", Tata McGraw-Hill, New Delhi, 2010.

REFERENCES:

1. Nagrath I.J. and Kothari D.P., "Modern Power System Analysis", Tata McGraw-Hill, 4th ed., 2011.
2. Mehta, R. Mehta, "Principles of Power Systems", 4th Revised Edition, S. Chand & co., New Delhi, 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		X	X
2	X			X		X		X	X	X	X	
3	X		X	X	X		X		X	X	X	X
4	X	X			X	X		X	X		X	X
5	X		X	X			X	X	X	X	X	

Approved by Fourth Academic council

13EE602 DESIGN OF ELECTRICAL MACHINES

L	T	P	C
3	2	0	4

COURSE OBJECTIVE:

- To impart knowledge on the Selection of magnetic, conducting and insulating materials and to provide knowledge on the design aspects of electrical Machines and to introduce computer aided machine design.

COURSE OUTCOMES:

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

CO1: Understand the concepts of various engineering materials and ratings of electrical machines for design

CO2: Determine the diameter and length of armature core, number of armature conductors and number of slots for armature design

CO3: Derive the output equations and overall dimensions of single phase and three phase transformers and tank design

CO4: Estimate and design the stator core dimensions, number of stator slots and number of stator conductors, rotor dimensions of an induction motor

CO5: Estimate and design the armature, length of air gap, rotor and explicate the step by step procedure for field winding of synchronous machine

UNIT I INTRODUCTION 12

Major considerations in Electrical Machine Design - Electrical Engineering Materials – Space factor – Choice of Specific Electrical and Magnetic loadings - Thermal considerations - Heat flow –Temperature rise - Rating of machines – Standard specifications.

UNIT II DC MACHINES 12

Output Equations – Main Dimensions - Magnetic circuit calculations – Carter's Coefficient – Net length of Iron –Real & Apparent flux densities – Selection of number of poles – Design of Armature –Design of commutator and brushes.

UNIT III TRANSFORMERS 12

Output Equations – Main Dimensions - KVA output for single and three phase transformers –Window space factor – Overall dimensions – Operating characteristics – Regulation – No load current – Temperature rise in Transformers – Design of Tank - Methods of cooling of Transformers.

UNIT IV INDUCTION MOTORS 12

Output equation of Induction motor – Main dimensions – Design of Stator - Length of air gap- Rules for selecting rotor slots of squirrel cage machines – Design of rotor bars & slots – Design of end rings – Design of wound rotor -– Magnetic leakage calculations – Leakage reactance of poly phase machines.

UNIT V SYNCHRONOUS MACHINES 12

Output equations – choice of loadings – Design of salient pole machines – Short circuit ratio – shape of pole face – Armature design – Armature parameters – Estimation of air gap length – Design of rotor –Design of damper winding – Determination of full load field mmf – Design of field winding – Design of turbo alternators – Rotor design.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Sawhney, A.K., "A Course in Electrical Machine Design", 6th ed., Dhanpat Rai & Sons, New Delhi, Reprint 2010.
2. K.G.Upadhaya, "Design of Electrical Machines", New Age International, 1st ed., 2008.

REFERENCES:

1. R.K.Agarwal, "Electrical Machine Design" - S.Kataria & Sons, N.Delhi. 4th ed., Reprint, 2003.
2. S.K.Sen, "Principles of Electrical machine Design" - Oxford & IBH pub. Co. Pvt. Ltd., 2nd ed., 2001.
3. V.N. Mittle,"Design of Electrical Machines", Standard Publishers Distributors, 2005.

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	X	X	X	X	X	X	X	X	X	X	X	
3	X	X	X	X	X	X	X	X	X	X	X	X
4	X	X	X		X	X			X	X	X	X
5	X	X	X		X				X	X	X	

Approved by Fourth Academic council

13ECC02	DIGITAL SIGNAL PROCESSING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- 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 IV FINITE 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, 4rth 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)

	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	
4	X											
5	X	X				X				X		

Approved by Fourth Academic council

13EE603 **POWER ELECTRONICS**

L	T	P	C
3	0	0	3

COURSE OBJECTIVE:

To understand the various applications of electronic devices for conversion, control and conditioning of the electrical power.

COURSE OUTCOMES:

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

CO1 : Realize the characteristics of important power semiconductor devices and converters
CO2 : Analyze the steady-state operation of power electronic converters
CO3 : Work in teams and independently for the design, development and testing of power electronics systems
CO4 : Understand the basic requirements of industrial power electronics
CO5 : Model and simulate the characteristics of power semiconductor devices and converters

UNIT I POWER SEMI-CONDUCTOR DEVICES 9

Structure, operation and characteristics of power electronic devices: SCR, TRIAC, GTO, BJT, MOSFET, IGBT - Safe operating area - Triggering and commutation circuit for SCR - Design of driver and snubber circuits.

UNIT II PHASE-CONTROLLED CONVERTERS 9

2-pulse, 3-pulse and 6-pulse converters – Performance parameters – Effect of source inductance – Gate circuit schemes for phase control - Single phase and three phase dual converters.

UNIT III DC TO DC CONVERTERS 9

Step-down and step-up chopper - Control strategy - Time ratio control and current limit control - Switched mode regulators: Buck, Boost, Cuk, Buck- Boost converter - Operation of four Quadrant chopper.

UNIT IV INVERTERS 9

Single phase bridge inverters- Three phase voltage source inverters (both120^0 mode and180^0 mode) - Voltage control using PWM techniques: Single PWM, Sinusoidal PWM, Modified sinusoidal PWM and Multiple PWM – Harmonic reduction - Current source inverters.

UNIT V AC TO AC CONVERTERS 9

Single phase AC voltage controller with R load – Three phase AC voltage controller with R load (no analysis) - Control strategy - Power factor control - Single phase and three phase Cycloconverter.

TOTAL: 45 PERIODS

Approved by Fourth Academic council

TEXT BOOKS:

1. P.S.Bimbra, "Power Electronics", 3rd ed., Khanna Publishers, 2012.
2. Muhammad H.Rashid, "Power Electronics: Circuits, Devices and Applications", 3rd ed., Prentice Hall of India, New Delhi, 2008.

REFERENCES:

1. M.D. Singh and K.B. Khanchandani, "Power Electronics", Tata Mc Graw Hill, India, 2013.
2. Bimal K.Bose, "Modern Power Electronics and AC Drives", Pearson Education, 2003.
3. Ned Mohan, Tore. M. Undel and William. P. Robbins, "Power Electronics: Converters, Applications and Design", 3rd ed., John Wiley and sons, 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							
2	X		X	X	X			X	X	X	X	
3	X	X	X	X			X	X	X	X	X	X
4	X				X			X	X	X	X	X
5	X				X				X	X	X	

Approved by Fourth Academic council

13EE604 **HIGH VOLTAGE ENGINEERING**

L	T	P	C
3	0	0	3

COURSE OBJECTIVE:

To understand the concept of insulation coordination between various electrical equipments in installation and the course explores the various generation, measuring techniques, testing.

COURSE OUTCOMES:

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

CO1 : Impart knowledge of over voltage phenomenon and insulation coordination in electrical Power systems

CO2 : Understand the breakdown mechanisms of dielectrics

CO3: Acquire knowledge to understand high voltage and high current generation techniques

CO4 : Gain adequate knowledge in the measurements of high voltages & currents

CO5 : Conduct tests for various electrical equipments

UNIT I OVER VOLTAGES IN ELECTRICAL POWER SYSTEMS & INSULATION COORDINATION **9**

Causes of over voltages and its effects on power system – Lightning, switching surges and temporary overvoltages, – Bewley's lattice diagram - Protection against over voltages, protection gaps, surge arresters - Insulation coordination.

UNIT II DIELECTRIC BREAKDOWN **9**

Gaseous breakdown in uniform and non-uniform fields – Corona discharges – Vacuum breakdown – Conduction and breakdown in pure and commercial liquids – Breakdown mechanisms in solid and composite dielectrics.

UNIT III GENERATION OF HIGH VOLTAGES AND HIGH CURRENTS **9**

Generation of high AC voltages - Cascaded transformers - Generation of high DC voltages - Rectifier and Voltage doubler circuits - Cockroft Walton voltage multiplier circuit - Van de Graff Generator - Electrostatic Generator - Generation of impulse and switching surges – Marx circuit-generation of high impulse current - Tripping and control of impulse generators.

UNIT IV MEASUREMENT OF HIGH VOLTAGES AND HIGH CURRENTS **9**

High Resistance with series ammeter – Dividers, Resistance, Capacitance and Mixed dividers – Peak Voltmeter, Generating Voltmeters - Capacitance Voltage Transformers, Electrostatic Voltmeters – Sphere Gaps - High current shunts - High voltage measurement using CRO.

UNIT V HIGH VOLTAGE TESTING 9

High voltage testing of electrical power apparatus as per International and Indian standards – Power frequency, impulse voltage and DC testing of Insulators, circuit breakers, bushing, isolators and transformers.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. S.Naidu and V. Kamaraju, "High Voltage Engineering", Tata McGraw Hill, 5th ed., 2013.
2. E. Kuffel and W.S. Zaengl, J.Kuffel, "High voltage Engineering fundamentals", Newnes 2nd ed., Elsevier , New Delhi, 2005.
3. Subir Ray,' An Introduction to High Voltage Engineering' PHI Learning Private Limited, 2nd ed., 2013.

REFERENCES:

1. L.L. Alston, 'High Voltage Technology', Oxford University Press, First Indian Edition, 2011.
2. C.L. Wadhwa, 'High voltage engineering', New Age International Publishers, 3rd ed., 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	X	X	X		X	X		X
2	X		X				X	X	X	X	X	
3	X		X	X	X	X		X		X		X
4	X			X	X	X			X	X	X	X
5			X	X			X	X	X		X	

Approved by Fourth Academic council

13EEC11	MICROPROCESSOR AND MICROCONTROLLER LABORATORY	L	T	P	C
		0	0	3	2

COURSE OBJECTIVE:

To impart the programming knowledge on microprocessors and microcontrollers and to apply it for the embedded applications

COURSE OUTCOMES:

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

CO1 : Apply fundamental of assembly language programming for microprocessor and microcontroller
CO2: Understand the internal operation of command words and command registers
CO3: Inscribe the interfacing of assembly language programs
CO4: Apply computing platform for various engineering applications
CO5: Design circuits for various applications using microcontroller and microprocessor

LIST OF EXPERIMENTS

Programming of 8085

1. Simple arithmetic operations: addition / subtraction / multiplication / division.
2. Programming with I/O & control instructions (Ascending/ descending Order, Largest/ Smallest Number)
3. Interface Experiments: with 8085
   (i) A/D Interfacing. & D/A Interfacing.
   (ii) Traffic light controller.
   (iii) I/O Port / Serial communication (8253/8251 USART).
   (iv) Read a key, interface display (8279 Keyboard Display).

Programming of 8051

4. Simple arithmetic operations: addition / subtraction.
5. Interface with A/D & D/A.
6. Interface with Stepper Motor.
7. Mini project development with processor.

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				
3		X		X	X	X	X					
4		X	X		X	X	X		X	X	X	X
5		X		X	X		X				X	

Approved by Fourth Academic council

13EE611	POWER ELECTRONICS LABORATORY	L	T	P	C
		0	0	3	2

COURSE OBJECTIVE:

To study the characteristics of switching devices and its applications in rectifier, inverter and chopper.

COURSE OUTCOMES:

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

CO1: Understanding the various characteristics of SCR, TRIAC, MOSFET and IGBT
CO2: Analyze the switching characteristics of SCR and MOSFET
CO3: Design and generate the gating pulses for converter circuits
CO4: Simulate the various electronics circuits using power electronics devices
CO5: Design of Rectifiers for various ranges of passive devices

LIST OF EXPERIMENTS

1. Steady State and Dynamic Characteristics of SCR
2. VI Characteristics of TRIAC
3. Steady State and Dynamic Characteristics of MOSFET
4. Steady State Characteristics of IGBT
5. Experimental Verification and Simulation of AC to DC Half Controlled Converter
6. Experimental Verification and Simulation of AC to DC Fully Controlled Converter
7. Experimental Verification and Simulation of Step Down Chopper
8. Experimental Verification and Simulation of Step Up Chopper
9. Experimental Verification and Simulation of Single Phase PWM Inverter
10. Simulation of AC to AC Converter
11. Design of Half Wave and Full Wave Rectifier

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			X				
3		X		X	X							
4		X		X								
5		X	X	X	X	X						

Approved by Fourth Academic council

		L	T	P	C
13GE611	**COMPREHENSION**	**0**	**0**	**2**	**1**

COURSE OBJECTIVE:

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

COURSE OUTCOMES:

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

CO 1: Understand and comprehend any given problem related to mechanical 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 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	

Approved by Fourth Academic council

13PT611 VERBAL APTITUDE AND REASONING - II

L	T	P	C
0	0	2	0

COURSE 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.

REFERENCES:

1. Quantitative Aptitude by Dinesh Khattar
2. Objective English by Hari Mohan Prasad & Uma Rani Sinha.
3. A Modern approach to verbal & non verbal reasoning by R.S.Aggarwal.
4. High school English Grammar & Composition by Wren & Martin

Approved by Fourth Academic council

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

Approved by Fourth Academic council

13EE701	ELECTRIC DRIVES AND CONTROL	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

To expose the students about the concepts of DC and AC drives and its application.

COURSE OUTCOMES:

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

CO 1: Analyze the steady-state operation and transient in dynamics of machines.
CO 2: Understand the operation of the converter, chopper fed dc drive and solve simple problems.
CO 3: Study and analyze the speed control of induction motor drive using VSI, CSI and AC Voltage controller.
CO 4: Understand the operation and speed control methods of synchronous motor drives.
CO 5: Use recent microcontroller/DSP controller for motor control and to study its applications.

UNIT I DRIVE CHARACTERISTICS **9**

Electric drive – Equations governing motor load dynamics – Steady state stability – Multi quadrant-Dynamics: acceleration, deceleration, starting & stopping – Typical load torque characteristics –Selection of motor.

UNIT II CONVERTER / CHOPPER FED DC MOTOR DRIVE **9**

Steady state analysis of the single and three phase converter fed separately excited DC motor drive – continuous and discontinuous conduction – Time ratio and current limit control – 4 quadrant operations of converter / chopper fed drive - Effect of ripples on the DC motor performance.

UNIT III INDUCTION MOTOR DRIVES **9**

Stator voltage control – Energy efficient drive – V/f control–Constant airgap flux – Field weakening mode – Voltage / current fed inverter – Rotor control – Rotor resistance control and slip power recovery schemes - Closed loop control.

UNIT IV SYNCHRONOUS MOTOR DRIVES **9**

V/f control and self control of synchronous motor: Margin angle control and power factor control – Permanent magnet synchronous motor.

UNIT V DIGITAL CONTROL AND DRIVE APPLICATIONS 9

Digital techniques in speed control - Advantages and limitations - Microprocessor/Microcontroller based control of drives - Selection of drives and control schemes for Steel rolling mills, Paper mills, Lifts and Cranes.

TOTAL = 45 PERIODS

TEXT BOOKS:

1. Dubey G.K., "Fundamentals of Electrical Drives", Narosa Publishing House, New Delhi, 2015.
2. Bose, B.K., "Modern Power Electronics and AC Drives", Pearson Education (Singapore) Pvt... Ltd, New Delhi, 2010.

REFERENCES:

1. Vedam Subramanyam, " Electric Drives: Concepts and Applications", Tata McGraw hill Pvt. Ltd, New Delhi, 2011.
2. Krishnan R, " Electric Motor Drives: Modeling, Analysis and Control", Prentice Hall of India, Pvt. Ltd, New Delhi, 2010.

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

Approved by Fourth Academic council

13EE702	POWER SYSTEM OPERATION AND CONTROL	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

To familiarize various control actions to be implemented to meet the variations of system load.

COURSE OUTCOMES:

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

CO1 : Know the knowledge about operation and control of the power system

CO2 : Understand control of real power by frequency control

CO3 : Understand control of reactive power by voltage control

CO4 : Analyze the optimal dispatch problems and unit commitment in various power plants

CO5 : Learn computer control of power systems

UNIT I INTRODUCTION **9**

System load variation - Load characteristics - Load curves and load duration curve (daily, weekly and annual) - Load factor - Diversity factor - Load forecasting and its techniques - An overview of system control - Need for voltage and frequency regulation in power system - Plant level and system level controls.

UNIT II REAL POWER - FREQUENCY CONTROL **9**

Fundamentals of speed governing mechanism and modeling - Speed-load characteristics - Load sharing between two synchronous machines in parallel - Concept of control area - LFC control of a single area system - Static and dynamic analysis of uncontrolled and controlled cases - Multi-area systems - Two area system modeling - Static analysis of uncontrolled case - Tie line with frequency bias control - State variable model.

UNIT III REACTIVE POWER–VOLTAGE CONTROL **9**

Typical excitation system - Modeling - Static and dynamic analysis - Stability compensation - Generation and absorption of reactive power - Relation between voltage, power and reactive power at a node -Methods of voltage control - Shunt reactors - Shunt capacitors - Series capacitors - Synchronous condensers - Static VAR systems - Tap changing transformer - System level voltage control.

UNIT IV UNIT COMMITMENT AND ECONOMIC DISPATCH **9**

Formulation of economic dispatch problem - I/O cost characterization - Incremental cost curve - Coordination equations without and with loss quantitative treatment only - Solution by direct method and λ-iteration method - Statement of unit commitment problem - Priority list method - Forward dynamic programming.

UNIT V COMPUTER CONTROL OF POWER SYSTEMS 9

Need of computer control - Energy control centre and the functions - System monitoring - Data acquisition and control - System hardware configuration - SCADA and EMS functions - Network topology – State estimation - Security analysis and control - Various operating states - Normal – Alert - Emergency - In-extremis and restorative - State transition diagram showing various state transitions and control strategies.

. **TOTAL: 45 PERIODS**

TEXT BOOKS:

1. Allen J. Wood , Bruce F. Wollenberg , Gerald B. Sheble "Power Generation Operation and Control", John Wiley and Sons, Third ed.,2013.
2. Olle .I. Elgerd , „„Electric Energy Systems theory - An introduction", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 34th reprint, 2010.

REFERENCES:

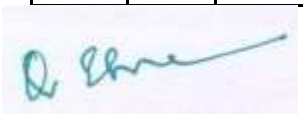
1. Abhijit Chakrabarti , Sunita Halder , " Power System Analysis Operation and Control " , PHI learning Pvt. Ltd., New Delhi, Third ed., 2013.

2. D.P.Kothari , I.J. Nagarath , " Power System Engineering ", Tata McGraw-Hill Publishing Company limited, New Delhi, 2nd ed., 2008.

3. C.L. Wadhwa , " Electrical Power Systems ", New Academic Science Ltd, 2009.

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							X
3	X	X	X	X		X						X
4	X	X		X	X	X		X				
5	X	X			X	X						



13EE703	POWER SYSTEM PROTECTION AND SWITCH GEAR	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

To develop an ability and skill to design the feasible protection systems needed for each main part of a power system and understand the method of circuit breaking, arc interruption theories and switching.

COURSE OUTCOMES:

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

CO1 : Discern and execute the suitable protective schemes for all types of faults

CO2 : Evaluate the performance of protective relays and its response to fault condition

CO3 : Examine the protection of Electrical equipment (Generator, Motor, bus bar and transmission line)

CO4 : Understand the method of circuit breaking, arc theories and arc interruption

CO5 : Impart knowledge about various types of circuit breaker and its applications.

UNIT I PROTECTION SCHEMES 9

Principles and need for protective schemes – Nature and causes of faults – Types of faults – Fault current calculation using symmetrical components - Protection against overvoltage due to lightning-Arcing grounds-Petersen coil-Power system earthing.

UNIT II PROTECTIVE RELAYS AND NUMERICAL PROTECTION 9

Operating principles of relays - The Universal relay – Torque equation – R-X diagram –Electromagnetic Relays: Over current, Directional, Distance, Differential, Negative sequence and under frequency relays-Static relays - Synthesis of various relays using Static comparators - Numerical relays- Block diagram-Applications.

UNIT III APPARATUS PROTECTION 9

Current transformers and Potential transformers and their applications in protection schemes - Zones of protection and essential qualities of protection - Protection of transformer - generator, motor, Bus bars and transmission line.

UNIT IV THEORY OF ARC QUENCHING 9

Physics of arcing phenomenon and arc interruption - DC and AC circuit breaking – Re-striking voltage and Recovery voltage - Rate of rise of recovery voltage - Resistance switching - Current chopping - Interruption of capacitive current.

UNIT V CIRCUIT BREAKERS AND ITS APPLICATIONS 9

Types of circuit breakers: Air blast, air break, oil, SF6 and vacuum circuit breakers – Comparison of different circuit breakers – Rating and selection of Circuit breakers.

TOTAL: 45 PERIODS

TEXT BOOKS:

1.M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarti, "A Text Book on Power System Engineering",DhanpatRai& Co.,2013.

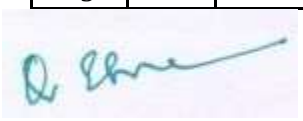
2. Sunil S.Rao, "Switchgear and Protection", Khanna Publishers, New Delhi, 13th ed., 2008.

REFERENCES:

1. B.Rabindranath and N.Chander, "Power System Protection and Switchgear", New Age International(P) Ltd., 1st ed.,2011.
2. BadriRam ,B.H. Vishwakarma, "Power System Protection and Switchgear", New Age International Pvt Ltd Publishers, 2nd ed., 2011.
3. C.L.Wadhwa, "Electrical Power Systems", New Age International (P) Ltd,6th ed., 2010.

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



13EE711 POWER SYSTEM AND SIMULATION LABORATORY

L	T	P	C
0	0	3	2

COURSE OBJECTIVE:

To provide better understanding of power system analysis through digital simulation

COURSE OUTCOMES:

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

CO1 : Develop programs for formation of bus admittance and impedance matrices.
CO2 : Develop programs for Power flow solution using Gauss-Seidel method.
CO3 : Know about Unit Commitment and Economic Dispatch.
CO4 : Develop programs for load flow solution using Newton –Raphson method.
CO5 : Develop programs for load flow solution using fast decoupled method

LIST OF EXPERIMENTS:

1. Formation of bus admittance Matrices and solution of networks.
2. Computation of parameters and modeling of transmission lines.
3. Formation of Bus Impedance Matrices and Solution of Networks.
4. Transient stability analysis of single-machine infinite bus system.
5. Transient stability analysis of multi-machine power systems.
6. Electromagnetic transients in power systems.
7. Load – frequency dynamics of single- area and two-area power systems.
8. Fault analysis – symmetrical short circuit analysis.
9. Solution of load flow and related problems using Gauss-Seidel method.
10. Solution of load flow and related problems using Newton-Raphson and fast-decoupled methods.

TOTAL: 30 PERIODS

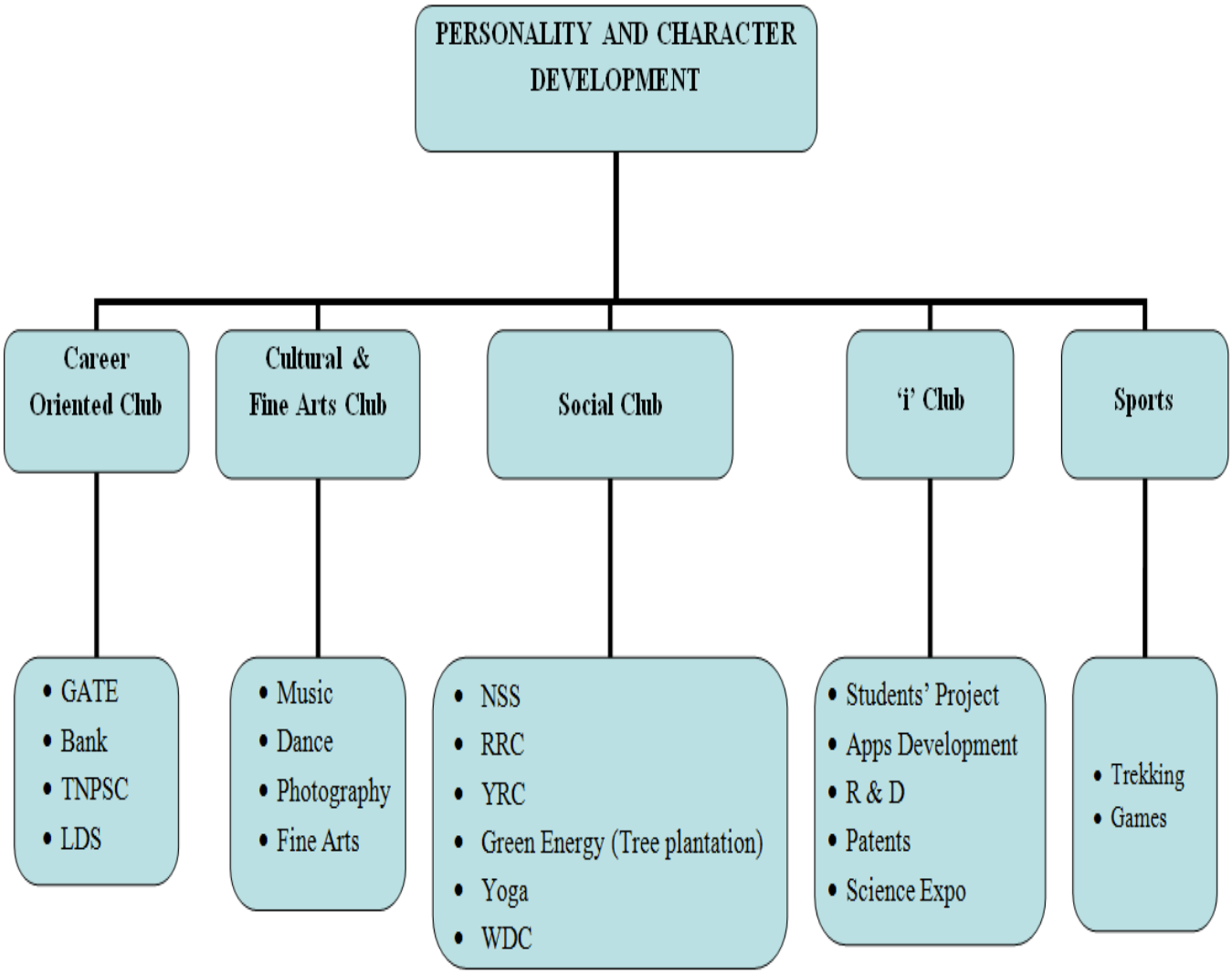
Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

	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	X		X
3	X					X	X			X	X	
4		X	X		X	X X	X		X	X		X
5		X	X		X	X X	X		X	X		X

Approved by Fourth Academic council

13GE711 PERSONALITY AND CHARACTER DEVELOPMENT

L	T	P	C
0	0	1	0



***LDS - Leadership Development Skills**

Approved by Fourth Academic council

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)

Approved by Fourth Academic council

13EE831 PROJECT WORK

L	T	P	C
0	0	20	10

COURSE OBJECTIVES:

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

COURSE OUTCOME:

CO 1: On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

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

TOTAL: 300 PERIODS

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

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

Approved by Fourth Academic council

SEMESTER V (E1)

13EEX01	COMPUTER COMMUNICATION NETWORKS (PE)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

To impart the knowledge on various communication systems and also gain the knowledge in network protocols.

COURSE OUTCOMES:

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

CO1: Gather knowledge about different types of communications
CO2: Understand the organization of computer networks, factors influencing computer network management

UNIT I MODULATION SYSTEMS 9

Need for Modulation - Principles of amplitude modulation – Frequency spectrum — power relations – generation of AM – DSB, DSB/SC, SSB; Demodulation – Envelop/diode detector - Superhet Receiver; Generation (Armstrong method) and detection (Foster Seely Disriminator) of FM and PM – Frequency spectrum – power relations.

UNIT II DIGITAL COMMUNICATION 9

Pulse modulation: PAM,PWM,PPM; Concept of Sampling - Sampling theorem – PCM - Digital T carrier system - Digital Radio System - Digital modulation:ASK,FSK,PSK.

UNIT III SATELLITE AND OPTICAL COMMUNICATION 9

Satellite - Orbital types - Geostationary satellites - Look angles - Satellite system link models - Satellite system link equations; Fiber optic communication system – Advantages - Losses of optical fiber communication - Principle of Light propagation through fiber - Light sources and detectors.

UNIT IV COMPUTER NETWORK ARCHITECTURE 9

Layering & Protocols - OS & Internet Architecture - Network topology - Link & Medium Access protocol - IEEE 802 standard - performance Network Adaptor - Hubs, Routers.

UNIT V DATA COMMUNICATION AND NETWORK PROTOCOL 9

Data Communication codes - Error detection and correction codes - Serial and parallel interface - Telephone network - Data modem - ISDN, LAN, ISO -OSI seven layer architecture for WAN.

TOTAL = 45 PERIODS

TEXT BOOKS:

1. Taub and Schiling "Principles of Communication Systems" Tata McGraw Hill, 2007.
2. Larry L. Peterson and Bruce S. Davie, "Computer Networks: A Systems Approach", Fourth Edition, Elsevier Publishers Inc., 2007.

REFERENCES:

1. G.Kennedy, "Electronic Communication Systems", McGraw Hill, 4th ed., 2002.
2. Nader F. Mir,"Computer and communication networks", Pearson Education, 2007.
3. Gerd Keiser, "Optical Fiber Communications", McGraw Hill Education (India) Pvt Ltd., 2013.

Mapping of Course Outcome and Programme Outcome

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

Approved by Fourth Academic council

13EEX02 **ADVANCED CONTROL SYSTEM (PE)**

L	T	P	C
3	0	0	3

COURSE OBJECTIVE:

To introduce the state-space concept, modelling of physical system in state-space, design controllers in state-space and also to introduce the concepts of nonlinearity, analysis of nonlinear systems

COURSE OUTCOMES:

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

CO 1: Model physical system in different types of state models, convert one state model into another state model, determine transfer function model from state model and find solution of state model

CO2 : Analyze the satiability of linear and nonlinear systems using Liapunov stability theorem

CO3: Analyze the satiability of linear and nonlinear systems using Krasovskki's theorem

CO4: Design control systems in state space

UNIT I STATE-SPACE ANALYSIS **9**

Overview of classical control systems - Advantages of state model - Concepts of state, State variables and state model - State model for linear time-invariant continuous time systems -Transfer function from state model - State transition matrix - Properties - Solution of state equations.

UNIT II DESIGN OF CONTROL SYSTEMS IN STATE-SPACE **9**

Linear transformation -Invariance of state model - Concept of controllability and observability – Controllable and observable canonical forms - Kalman and Gilbert tests - Pole-Placement by state feedback - Ackermann's formula - Full order and minimum-Order state observers.

UNIT III PHASE-PLANE ANALYSIS **9**

Nonlinear systems - Common physical nonlinearities -Jump resonance - Phase plane and phase portraits - Singular points - Types - Construction of phase trajectories: analytical, isoclines, delta methods – Limit cycle oscillations - Stability analysis.

UNIT IV DESCRIBING FUNCTION METHOD **9**

Basic concepts - Derivation of describing functions for saturation, dead-zone, backlash, ideal relay, relay with dead-zone, relay with saturation, relay with hysteresis - Stability analysis by describing function.

UNIT V LIAPUNOV STABILITY ANALYSIS 9

Concepts of definiteness of sign - Quadratic forms - Liapunov theorems on the stability and instability of nonlinear systems - Asymptotic stability of linear systems by the second method of Liapunov -Krasovskki's

theorem on the global asymptotic stability of nonlinear systems - Variable-gradient method for generating Liapunov functions. **TOTAL = 45 PERIODS**

TEXT BOOKS:

1. I .J. Nagrath and M.Gopal, "Control Systems Engineering", 5th ed., New Age International, New Delhi, 2013.
2. Roy Choudhury D, "Modern Control Engineering", Prentice Hall of India, New Delhi, 2009.

REFERENCES:

1. Muhammad Ali Mazidi, Rolin D. Mckinlay and Danny Causey " PIC Microcontroller and Embedded Systems using Assembly and C for PIC18", Pearson Education 2008.
2. Muhammad Ali Mazidi, Janice G. Mazidi and Rolin D. McKinlay , "The 8051 Microcontroller and Embedded Systems" Prentice Hall, 2005.
3. Myke Predko, "Programming and customizing the 8051 microcontroller", Tata McGraw Hill, 2001.

Mapping of Course Outcome and Programme Outcome

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	X		
3	X		X		X	X	X	X	X	X		
4			X	X	X	X	X	X	X	X	X	

Approved by Fourth Academic council

13EEX03 SEMICONDUCTING MATERIALS AND DEVICES (PE)

L	T	P	C
3	0	0	3

COURSE OBJECTIVE:

To understand the charge flow of semi conductive materials and the operation of semiconducting devices

COURSE OUTCOMES:

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

CO1 : Understand the properties of semi conductor

CO2 : Gain adequate knowledge in carrier transport properties

CO3: Acquire knowledge of P-N junction diode

CO4 : Familiar with operation of Bipolar Junction Transistor

CO5 : Get dynamic understanding of Optical Devices

UNIT I PROPERTIES OF SEMICONDUCTOR 9

Energy bands – Allowed and forbidden energy bands – Kronig Penny model – Electrical conductivity in solids based on energy bands - Band model – Electron effective mass – Concept of holes in semiconductor –Density of states – Extension to semiconductors.

UNIT II CARRIER TRANSPORT PROPERTIES 9

Carrier drift – Drift current density – Mobility effects on carrier density – Conductivity in semiconductor – Carrier transport by diffusion – Diffusion current density – Total current density – Breakdown phenomena – Avalanche breakdown.

UNIT III P-N JUNCTION DIODE 9

Qualitative description of charge flow in p-n junction – Boundary condition – Minority carrier distribution – Ideal p-n junction current – Temperature effects – Applications – The turn on transient and turn off transient.

UNIT IV BIPOLAR JUNCTION TRANSISTOR 9

Introduction to basic principle of operation – The modes of operation – Amplification – Minority carrier distribution in forward active mode – Non-ideal effects – Base with modulation –Current clouding – Breakdown voltage – Voltage in open emitter configuration and open base configuration

UNIT V OPTO ELECTRONIC DEVICES 9

Optical absorption in a semiconductor, photon absorption coefficient – Electron hole pair generation – Solar cell – Homo junction and hetero junction - Photo transistor –Laser diode, the optical cavity, optical absorption, loss and gain - Threshold current.

TOTAL = 45 PERIODS

Approved by Fourth Academic council

TEXT BOOKS:

1. Donald A Neamen, "Semiconductor physics and devices", Tata McGraw Hill, 2007
2. Albert Malvino, David J Bafes, "Electronic Principles", Tata McGraw Hill, 2007

REFERENCES:

1. M.S. Tyagi, Introduction to Semiconductor materials and devices, John Wiley and sons, 2008.
2. S.M. Sze & K.Ng. Kwok, Physics of semiconductor devices, John Wiley and sons, 2008.
3. M. K. Achuthanand and K.N. Bhat, Fundamentals of semiconductor devices, Tata McGraw Hill, 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	X				X	
4		X		X		X	X		X		X	
5		X			X		X		X		X	

		L	T	P	C
13EEX04	**FIBRE OPTICS AND LASER INSTRUMENTS (PE)**	**3**	**0**	**0**	**3**

COURSE OBJECTIVE:

To expose the students to the basic concepts of optical fibres and their properties and also gain knowledge about Industrial and medical applications of optical fibres

COURSE OUTCOMES:

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

CO1 : Analyze the theory and classification of fiber optics and fibre characteristics

CO2 : Gain knowledge about the fibre optic sensor measurements

CO3 : Ensure ideas about the types of lasers and its applications

CO4 : Learn about the industrial application of lasers and its applications

CO5 : know the basic principle and methods of Holographic interferometry and application of laser instruments in medical surgeries

UNIT I OPTICAL FIBRES AND THEIR PROPERTIES 9

Theory and classification of fiber optics: Principles of light propagation through a fibre - Different types of fibres and their properties, fibre characteristics – Absorption losses – Scattering losses – Dispersion – Connectors and splicers – Optical sources – Optical detectors.

UNIT II INDUSTRIAL APPLICATION OF OPTICAL FIBRES 9

Fibre optic sensors – Fibre optic instrumentation system – Different types of modulators –detectors- fibre optic communication set up- Interferometric method of measurement of length – Moire fringes – Measurement of pressure, temperature, current, voltage, liquid level and strain.

UNIT III LASER FUNDAMENTALS 9

Fundamental characteristics of lasers – Three level and four level lasers – Properties of laser – Laser modes – Resonator configuration – Q-switching and mode locking – Cavity damping – Simple frequency operation-Types of lasers – Gas lasers, solid lasers, liquid lasers, semiconductor lasers.

UNIT IV INDUSTRIAL APPLICATION OF LASERS 9

Laser for measurement of distance, length, velocity, acceleration and Atmospheric effect – Material processing – Laser heating – Welding - Melting and trimming of material – Removal and vaporization.

UNIT V HOLOGRAM AND MEDICAL APPLICATIONS 9

Holography – Basic principle - Methods – Holographic Interferometry and application, Holography for non-destructive testing – Holographic components – Medical applications of lasers - Laser and tissue interactive – Laser instruments for surgery, removal of tumors of vocal cards, brain surgery, plastic surgery, gynaecology and oncology.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. J.M. Senior, "Optical Fiber Communication – Principles and Practice", Prentice Hall of India, 3rd ed., published in 2009.
2. John F. Ready, "Industrial Applications of Lasers", Academic Press, 2012.

REFERENCES:

1. G. Keiser, "Optical Fiber Communications", McGraw Hill, 4th ed., July17, 2013.
2. Jasprit Singh, "Optoelectronics an Introduction to Materials & Devices" McGraw Hill Education Private Limited, 2014.
3. M. Arumugam, "Optical Fiber Communication and Sensors", Anuradha Agencies, 2010.
4. Mr. Gupta, "Fiber Optics Communication", Prentice Hall of India, 3rd ed., 2009.

Mapping of Course Outcome and Programme Outcome

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

Approved by Fourth Academic council

SEMESTER VI (E2)

13GEC04 TOTAL QUALITY MANAGEMENT (PE)

L	T	P	C
3	0	0	3

COURSE 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

Approved by Fourth Academic council

TEXTBOOK:

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

REFERENCES:

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th ed., First Indian Edition, Cengage Learning, 2012.
2. Suganthi. L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.
3. Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

Mapping of Course Outcome and Programme Outcome

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

Approved by Fourth Academic council

13EEX05 MICROCONTROLLER BASED SYSTEM DESIGN (PE)

L	T	P	C
3	0	0	3

COURSE OBJECTIVE:

To develop the knowledge of the students about Micro-Controller family and need for I/O and memory expansion methods for an application

COURSE OUTCOMES:

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

CO 1: Understand and design the internal functions of Microcontroller
CO 2: Interface the peripherals for real time embedded applications
CO 3: Realize the hardware concepts behind PIC Microcontrollers

UNIT I 8051 MICROCONTROLLER 9

Role of microcontrollers – 8 bit microcontrollers – Architecture of 8031/8051/8751 –Hardware description – Memory organization – Addressing mode – Boolean processing – instruction set – Simple programs.

UNIT II INTERFACING & APPLICATIONS 9

Peripheral interface – Interrupt – Applications – Small motor control – Keyboard interfacing – Pulse width and frequency interfacing – Analog and digital interfacing.

UNIT III 8096 MICROCONTROLLER PROGRAMMING FRAMEWORK 9

16bit microcontroller – Intel 8096 – Architecture – Modes of operation – Addressing modes – Instruction set – Simple programs.

UNIT IV REAL TIME CONTROL 9

Peripheral functions of Intel 8096 – Interrupt structure – Timer – High speed inputs and outputs analog interface- PWM output I/O ports- Status and control registers – Watch dog timer- Bus timing and memory interface – Need for expansion methods.

UNIT V PIC MICROCONTROLLER 9

Introduction – PIC microcontroller- Architecture-memory organization – I/O ports – Reset circuits – Instruction set – compare/capture/PWM.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Ajay V.Deshmukh, Microcontrollers: Theory and ApplicationsTata McGraw Hill, 2004.

REFERENCES:

1. John Peatman, Design with Microcontrollers, McGraw Hill Book company, Singapore, 1988
2. John Peatman, Design with PIC Microcontrollers, Pearson Education Asia, 2001
3. Intel, 16Bit Embedded Controller Hand Book, Intel Corporation USA, 1989

Mapping of Course Outcome and Programme Outcome

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

Approved by Fourth Academic council

13EEX06 **SOLID STATE RELAYS (PE)**

L	T	P	C
3	0	0	3

COURSE OBJECTIVE:

To develop the adequate knowledge in static relay circuits and the analysis of static relays used for protection and testing.

COURSE OUTCOMES:

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

- **CO 1:** Understand the static relay circuits used for different types of relays
- **CO 2:** Know about static relay circuits used for carrier current protection and testing
- **CO 3:** Know about static relays used for measurements of various electrical parameters based on microprocessor

UNIT I INTRODUCTION TO STATIC RELAYS 9

Advantages of Static Relays - Generalized characteristics and operational equations of relays - Steady state and transient performance of signal driving elements - Signal mixing techniques and measuring techniques - CT's and PT's in relaying schemes - Saturation effects.

UNIT II STATIC RELAY CIRCUITS I 9

Static relay circuits (using Analog and Digital IC's) for over current - Inverse - time characteristics - Differential relay and Directional relay.

UNIT III STATIC RELAY CIRCUITS II **9**

Static relay circuits for generator loss of field - Under frequency - Distance relays: Impedance, reactance, mho - Reverse power relays.

UNIT IV CARRIER CURRENT PROTECTION AND TESTING **9**

Static relay circuits for carrier current protection - Steady state and transient behaviour of static relays - Testing and maintenance - Tripping circuits using thyristors.

UNIT V MICROPROCESSOR BASED RELAYS 9

Hardware and software for the measurement of voltage, current, frequency, phase angle - Microprocessor implementation of over current relays - Inverse time characteristics - Impedance relay - Directional Relay - Mho Relay.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Rao T.S.M., "Power System Protection- Static Relays", Tata McGraw Hill, Reprint 2010.
2. Rao, "Digital Numerical Relays", McGraw Hill, 1st ed., 2005.

REFERENCES:

1. Van C. Warrington, “Protective Relays - Their Theory and Practice”, Chapman and Hall
2. Ravindranath B. and Chander M., “Power System Protection and Switchgear”, Wiley Eastern, 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					

Approved by Fourth Academic council

13GEC08 INDUSTRIAL MANAGEMENT AND ECONOMICS (PE)

L	T	P	C
3	0	0	3

COURSE OBJECTIVE:

To acquire basic knowledge on economics, demand, supply, pricing, break-even analysis, banking, industrial finance and accounting. To acquire basic knowledge in marketing and insurance

COURSE OUTCOMES:

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

CO1 : Have basic knowledge on economics, demand, supply, pricing, break-even analysis, banking, industrial finance and accounting

CO2 : Have Knowledge on skills required for industrial management, human resource management, job analysis, recruitment and training processes

CO3 : Have basic knowledge in marketing and insurance

UNIT I ECONOMICS 9

Definition - Relationship between Economics and Engineering - Demand Analysis and Supply Analysis, Elasticity of Demand and Supply - Cost of Production - Break-even Analysis - Pricing under perfect competition, monopoly and monopolistic market.

UNIT II INDUSTRIAL FINANCE AND ACCOUNTING 9

Need for Finance, Types of Finance - Sources of Finance -Business cycle and Business policies-Demand Recession in India-Causes, Indicators and Prevention- Stock Exchange.

UNIT III MONEY AND EMPLOYMENT 9

Estimation of National Income, Methods and Problems - Inflation and Deflation - Unemployment – Money and Changes in Value of Money, Commercial Banks, Central Banking - New Economic Environment - Privatisation, Liberalisation and Globalisation - Importance of Patent Rights.

UNIT IV HUMAN RESOURCE MANAGEMENT 9

Principles of Management, Evolution of Management, Development of Managerial Skills - Human Resource Management - Importance - Objectives - Job Analysis - Recruitment - Selection and Placement and Training Development.

UNIT V MARKETING AND INSURANCE 9

Marketing - Definition, Aims, Need for Marketing - Marketing function - Marketing management and its functions - Marketing versus Selling - Concept of Insurance - Life Insurance, Fire Insurance, Marine Insurance.

TOTAL = 45 PERIODS

Approved by Fourth Academic council

TEXT BOOK:

1. P.L. Mehta, "Managerial Economics", S.Chand & Co, 2007.

REFERENCE BOOKS:

1. Varshney, R.L and Maheswari,K.L, "Managerial Economics", S.Chand & Co, 2007.
2. O.P. Khanna, "Industrial Engineering and Management", Dhanpat Rai Publication (P) Ltd-2006.
3. Philip Kotler, "Marketing Management", 13th Edition, Pearson Education.
4. R.S.N. Pillai and Bagavathi, "Marketing Management", Sultan Chand & Sons, 2009.

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

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

Approved by Fourth Academic council

PROFESSIONAL ELECTIVES

		L	T	P	C
13EEX07	**POWER QUALITY**	**3**	**0**	**0**	**3**

COURSE OBJECTIVE:

To study the production of voltages sags, over voltages, harmonics, methods of control and power quality monitoring

COURSE OUTCOMES:

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

CO1 : Introduce the power quality problem.
CO2 : Educate on production of voltages sags and interruptions.
CO3 : Study the overvoltage problems.
CO4 : Learn the sources and effect of harmonics in power system.
CO5 : Impart knowledge on various methods of power quality monitoring.

UNIT I INTRODUCTION **9**

Need for power quality - Overloading - Under voltage - Sustained interruption - Sags and swells - Waveform distortion - Total Harmonic Distortion (THD) - Computer Business Equipment Manufacturers Associations (CBEMA) curve.

UNIT II VOLTAGE SAGS AND INTERRUPTIONS **9**

Sources of sags and interruptions - Estimating voltage sag performance - Motor starting sags - Estimating the sag severity - Mitigation of voltage sags - Active series compensators - Static transfer switches and fast transfer switches.

UNIT III OVERVOLTAGES **9**

Capacitor switching - Lightning- Ferro resonance - Mitigation of voltage swells - Surge arresters - Low pass filters - Power conditioners – Lightning protection – Shielding - Line arresters - Protection of transformers and cables.

UNIT IV HARMONICS **9**

Voltage and current distortion - Harmonic indices - Harmonic sources from commercial and industrial loads - Locating harmonic sources - Power system response characteristics - Resonance - Harmonic distortion evaluation - Devices for controlling harmonic distortion - Passive filters - Active filters - IEEE and IEC standards.

UNIT V POWER QUALITY MONITORING **9**

Power line disturbance analyzer - Power quality measurement equipment - Harmonic / spectrum analyzer - Flicker meters - Disturbance analyzer - Applications of expert system for power quality monitoring.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Roger.C.Dugan, Mark.F.McGranagham, Surya Santoso, H.Wayne Beaty, "Electrical Power Systems Quality" McGraw Hill, 2012.
2. C.Sankaran, "Power Quality", CRC Press, New York, 2011.

REFERENCES:

1. Angelo Baggini, "Handbook of Power Quality", John Wiley & Sons, New York 2011.
2. Barry W. Kennedy, "Power Quality Primer", MC Graw Hill Publications, New York. 2006
3. M.H.J. Bollen, "Understanding Power Quality Problems: Voltage Sags and Interruptions", Wiley, 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				
2	X	X				X						
3		X		X			X				X	
4	X		X				X				X	
5		X			X		X	X			X	

Approved by Fourth Academic council

13EEX08	CRYPTOGRAPHY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

To impart knowledge on fundamentals of different encryption ,decryption schemes and also to introduce the principles of number theory and the practice of network security and cryptographic algorithms.

COURSE OUTCOMES:

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

CO1 : Gain basic knowledge on encryption and decryption schemes.
CO2 : Demonstrate the concepts of public key cryptosystems.
CO3 : Develop the network security by using several algorithms.
CO4 : Analyze the techniques involved in system security and attacks.
CO5 : Understand the factors and issues of Wireless LAN Security standards.

UNIT I SYMMETRIC CIPHERS 9

Overview – Classical encryption techniques – Block ciphers and the data encryption standard – Introduction to finite fields – Advanced encryption standard – Contemporary symmetric ciphers – Confidentiality using symmetric encryption.

UNIT II PUBLIC-KEY ENCRYPTION AND AUTHENTICATION 9

Introduction to number theory – Public-key cryptography and RSA – Diffie-Hellman key exchange – Elliptic curve cryptography – Message authentication and hash functions – Hash algorithms – Digital signatures and Authentication protocols.

UNIT III NETWORK SECURITY 9

Authentication applications – Kerberos – X.509 authentication service – Electronic mail security – Pretty Good Privacy – S/MIME – IP security architecture – Authentication header – Encapsulating security payload.

UNIT IV SYSTEM SECURITY 9

Intruders – Intrusion detection – Password management – Malicious software – Firewalls – Firewall design principles – Trusted systems.

UNIT V WIRELESS SECURITY 9

Introduction to wireless LAN security standards – Wireless LAN security factors and issues- LIFI technology.

TOTAL: 45 PERIODS

Approved by Fourth Academic council

TEXT BOOK:

1. William Stallings, "Cryptography and Network Security – Principles and practice", Pearson Education, 6th ed., 2014.

REFERENCES:

1. Atul Kahate, "Cryptography and Network Security", Tata McGraw Hill, 3 rd ed., 2013.
2. Bruce Schneier, "Applied Cryptography", John Wiley and Sons Inc, 2003.
3. Stewart S. Miller, "Wi-Fi Security", McGraw Hill, 2003.
4. Charles B. P Fleeger, Shari Lawrence P Fleeger, "Security in Computing", Pearson Education, 3 rd ed., 2003.
5. Mai, "Modern Cryptography: Theory and Practice", Pearson education, 1st ed., 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		X	X				
2		X		X	X			X				
3				X	X			X				
4		X		X	X		X	X				
5		X		X			X				X	

Approved by Fourth Academic council

13EEX09	ENERGY MANAGEMENT AND AUDITING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

To expose the students to analyze the energy cost and to understand the concepts of energy management and auditing in electrical equipment, metering and lighting systems.

COURSE OUTCOMES:

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

CO1 : Understand the basic concept of energy management and auditing.
CO2 : Analyze the energy cost and load management.
CO3 : Emphasize the energy management for electrical equipments.
CO4 : Illustrate the concepts of energy management in metering systems.
CO5 : Emphasize the concepts of energy auditing in lighting systems.

UNIT I INTRODUCTION **9**

Definition - Need for energy management - Energy basics- Designing and starting an energy management program - Mandatory auditing requirements - Audit purpose, Scope and frequency - Energy audit process.

UNIT II ENERGY COST AND LOAD MANAGEMENT **9**

Important concepts in an economic analysis - Economic models -Time value of money - Utility rate structures-cost of electricity - Loss evaluation - Load management: Demand control techniques - Utility monitoring and control system.

UNIT III ENERGY MANAGEMENT FOR ELECTRICAL EQUIPMENTS **9**

Systems and equipment - Electric motors - Transformers and reactors - Capacitors and synchronous machines, Pumps, fans, lighting and variable speed drives.

UNIT IV METERING FOR ENERGY MANAGEMENT **9**

Relationships between parameters - Units of measures - Typical cost factors - Utility meters - Timing of meter disc for kilowatt measurement - Demand meters - Paralleling of current transformers - Instrument transformer burdens - Multitasking solid - State meters - Metering location versus requirements - Metering techniques and practical examples.

UNIT V ENERGY AUDITING IN LIGHTING SYSTEMS 9

Choice of lighting, Concepts of lighting systems - The task and the working space - Light sources - Ballasts - Luminaries - Lighting controls - Optimizing lighting energy - Power factor and effect of harmonics on power quality - Cost analysis techniques-Lighting and energy standards

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Barney L.Capehart, Wayne C.Turner, and William J.Kennedy, "Guide to Energy Management", The Fairmont Press, Inc, 5th ed., 2006.

2. Thiruvengadam S, Srinivasan P.S, "Energy Management in Electrical Energy System", ISTE Publication, New Delhi, 1999.

REFERENCES:

1. Reay D.A, "Industrial Energy Conservation",Pergamon Press,2nd ed., 1979.
2. IEEE Recommended Practice for "Energy Management in industrial and Commercial Facilities", IEEE, 1996.
3. Amit K.Tyagi, "Handbook on Energy Audits and Management", TERI, 2003.
4. Eastop T.D & Croft D.R, "Energy Efficiency for Engineers and Technologists". Logman Scientific & Technical", ISBN-0-582-03184, 1990.

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

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

Approved by Fourth Academic council

13EEX10	SPECIAL ELECTRICAL MACHINES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE*:*

To impart the students about the construction, principle of operation, performance of special electrical machines as an extension of basic electrical machines

COURSE OUTCOMES:

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

CO1 : Gain knowledge on basic synchronous reluctance motors

CO2 : Learn about Stepping motors and its different types

CO3 : Emphasize the ideas about operation and performance of switched reluctance motors

CO4 : Analyze the characteristics of permanent magnet brushless DC motors

CO5 : Understand the basics of permanent magnet synchronous motors

UNIT I SYNCHRONOUS RELUCTANCE MOTORS **9**

Constructional features – Types: Axial and Radial flux motors – Operating principles – Variable Reluctance and Hybrid motors – Voltage and Torque equations – Phasor diagram - Characteristics – Applications.

UNIT II STEPPING MOTORS **9**

Constructional features – Principle of operation – Variable reluctance motor – Hybrid motor – Single and multi stack configurations – Theory of torque predictions – Modes of excitations – Characteristics – Drive circuits – Microprocessor control of stepping motors – Closed loop control.

UNIT III SWITCHED RELUCTANCE MOTORS **9**

Constructional features – Principle of operation – Torque prediction –Power converters and their controllers – Methods of rotor position sensing – Closed loop control of SRM – Characteristics –Applications.

UNIT IV PERMANENT MAGNET BRUSHLESS D.C. MOTORS **9**

Permanent Magnet materials and their characteristics – Principle of operation – Types – Applications –EMF and Torque equations – Electronic commutator – Power controllers – Motor characteristics and control.

UNIT V PERMANENT MAGNET SYNCHRONOUS MOTORS **9**

Principle of operation – EMF and Torque equations – Sine wave motor with practical windings – Phasor diagram –Torque/Speed characteristics – Power controllers – Converter Volt-Ampere requirements – Applications.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. T.J.E. Miller, "Brushless Permanent Magnet and Reluctance Motor Drives", Clarendon Press, Oxford, 1989.
2. T. Kenjo, "Stepping Motors and their Microprocessor Controls", Clarendon Press London, 1984.

REFERENCES:

1. E.G. Janardanan, "Special Electrical Machines", PHI learning Private Limited, Delhi, 2014.
2. K.Venkataratnam, "Special Electrical Machines", Universities Press (India) Private Limited, 2008.
3. Paul Acarnley P P, "Stepping Motors – A Guide to Motor Theory and Practice", Peter Perengrinus, London, 2007.
4. R.Krishnan, "Switched Reluctance Motor Drives – Modeling, Simulation, Analysis, Design andApplication", CRC Press, New York, 2001.
5. T. Kenjo and S. Nagamori, "Permanent Magnet and Brushless DC Motors", Clarendon Press,London, 1988.
6. P.P. Aearnley, "Stepping Motors – A Guide to Motor Theory and Practice", Peter Perengrinus, London, 1982.

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	X			X				
3	X	X	X	X	X	X		X				
4	X	X	X	X	X	X		X				
5	X	X	X		X	X		X				

Approved by Fourth Academic council

13GEC03	PROFESSIONAL ETHICS AND HUMAN VALUES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To know the theory of engineering ethics.
- To enable the students to create an awareness on Engineering Ethics and Human Values.

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.

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

Approved by Fourth Academic council

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)

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

Approved by Fourth Academic council

13EEX11 FUNDAMENTALS OF ELECTRIC POWER UTILIZATION

L	T	P	C
3	0	0	3

COURSE OBJECTIVE:

To impart the knowledge about electric power utilization of electrical energy in power system and appliances

COURSE OUTCOMES:

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

CO1: Inherit the knowledge about the electric drives for power utilization

CO2: Know about the lighting sources and there schemes.

CO3: Illustrate various heating and welding methods.

CO4: Epitomize the concept of electric traction system for power utilization.

CO5: Explore electrolytic process and its importance.

UNIT I INTRODUCTION TO DRIVES 9

Group drive – Individual drive – Selection of motors – Starting and running characteristics – Mechanical features of electric motors – Choice of drives – Power requirement calculation – Power factor improvement.

UNIT II ILLUMINATION 9

Introduction – Definition and meaning of terms used in illumination engineering – Classification of light sources – Incandescent lamps, mercury vapour lamps, fluorescent lamps – Design of illumination systems – Indoor lighting schemes – Factory lighting halls – Outdoor lighting schemes – Flood lighting – Street lighting – Energy saving lamps, LED.

UNIT III HEATING AND WELDING 9

Introduction – Advantages of electric heating – Modes of heat transfer – Methods of electric heating – resistance heating – Arc furnaces – Induction heating – Dielectric heating – Electric welding – Types – Resistance welding – Arc welding – Power supply for arc welding – Radiation welding.

UNIT IV ELECTRIC TRACTION 9

Traction system – Speed– Time characteristics – Series and parallel control of D.C motors – Open **circuited,** shunt and bridge transitions – Traction effort calculation – Electric braking – Tramways and trolley bus – A.C traction and its recent trends.

UNIT V ELECTROLYTIC PROCESSES 9

Electrolysis – Polarization factor – Preparation work for electro plating – Tanks and other equipments – Calculation of energy requirements – Methods of charging and maintenance – Ni–ion and Ni– cd batteries – Components and materials – Capacity rating of batteries.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. J.B.Gupta, "Utilisation Electric Power and Electric Traction", S.K.Kataria and Sons, 10th ed., 2012.
2. Taylor. E. Openshaw, "Utilization of Electrical Energy in SI Units" Orient Longman Private Limited, New Delhi, 2009.

REFERENCES:

1. G.C.Garg, "Utilization of Electric Power and Electric Traction", Khanna Publishers, 2006.
2. R.K.Rajput, "Utilisation of Electric Power", Laxmi publications Private Limited., 1st ed.,2007.
3. N.V. Suryanarayana, "Utilisation of Electric Power", Wiley Eastern Limited, New Age International Limited, 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		X						X	
2	X				X	X					X	
3			X	X		X						
4			X		X	X			X			
5		X		X		X		X		X		

Approved by Fourth Academic council

13EEX12	SOLAR ENERGY UTILIZATION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

To develop the skills of the students in the areas of solar energy utilization

COURSE OUTCOMES:

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

CO1 : Expose the ideas about fundamentals and fabrication of solar cell

CO2 : Learn the modules, power conditioning and regulation of standalone PV systems

CO3 : Analysis the economic aspects, efficiency and performance of grid connected PV systems

CO4 : Describe the various energy storage systems

CO5 : Outline the solar utilization for both domestic and industrial applications.

UNIT I INTRODUCTION **9**

Characteristics of sunlight – Semiconductors and P-N junctions – Behavior of solar cells – Cell properties – PV cell interconnection – Fabrication - Solar radiation measurement.

UNIT II STAND ALONE PV SYSTEM **9**

Solar modules – Storage systems – Power conditioning and regulation – Protection – Standalone PV systems design – Battery sizing.

UNIT III GRID CONNECTED PV SYSTEMS **9**

PV system in buildings – Design issues for central power stations – Safety – Economic aspect – Efficiency and performance – International PV programs- Grid synchronization concepts.

UNIT IV ENERGY STORAGE SYSTEMS **9**

Impact of intermittent generation – Battery energy storage – Solar thermal energy storage - Pumped hydroelectric energy storage.

UNIT V APPLICATIONS **9**

Water pumping – Battery chargers – Solar street light – Solar heater - Solar car – Direct drive applications - Space – Telecommunications.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Frank S. Barnes & Jonah G. Levine, "Large Energy storage Systems Handbook", CRC Press, 2011.
2. G.D Rai, " Non-Conventional Energy Sources", Khanna Publishers, 5th ed., 2013.

REFERENCES:

1. Stuart R.Wenham, Martin A.Green, Muriel E. Watt and Richard Corkish, "Applied Photovoltaics", Earthscan, UK, 2007.
2. Sukhatme, S.P., "Solar Energy", Tata McGraw Hill, 2000.
3. B H Khan, "Non-Conventional Energy Sources", Tata McGraw Hill, 2nd ed., 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	X	X		X	X	X		X
3		X	X	X	X	X		X	X	X		X
4		X	X	X	X	X			X	X		X
5		X					X					X

\

Approved by Fourth Academic council

13EEX13	FLEXIBLE AC TRANSMISSION SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

To teach the students FACTS technology, which have come into wide scale operation and offers further opportunities to improve the control of transmission systems under deregulated environment.

COURSE OUTCOMES:

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

CO1 : Acquire an introduction about reactive power control techniques.

CO2 : Learn about Static VAR Compenstor and its applications

CO3 : Gain knowledge on Thyristor Controlled Series Capacitor (TCSC)

CO4 : Understand the applications of STATCOM devices and applications

CO5 : Know about the coordination techniques of FACTS controller

UNIT I INTRODUCTION 9

Reactive power control in electrical power transmission lines -Uncompensated transmission line - series compensation – Basic concepts of Static VAR Compensator (SVC) – Thyristor Controlled Series Capacitor (TCSC) – Unified Power Flow Controller (UPFC).

UNIT II STATIC VAR COMPENSATOR (SVC) AND APPLICATIONS 9

Voltage control by SVC – Advantages of slope in dynamic characteristics – Influence of SVC on system voltage – Design of SVC voltage regulator –Modeling of SVC for power flow and fast transient stability – Applications: Enhancement of transient stability – Steady state power transfer – Enhancement of power system damping.

UNIT III THYRISTOR CONTROLLED SERIES CAPACITOR (TCSC) AND APPLICATIONS 9

Operation of the TCSC – Different modes of operation – Modeling of TCSC – Variable reactance model – Modeling for power flow and stability studies –Applications: Improvement of the system stability limit – Enhancement of system damping**.**

UNIT IV EMERGING FACTS CONTROLLERS 9

Static Synchronous Compensator (STATCOM) - Principle of operation - V-I characteristics - Unified Power Flow Controller (UPFC) - Principle of operation - Modes of operation applications - Modeling of UPFC for power flow studies

UNIT V CO-ORDINATION OF FACTS CONTROLLERS 9

Controller interactions – SVC-SVC interaction – Co-ordination of multiple controllers using linear control techniques – Control coordination using genetic algorithms.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. R.Mohan Mathur, Rajiv K.Varma, "Thyristor – Based Facts Controllers for Electrical Transmission Systems", IEEE press and John Wiley & Sons, Inc, 2011.
2. Narain G. Hingorani, "Understanding FACTS -Concepts and Technology of Flexible AC Transmission Systems", Standard Publishers Distributors, 2011.

REFERENCES:

1. V.K.Sood, "HVDC and FACTS controllers – Applications of Static Converters in Power System", Springer, 1st ed., 2013
2. Xiao – Ping Zang, Christian Rehtanz and Bikash Pal, "Flexible AC Transmission System: Modelling and Control" Springer-verlag Gmbh, 2nd ed., 2012.
3. K.R.Padiyar," FACTS Controllers in Power Transmission and Distribution", New Age International (P) Limited, Publishers, 2009.
4. Laszlo Gyugyi Narain G.Hingorain, "Understanding Facts : Concepts And Technology Of Flexible Ac Transmission Systems"wiley,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				
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				

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

List of Open Electives for

All B.E. / B.Tech. Programmes [R13]

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

JUNE 2015

Approved by third Academic council

LIST OF OPEN ELECTIVES (OE)

GROUP – I

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

LIST OF OPEN ELECTIVES (OE)

GROUP – II

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

LANGUAGE ELECTIVES

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

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

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

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.

(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 D**EVELOPING MOBILE APPS**

(Common to All Branches except IT branch)

L	T	P	C
3	0	0	3

OBJECTIVES:

- Understand system requirements for mobile applications.
- Generate suitable design using specific mobile development frameworks .
- Generate mobile application design.
- Implement the design using specific mobile development frameworks .
- Deploy the mobile applications in marketplace for distribution.

COURSE OUTCOMES:

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

CO1: Describe the requirements for mobile applications
CO2: Explain the challenges in mobile application design and development
CO3: Implement the design using Android SDK
CO4: Implement the design using Objective C and iOS
CO5: Deploy mobile applications in Android and iPone marketplace for distribution

UNIT I : INTRODUCTION (5)

Introduction to mobile applications – Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications

UNIT II : BASIC DESIGN (8)

Introduction – Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – User interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security, availability and modifiability.

UNIT III : ADVANCED DESIGN (8)

Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment – Design patterns for mobile applications.

UNIT IV : TECHNOLOGY I - ANDROID (12)

Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and Wifi – Integration with social media applications.

UNIT V : TECHNOLOGY II - IOS (12)

Introduction to Objective C – iOS features – UI implementation – Touch frameworks – Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application – Using Wifi - iPhone marketplace.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. http://developer.android.com/develop/index.html
2. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012

REFERENCES :

1. Charlie Collins, Michael Galpin and Matthias Kappler, “Android in Practice”, DreamTech,2012
2. James Dovey and Ash Furrow, “Beginning Objective C”, Apress, 2012
3. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, “Beginning iOS 6 Development: Exploring the iOS SDK”, Apress, 2013.

13ITZ04 SOFTWARE PROJECT MANAGEMENT

(Common to All Branches except IT branch)

L	T	P	C
3	0	0	3

OBJECTIVES :

- To plan and manage projects at each stage of the software development life cycle (SDLC).
- To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.
- To understand successful software projects that support organization's strategic goals.

COURSE OUTCOMES:

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

CO1: Evaluate and select the most desirable projects & Identify desirable characteristics of effective project managers.

CO2: Apply appropriate approaches to plan a new project.

CO3: Apply appropriate methodologies to develop a project schedule.

CO4: Develop a suitable budget for a new project & Identify important risks facing a new project.

UNIT I : INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT (9)

Project Definition – Contract Management – Activities Covered By Software Project Management – Overview Of Project Planning – Stepwise Project Planning.

UNIT II : PROJECT EVALUATION (9)

Strategic Assessment – Technical Assessment – Cost Benefit Analysis –Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation.

UNIT III : ACTIVITY PLANNING (9)

Objectives – Project Schedule – Sequencing and Scheduling Activities –NetworkPlanning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning And Control.

UNIT IV : MONITORING AND CONTROL (9)

Creating Framework – Collecting The Data – Visualizing Progress – Cost Monitoring – Earned Value – Priortizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types Of Contract – Stages In Contract Placement – Typical Terms Of A Contract – Contract Management – Acceptance.

UNIT V : MANAGING PEOPLE AND ORGANIZING TEAMS (9)

Introduction – Understanding Behavior – Organizational Behaviour: A Background –Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation– The Oldman – Hackman Job Characteristics Model – Working In Groups – Becoming A Team –Decision Making – Leadership – Organizational Structures – Stress – Health And Safety – Case Studies.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Bob Hughes, Mikecotterell, “Software Project Management”, Third Edition, Tata McGraw Hill, 2004.

REFERENCES:

1. Ramesh, Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
2. Royce, “Software Project Management”, Pearson Education, 1999.
3. Jalote, “Software Project Management in Practice”, Pearson Education, 2002.

13MEZ01 SIX SIGMA

(Common to All Branches except Mechanical Engineering)

L	T	P	C
3	0	0	3

OBJECTIVES:

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

COURSE OUTCOMES:

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

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

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

UNIT I : INTRODUCTION (9)

Overview of Six Sigma and Lean Manufacturing - 6 sigma, TQM & MBNQA - common terms - organizational success factors - leadership, strategic initiative - internal communication - launching of 6 sigma - organizational structure - six sigma training plan - project selection - assessing organizational readiness - common pitfalls - work as a process - vertical functions and horizontal processes

UNIT II : PREPARATION PHASE (9)

Voice of the customer - importance, identify the customer, collect VOC data, Critical-to-Quality customer requirements - project management - challenges - project culture - project management processes - team typing-team stages - understanding team dynamics - forming, storming, norming, performing, characteristics of effective teams

UNIT III : DEFINE AND MEASURE PHASE (9)

DMAIC Phases - define phase overview - project charter - voice of the customer - high level process map - project team - measure phase overview - statistical methods - normal distribution - Population Parameters Vs Sample Statistics - sampling plan - data collection plan - choosing statistical software - measure tools - measurements - cost of poor quality - probability distributions - measurement system analysis - Process Capability

UNIT IV : ANALYZE AND IMPROVE PHASE (9)

Overview - process analysis - hypothesis testing - statistical tests and tables - tools for analyzing relationships among variables - survival analysis - improve phase overview - process redesign - generating improvement alternatives - design of experiments - pilot experiments - Cost/Benefit Analysis - implementation plan - card one case study improve phase results

UNIT V : CONTROL PHASE, DESIGN FOR SIX SIGMA AND LEAN SERVICING (9)

Control phase overview - control plan - process scorecard - failure mode and effects analysis - SPC Charts - final project report and documentation - design for six sigma overview - DFSS Tools - Quality Function Deployment – TRIZ - Lean Production Overview - lean servicing concepts - getting started with lean - continuous flow production - case study

TOTAL: 45 PERIODS

TEXT BOOK:

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

REFERENCES:

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

13MEZ02 ESSENTIALS OF RADIO FREQUENCY IDENTIFICATION

(Common to All Branches except Mechanical Engineering)

L	T	P	C
3	0	0	3

OBJECTIVES:

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

COURSE OUTCOMES:

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

CO1: Demonstrate various components of RFID system

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

UNIT I : INTRODUCTION AND RFID ARCHITECTURE (9)

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

UNIT II : TAGS AND PROTOCALS (9)

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

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

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

UNIT IV : MIDDLEWARE AND INFORMATION SERVICE (9)

Motivations - logical architecture - application level events specification - commercial RFID middleware - RFID Data - EPC global network - object naming service - EPC information services

UNIT V : MANAGEABILITY, PRIVACY AND SECURITY (9)

Edge deployment options - capabilities needed for edge management - standards and technologies - privacy and security issues - RFID Privacy - RFID Security - EPC identity encodings

TOTAL : 45 PERIODS

TEXT BOOK:

1. Himanshu Bhatt, Bill Glover, “RFID Essentials”, O'Reilly Media publications, 2006

REFERENCES:

1. Klaus Finkenzeller, “RFID Handbook”, John Wiley & Sons, Ltd, 2010
2. Stephen B. Miles, Sanjay E. Sarma, John R. Williams, “RFID Technology and Applications”, Cambridge University Press, 2008
3. Patrick J Sweeney, “RFID for DUMMIES”, Wiley India Publications, 2005
4. Elaine Cooney, “RFID + The Complete review of Radio Frequency Identification”, 1st ed., Delmar Cengage Learning 2007

13MEZ03 ELECTRIC VEHICLE TECHNOLOGY

(Common to All Branches except Mechanical Engineering)

L	T	P	C
3	0	0	3

OBJECTIVES:

- To know the various components of electric vehicles and their working principles.
- To get knowledge on types of batteries and fuel cell

COURSE OUTCOMES:

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

CO1: Identify the elements of an electric vehicle for a particular application.

CO2: Apply the knowledge on mathematical modelling to find out the operating characteristics of an electric vehicle.

UNIT I : INTRODUCTION AND BATTERIES (9)

Types of electric vehicle - battery parameters - lead acid batteries - nickel based batteries - battery charging - designer's choice of battery - use of batteries in hybrid vehicles - battery modelling

UNIT II : ALTERNATIVE ENERGY SOURCES AND FUEL CELLS (9)

Solar photovoltaics - wind power - flywheels - super capacitors - supply rails - hydrogen fuel cells - fuel cell thermodynamics - connecting cells in series - water and thermal management in PEM fuel cell

UNIT III : HYDROGEN SUPPLY AND STORAGE (9)

Introduction - fuel reforming - fuel cell requirements, steam reforming, partial oxidation and autothermal reforming, further fuel processing, mobile applications - storage as hydrogen - chemical methods

UNIT IV : ELECTRIC MACHINES AND CONTROLLERS (9)

Brushed DC electric motor - DC regulation and voltage conversion - brushless electric motors - motor cooling, efficiency, size and mass - electrical machines for hybrid vehicles

UNIT V : ELECTRIC VEHICLE MODELLING AND DESIGN CONSIDERATIONS (9)

Introduction - tractive effort - modelling vehicle acceleration and electric vehicle range - simulations - aerodynamic considerations - rolling resistance - transmission efficiency - vehicle mass - general issues

TOTAL : 45 PERIODS

TEXT BOOK:

1. James Larminie, John Lowry, "Electric Vehicle Technology Explained", John Wiley & Sons Ltd 2012

REFERENCES:

1. Mehrdad Ehsani, Yimin Gao, Ali Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles", 2nd ed., CRC Press 2009
2. Chau.K.T, "Electric vehicle machines and drives", Wiley-IEEE Press, 2015
3. James D Halderman, "Hybrid and Alternative Fuel Vehicles", 3rd Revised edition, Pearson Education, 2012
4. Jingyu Yan , Huihuan Qian , Yangsheng Xu, "Hybrid Electric Vehicle Design and Control", McGraw-Hill Professional Publishing, 2013

13MEZ04 VALUE ENGINEERING

(Common to All Branches except Mechanical Engineering)

L	T	P	C
3	0	0	3

OBJECTIVES:

- To know the concept of value engineering and its applications.
- To get knowledge on various stages of value engineering implementation

COURSE OUTCOMES:

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

CO1: Identify and prioritize functions of the products.

CO2: Apply the techniques of cost reduction to minimize the product cost by maintaining the required performance

UNIT I : VALUE AND FUNCTION (9)

Seven types values - economic value - cost, use, esteem and exchange values - mathematical model of value - types and levels of functions - function identification - method of finding functions of a product - case study - vocabulary of verbs and nouns

UNIT II : COST AND WORTH (9)

Cost and price - elements of cost - direct material, direct labour, direct expenses, overheads - calculation of cost - case study - method of determining function cost - evaluation of worth - guidelines to find out worth - value gap and value index

UNIT III : VALUE ENGINEERING TECHNIQUES (9)

Brainstorming and Gordon techniques - feasibility ranking - morphological analysis technique - ABC analysis - probabilistic approach - make or buy - function-cost-worth analysis - FAST - weighted evaluation method - evaluation matrix - life cycle cost

UNIT IV : TEAM DYNAMICS AND JOB PLAN (9)

Team structure - team building - physical, intellectual, spiritual transformations - job plan - orientation phase – information phase - function phase - creative phase - evaluation phase - recommendation phase - implementation phase - audit phase

UNIT V : FINANCIAL ASPECTS AND HUMAN RELATION (9)

Break-even point - payback period - return on investment - discounted cash flows - balance sheet and profit and loss account - human aspects in value engineering - individual ego states - techniques of transactions - human interactions - Managerial grid

TOTAL : 45 PERIODS

TEXT BOOK:

1. Mukhophadhyaya A K, “Value Engineering”, Sage Publications Pvt. Ltd., New Delhi, 2003

REFERENCES:

1. Mukhophadhyaya A K, “Value Engineering Mastermind”, Sage Publications Pvt. Ltd., New Delhi, 2009
2. Richard J Park, “Value Engineering – A plan for inventions”, St.Lucie Press, London, 1998.
3. Larry W Zimmesman. P E , “VE –A Practical approach for owners designers and contractors”, CBS Publishers, Delhi, 1992
4. Arthus E Mudge, “Value Engineering”, McGraw Hill book company, 1971

GROUP II OPEN ELECTIVES LIST

13GEZ01- SUSTAINABLE DEVELOPMENT
(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- To understand the principle of sustainable d-evelopment and resource degradation.
- To know the concepts of international contribution on sustainable engineering & legal system in sustainable development.
- To gain knowledge on public participation on economic growth and resource protection management.

COURSE OUTCOMES:

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

CO1: Know the principle of sustainable development and resource degradation.
CO2: Know the concepts of legal system in sustainable development.
CO3: Gain knowledge on international contribution on sustainable engineering.
CO4: Identify the public participation on economic growth.
CO5: Understand the approach on resource protection and management.

UNIT I : PRINCIPLES OF SUSTAINABLE DEVELOPMENT (6)

History and emergence of the concept of Sustainable Development – Definitions – Environmental issues and crisis – Resource degradation – green house gases – desertification – social insecurity – Industrialization – Globalization and Environment.

UNIT II : INDIANS JUDICIARY SYSTEM & SUSTAINABLE DEVELOPMENT (6)

Judicial System in India – Induction of sustainability concepts through legal systems – concepts – principles – doctrines – case laws.

UNIT III : SUSTAINABLE DEVELOPMENT AND INTERNATIONAL CONTRIBUTION (6)

Components of sustainability – Complexity of growth and equity – International Summits – Conventions – Agreements – Trans boundary issues – Action plan for implementing sustainable development – Moral obligations and Operational guidelines.

UNIT IV : SOCIO-ECONOMIC SUSTAINABLE DEVELOPMENT SYSTEMS (6)

Socio-economic policies for sustainable development – Strategies for implementing eco-development programmes – Sustainable development through trade – Economic growth – Carrying Capacity – Public participation.

UNIT V : AGENDA FOR FUTURE GLOBAL SUSTAINABLE DEVELOPMENT (6)

Role of developed countries in the sustainable development of developing countries – Demographic dynamics and sustainability – Integrated approach for resource protection and management.

TOTAL: 30 PERIODS

REFERENCES:

1. Kirkby, J., O' Keefe, P. and Timberlake, Sustainable Development, Earth scan Publication, London, 1996.
2. Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 1998.
3. Bowers, J., Sustainability and Environmental Economics – an alternative text, Longman, London, 1997.
4. Revelle CS, Whitlach EE & Wright JR. *Civil & Environmental Systems Engineering*, **1st or 2nd** Edition, Prentice Hall of India.

13GEZ02 - WASTE MANAGEMENT

(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- To understand of the basic principles of waste and resource management will be supplemented, where appropriate, by practical problem-solving exercises.
- To provide detailed knowledge and skills in the management, treatment, disposal and recycling options for solid wastes.
- To provide details on resource efficiency plays in conserving resources and contributing to a low carbon economy.

COURSE OUTCOMES:

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

CO1: Understand and apply the basic for solving practical waste management challenges.
CO2: Understand the collection of waste and recycling.
CO3: Understand the fundamental principles of existing and emerging technologies for the treatment of waste.
CO4: Appreciate the role of decision-making tools in the critical assessment of major waste issues.
CO5: Understand the economy and financial aspects of waste management.

UNIT I : INTRODUCTION & TYPES OF SOURCES (6)

Problems and need of solid and hazardous waste management - Waste management planning - Toxicology and risk assessment - Legislations on management and handling of different types of wastes.

UNIT II : WASTE GENERATION RATES (6)

Composition - Hazardous Characteristics – TCLP tests – waste sampling- reduction of wastes at source – Recycling and reuse. Handling and segregation of wastes at source – storage and collection of municipal solid wastes – Analysis of Collection systems - Need for transfer and transport – Transfer stations -labeling and handling of hazardous wastes.

UNIT III : WASTE PROCESSING (6)

Processing technologies – biological and chemical conversion technologies – Composting - thermal conversion technologies - energy recovery – incineration – solidification and stabilization of hazardous wastes - treatment of biomedical wastes.

UNIT IV : DISPOSAL (6)

Site selection - design and operation of sanitary landfills - secure landfills and landfill bioreactors – leachate and landfill gas management – landfill closure and environmental monitoring – landfill remediation

UNIT V : ECONOMY AND FINANCIAL ASPECTS (6)

Elements of integrated waste management - Economy and financial aspects of waste management. Other Waste Types: Nuclear and Radio Active Wastes.

TOTAL: 30 PERIODS

REFERENCES:

1. Hilary Theisen and Samuel A, Vigil, George Tchobanoglous, Integrated Solid Waste Management, McGraw- Hill, New York, 1993
2. CPHEEO, Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organization, Government of India, New Delhi, 2000
3. Michael D. LaGrega, Philip L Buckingham, Jeffrey C. E vans and Environmental Resources Management, Hazardous waste Management, Mc-Graw Hill International edition, New York, 2001.
4. Vesilind P.A., Worrell W and Reinhart, Solid waste Engineering, Thomson Learning Inc., Singapore, 2002.
5. Charles A. Wentz, Hazardous Waste Management, Second Edition, Pub: McGraw Hill International Edition, New York, 1995.

13GEZ03 DESIGN THINKING

(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- To acquire Design Thinking skills.
- To learn by doing projects.
- To solve so called "wicked problems" (problems for which neither question nor answer is well defined)

COURSE OUTCOMES:

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

CO1: Have a sense of self-efficacy & creative confidence

CO2: Know how to manage a Design Thinking workshop: Layout, roles, times and process.

CO3: Apply Design thinking tools to increase research output.

UNIT I : INTRODUCTION TO DESIGN THINKING (6)

Overview - Use of Design Thinking – Design Process. Getting Started: Define Challenges – Create a Project Plan. Design Thinking Tools.

UNIT II : DISCOVERY (6)

Understand the Challenge: Review the Challenge - Build your Team - Refine your Plan. Prepare Research: Identify Sources of Inspiration - Select Research Participants - Prepare For Fieldwork. Gather Inspiration: Immerse Yourself in Context - Seek Inspiration In Analogous Settings - Learn From Experts - Learn From Users.

UNIT III : INTERPRETATION (6)

Tell Stories: Capture Your COURSEs- Share Inspiring Stories. Search for meaning: Find Themes - Make Sense of Findings - Define Insights. Frame Opportunities: Create a Visual Reminder - Make Insights Actionable.

UNIT IV : IDEATION (6)

Generate Ideas: Prepare for Brainstorming - Facilitate Brainstorming - Select Promising Ideas - Sketch to Think. Refine Ideas - Do a Reality Check - Describe Your Idea.

UNIT V : EXPERIMENTATION AND EVOLUTION (6)

Make Prototypes: Create a Prototype. Get Feedback: Identify Sources for Feedback - Select Feedback Participants - Facilitate Feedback Conversations - Capture Feedback COURSEs - Integrate Feedback.
Track COURSEs: Define Success - Document Progress. Move Forward: Plan Next.

TOTAL: 30 PERIODS

REFERENCES:

1. http://www.designthinkingforeducators.com/toolkit
2. https://hbr.org/2008/06/design-thinking
3. http://asimetrica.org/wp-content/uploads/2014/06/design-thinking.pdf

13GEZ04 BIG DATA ANALYTICS

(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- To know the fundamentals of big data analytics.
- To learn about Hadoop components and storage
- To understand Hadoop operations.
- To use Map-Reduce programming model for processing large sets of data in parallel.
- To work with tools like HBase and Hive..

COURSE OUTCOMES:

On completion of this course the student will be able to

CO1. Identify the need for big data analytics for a domain.
CO2. Explore Hadoop distributed system and its components.
CO3. Install and utilize Hadoop tool.
CO4. Design applications using Map Reducing Concepts.
Implement Big Data concepts using tools like HBase and Hive

UNIT - I BIG DATA INTRODUCTION (6)

Introduction – Characteristics of Big Data – Various V's of Data – Data in Warehouse and Hadoop – Need of Big Data Solution – Use Cases: Patterns for Big Data Deployment, IT for IT Log Analytics, The Fraud Detection Pattern, Social Media Pattern – The Call Center Mantra – Risk –Energy Sector

UNIT - II HADOOP (6)

History of Hadoop – Components – Distributed File System – Basics of Map Reduce – Hadoop Common Components – HDFS Shell Commands – Application Development in Hadoop – Other Hadoop Components

UNIT- III HADOOP OPERATIONS (6)

Setting up a Hadoop Cluster – Cluster Specification – Cluster Setup and Installation – Hadoop Configuration – Case Study: Installing Apache Hadoop.

UNIT - IV MAPREDUCE (6)

The Configuration API – Setting up the Development Environment – Writing a Unit Test With MR Unit – Running Locally on Test Data – Running on a Cluster – Anatomy of a Map Reduce Job Run – Failures – Shuffle and Sort – Task Execution

UNIT- V HBASE AND HIVE (6)

HBASE: HBasics –Concepts – Installation – Clients – Building an Online Query Application – HBase versus RDBMS – Praxis; HIVE: Installing Hive – Running Hive – Comparison with Traditional Databases – HiveQL – Tables – Querying Data.

TOTAL: 30 PERIODS

REFERENCES:

1. Chris Eaton, Dirk Deroos et al., "Understanding Big Data: Analytics For Enterprise Class Hadoop And Streaming Data", The McGraw-Hill Companies, 2012.
2. Tom White, "Hadoop: The Definitive Guide ",O Reilly 2012.
3. Frank J. Ohlhorst, Big Data Analytics ,1st Edition, Wiley, 2012

13GEZ05 ROBO DESIGN
(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- To impart knowledge about the engineering aspects of Robots and their applications.

LEARNING OUTCOMES:

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

CO1: End effectors and sensors.

CO2: Robots cell design and programming.

CO3: Industrial application of robot

UNIT I : INTRODUCTION (6)

Basic concepts - Robot anatomy - Manipulators - kinematics: Forward and inverse kinematics - Precision movement, robot specifications and Work volume, Types of Robot drives - Basic robot motions - Point to point control, continuous path control. Robot control - unit control system concept - servo and non-servo control of robot joints, adaptive and optimal control.

UNIT II : END EFFECTORS AND SENSORS (6)

End effectors - classification - mechanical, magnetic, vacuum and adhesive gripper - gripper force analysis and design. Sensor devices, Types of sensors - contact, position and displacement sensors, Force and torque sensors - Proximity and range sensors - acoustic sensors - Robot vision systems - Sensing and digitizing - Image processing and analysis.

UNIT III : ROBOT CELL DESIGN (6)

Robot work cell design and control – Safety in Robotics – Robot cell layouts – Multiple. Robots and machine interference – Robot cycle time analysis.

UNIT IV : ROBOT PROGRAMMING (6)

Robot language classification - programming methods - off and on line programming - Lead through method - Teach pendent method - VAL systems and language, simple program.

UNIT V : INDUSTRIAL APPLICATIONS (6)

Application of robots - Material handling - Machine loading and unloading, Assembly, Inspection, Welding, Spray painting, Mobile robot, Microbots - Recent developments in robotics- safety considerations.

TOTAL : 30 PERIODS

TEXT BOOKS:

1. Deb .S.R, "Robotics technology and flexible automation", Tata McGraw Hill publishing company limited, New Delhi, 2010.
2. Mikell P. Groover, "Industrial Robotics Technology Programming and Applications", McGraw Hill Co., Singapore, 2008.

REFERENCES:

1. Klafter.R.D, Chmielewski.T.A and Noggins,"Robot Engineering: An Integrated Approach", Prentice Hall of India Pvt. Ltd., New Delhi, 2011.
2. Fu K.S, Gonzalez.R.C,& Lee, C.S.G, "Robotics control, sensing, vision and intelligence", McGraw Hill Book Co., Singapore, Digitized 2007.
3. Craig.J.J, "Introduction to Robotics mechanics and contro"l, Addison- Wesley, London, 2008.

13GEZ06 CREATIVITY INNOVATION AND NEW PRODUCT DEVELOPMENT

(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- The students should develop their leadership qualities and creative thinking capability in product development.

LEARNING OUTCOMES:

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

CO1: Improve their creativity and problem solving methods.

CO2: Improve their knowledge in project selection.

CO3: Understand the Patent Laws

CO4: Know the Quality standards

UNIT I : PROJECT SELECTION **(6)**

Collection of ideas and purpose of project - Selection criteria.

UNIT II : PROJECT EVALUATION **(6)**

Screening ideas for new products (evaluation techniques).

UNIT III : NEWP RODUCT DEVELOPMENT **(6)**

Research and new product development - Patents - Patent search - Patent laws - International code for patents - Intellectual property rights (IPR).

UNIT IV : NEW PRODUCT PLANNING **(6)**

Design of proto type - testing - quality standards - marketing research - introducing new products.

UNIT V : LABORATORY **(6)**

Creative design - Model Preparation - Testing - Cost evaluation - Patent application.

TOTAL: 30 PERIODS

TEXT BOOKS:

1. Harry Nystrom; Creativity and innovation, John Wiley & Sons, 1979.
2. Brain Twiss; Managing technological innovation, Pitman Publishing Ltd., 1992.
3. Paul Sloane; The leader's guide to lateral thinking skills kogan page india, 2008.

REFERENCES:

1. Harry B, Watton, "New Product Planning", Prentice Hall Inc., 1992.
2. Khandwalla, RN.,- "Fourth Eye (Excellence through Creativity) - Wheeler Publishing",Allahabad, 1992. I.P.R. Bulletins, TIFAC, New Delhi, 1997.

13GEZ07 ENERGY AUDITING

(*Common to All branches*)

L	T	P	C
2	0	0	2

COURSE OBJECTIVE:

- To familiarize the students about energy management and energy audit

COURSE OUTCOMES:

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

CO1: Fa miliarize about forms of energy

CO2: Un derstand energy management concepts

CO3: An alyze and report the outcome of energy audit

UNIT I : FUNDAMENTALS OF ENERGY **(6)**

Basics of energy and its various forms: Conventional and non-conventional sources - Different fuels and its energy contents - Renewable energy: solar energy, wind energy, bio energy, hydro energy, geothermal energy, wave energy, tidal energy and OTEC.

UNIT II : ENERGY MANAGEMENT **(6)**

Energy management: various approaches, cost effectiveness, bench marking, optimization of energy requirement and maximization of system efficiencies - Fuels and energy substitution

UNIT III : ENERGY AUDIT **(6)**

Energy audit : need, preliminary audit, detailed audit, methodology and approach - Instruments for audit, monitoring energy and energy savings.

UNIT IV : ASSESSMENT AND REPORTING **(6)**

Evaluation of saving opportunities – Determining the savings in INR, Non-economic factors, conservation opportunities, estimating cost of implementation - Energy audit reporting: Plant energy study report, importance, effective organization, report writing and presentation.

UNIT V : ENERGY SAVINGS CASE STUDY **(6)**

Case study: Simple calculations of energy savings and conservation in process equipments like boilers, heat exchangers only.

TOTAL : 30 PERIODS

TEXT BOOKS:

1. Paul. O. Callaghan., "Energy Management", McGraw-Hill Professional Publishing, 2003.
2. Albert Thumann, "Handbook of energy audits", 6th ed., The Fairmount Press, 2003.

REFERENCES:

1. Murphy.W.R and McKay.G, "Energy Management" , Butterworths, London, 2007.
2. Steve Doty, Wayne C.Turner, " Energy Management Handbook", Fairmont Press, 7th ed., 2009.
3. Barney L. Capehart, Wayne C.Turner, William J.Kennedy, "A Guide to Energy Management", The Fairmont Press, 6th ed., 2008.

13GEZ08 - ENERGY CONSERVATION

(*Common to All branches*)

L	T	P	C
2	0	0	2

COURSE OBJECTIVE:

- To enable the students to acquire the knowledge of energy conservation measures in thermal and electrical energy systems.

COURSE OUTCOMES:

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

CO1: Understand the concepts of energy management

CO2: Measure the electrical energy conservation

UNIT I :ENERGY CONSERVATION PRINCIPLES **(6)**

Energy scenario - Principles of energy conservation - Resource availability - Energy savings - Current energy consumption in India - Roles and responsibilities of energy managers in industries.

UNIT II : ENERGY CONSERVATION IN STEAM SYSTEMS **(6)**

Power plant components - Conservation measures in steam systems, losses in boiler - Methodology of upgrading boiler performance - Blow down control, excess air control - Pressure reducing stations - Condensate recovery - Condensate pumping - Thermo compressor - Recovery of flash steam - Air removal and venting - Steam traps - Cooling towers.

UNIT III : ENERGY CONSERVATION IN FLUID MACHINERY **(6)**

Centrifugal pumps - Energy consumption and energy saving potentials - Design consideration - Minimizing over design - Fans and blowers : specification, safety margin, choice of fans, controls and design considerations - Air compressor and compressed air systems: selection of compressed air layout, energy conservation aspects to be considered at design stage.

UNIT IV : ELECTRICAL ENERGY CONSERVATION **(6)**

Potential areas for electrical energy conservation in various industries: conservation methods, energy management opportunities in electrical heating, lighting system, cable selection - Energy efficient motors - Factors involved in determination of motor efficiency - Adjustable AC drives - Variable speed drives - Energy efficiency in electrical system.

UNIT V : ENERGY MANAGEMENT **(6)**

Organizational background desired for energy management persuasion – Motivation - Publicity role - Tariff analysis - Industrial energy management systems energy monitoring - Auditing and targeting - Economics of various energy conservation schemes – Energy policy and energy labeling.

TOTAL : 30 PERIODS

TEXT BOOKS:

1. Reay.D.A, "Industrial energy conservation", Pergamon Press, 1st ed., 2003.
2. White.L.C, "Industrial Energy Management and Utilization", Hemisphere Publishers, 2002.

REFERENCES:

1. Smith.C.B, "Energy Management Principles", Pergamon Press, 2006.
2. Hamies, "Energy Auditing and Conservation; Methods, Measurements, Management and Case study", Hemisphere, 2003.
3. Trivedi. P.R and Jolka .K.R, " Energy Management", Common Wealth Publication, 2002.

13GEZ09 LAW FOR ENGINEERS

(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVE

- To familiarize the students with fundamental knowledge of laws that would be of utility in their profession.
- Enable the students to understand the new areas of law like IPR.

LEARNING OUTCOMES :

CO1: Evaluate and select the most desirable projects & Identify desirable characteristics of effective project managers.

CO2: Apply appropriate approaches to plan a new project.

CO3: Apply appropriate methodologies to develop a project schedule.

CO4: Develop a suitable budget for a new project & Identify important risks facing a new project.

UNIT 1 INTRODUCTION TO INDIAN CONSTITUTION (6)

Introduction to Constitution, Longest known Constitution, Preamble, Importance of Preamble, Justice, Liberty, Equality, Fraternity, Secular, Origin of Secularism.

UNIT 2 FUNDAMENTAL RIGHTS AND DUTIES (6)

Inalienable Human Rights, Fundamental Rights: Definition, Need, History, Suspension, Classification and Amendments, Fundamental Duties: General, Comparison with Directive Principles, List of Duties.

UNIT 3 INTELLECTUAL PROPERTY RIGHTS (IPR) (6)

Introduction to IPR, Main forms of IP, Copyrights, Trademarks, Patents and Designs, Protection in Foreign Countries, Protection inside Country, Patentable inventions, Process of obtaining patent - application, examination, opposition and sealing of patents, Duration of patents.

UNIT 4 COLLECTIVE BARGAINING (6)

Concept and Meaning of Collective Bargaining, Prerequisites of Collective Bargaining, Advantages and Disadvantages, Collective Bargaining in India.

UNIT 5 INDUSTRIAL AND INDIVIDUAL DISPUTE (6)

Industrial Dispute: Overview, Factum of Industrial Dispute, Parties to the Dispute, Subject Matter of the Dispute, Origin of the Dispute, Individual Dispute.

TOTAL : 30 PERIODS

TEXT BOOKS:

1. Brij Kishore Sharma (2011), Introduction to the Constitution of India, PHI Learning Private Limited.
2. S C Srivastava (2008), Industrial Relations and Labour Laws, VIKAS Publishing House Pvt Ltd.

REFERENCE BOOKS:

1. Agarwal H. O.(2008), International Law and Human Rights, Central Law Publications.
2. S.K. Awasthi & R.P. Kataria(2006), Law relating to Protection of Human Rights, Orient Publishing.
3. S.K. Kapur(2001), Human Rights under International Law and Indian Law, Central Law Agency.

13GEZ10 - ADVANCED MATHEMATICS FOR ENGINEERS
(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

The main objective of this paper is to gain familiarity with the application of statistics and graph theory.The paper is oriented towards the techniques needed to solve research problems.This paper is intended to help students to build the skill necessary to analyze the research oriented problems in their course of study.

UNIT I: STATISTICS **(6)**

Linear Correlation and Regression - Curve fitting - Method of least squares - Multiple Regression.

UNIT II: DISTRIBUTIONS **(6)**

Discrete and Continuous distributions: Binomial – Poisson - Geometric Distributions and Uniform – Exponential Distributions.

UNIT III: TEST OF HYPOTHESIS **(6)**

Testing hypothesis Involving Means and Proportions - Small Samples t – Test and Chi Square test.

UNIT IV: GRAPH THEORY **(6)**

Basic definitions in graphs, walk, path, circuits – Connected and Disconnected - Components - Euler graphs - Operations on graph.

UNIT V: TREES **(6)**

Properties of Trees – Distance and Centers in a tree – Rooted and Binary trees, Spanning trees - Adjacency matrix – Incidence matrix.

TOTAL : 30PERIODS

TEXT BOOKS

1. S.C.Gupta and V.K.Kapoor, "Fundamentals of Mathematical Statistics ", Sultan Chand & Co, 2002.
2. T.Veerarajan, " Probability and Random Processes", TMH,2006.
3. NarsinghDeo, "Graph Theory", Prentice – Hall of India,2004.

REFERENCES

1. P.Kandasamy, K.Thilagavathy,K.Gunavathy," Probability and Random Variable and Random Processes", S.Chand& Co Ltd, 2004.
2. V.K.Balakrishnan,"Theory and Problems of Graph Theory", Schaum'sOutlines,Tata McGraw-Hill Publishing Company ltd, New Delhi,2004.

13GEZ11 - DISASTER MANAGEMENT
(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- Develop an understanding of why and how the modern disaster manager is involved with pre-disaster and post-disaster activities
- Identify the organizations that are involved in natural disaster assistance

LEARNING OUTCOMES:

On completion of this course the students will be able to

CO1: Know the key personnel or specialists related to disaster management and associate them with the types of disasters and phases in which they are useful.
CO2: Understand the six elements of disaster management.

UNIT I : INTRODUCTION **(6)**

Introduction – Disaster preparedness – Goals and objectives of ISDR Programme- Risk identification – Risk sharing – Disaster and development: Development plans and disaster management –Alternative to dominant approach – disaster-development linkages -Principle of risk partnership

UNIT II : APPLICATION OF TECHNOLOGY IN DISASTER RISK REDUCTION **(6)**

Application of various technologies: Data bases – RDBMS – Management Information systems – Decision support system and other systems – Geographic information systems – Intranets and extranets – video teleconferencing. Trigger mechanism – Remote sensing-an insight – contribution of remote sensing and GIS - Case study.

UNIT III : AWARENESS OF RISK REDUCTION **(6)**

Trigger mechanism – constitution of trigger mechanism – risk reduction by education – disaster information network – risk reduction by public awareness

UNIT IV : DEVELOPMENT PLANNING ON DISASTER **(6)**

Implication of development planning – financial arrangements – areas of improvement – disaster preparedness – community based disaster management – emergency
response.

UNIT V : SEISMICITY **(6)**

Seismic waves – Earthquakes and faults – measures of an earthquake, magnitude and intensity – ground damage – Tsunamis and earthquakes

TOTAL: 30 PERIODS

TEXT BOOKS:

1. Pardeep Sahni, Madhavi malalgoda and ariyabandu, "Disaster risk reduction in south asia", PHI
2. Amita sinvhal, "Understanding earthquake disasters" TMH, 2010.

REFERENCES

1. Pardeep sahni, Alka Dhameja and Uma medury, "Disaster mitigation: Experiences and reflections", PHI

13GEZ12 - INDUSTRIAL PSYCHOLOGY

(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- To develop an awareness of the history and major perspectives underlying and driving the field of Industrial and Organizational (I/O) Psychology.
- To develop an understanding for the potential I/O Psychology has for society and organizations now and in the future.

LEARNING OUTCOMES:

On completion of this course the students will be able to

CO1: Understand and work effectively with a diversity of individuals and groups.

CO2: Apply theory and research to contemporary problems.

UNIT I : INTRODUCTION **(5)**

Introduction to Industrial Psychology – Definitions & Scope**.** Major influences on industrial Psychology- Scientific management and human relations schools Hawthorne Experiments

UNIT II : INDIVIDUAL IN WORKPLACE-I **(5)**

Motivation and Job satisfaction, stress management. Organizational culture, Leadership & group dynamics.

UNIT III : INDIVIDUAL IN WORKPLACE-II **(5)**

Performance Management: Training & Development.

UNIT IV : WORK ENVIRONMENT & PSYCHOLOGY **(7)**

Work Environment & Psychology-fatigue. Boredom, accidents and safety. Job Analysis, Recruitment and Selection – Reliability & Validity of recruitment tests

UNIT V: DYNAMICS OF INDUSTRIAL BEHAVIOUR **(8)**

Organizational culture and climate – Factors affecting organizational climate – Importance. Job satisfaction – Determinants – Measurements – Influence on behavior. Organizational change – Importance – Stability Vs Change – Proactive Vs Reaction change – the change process – Resistance to change – Managing change. Stress – Work Stressors – Prevention and Management of stress – Balancing work and Life. Organizational development – Characteristics – objectives –. Organizational effectiveness Developing Gender sensitive workplace

TOTAL: 30 PERIODS

REFERENCES:

1. Miner J.B. (1992) Industrial/Organizational Psychology. N Y : McGraw Hill.
2. Blum & Naylor (1982) Industrial Psychology. Its Theoretical & Social Foundations CBS Publication.
3. Aamodt, M.G. (2007) Industrial/Organizational Psychology : An Applied Approach (5th edition) Wadsworth/Thompson : Belmont, C.A.
4. Aswathappa K. (2008). Human Resource Management (fifth edition) New Delhi : Tata McGraw Hill.

13GEZ13 PROJECT MANAGEMENT

(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- To know stages of project management in an organization
- To understand the roles and responsibilities of a project manager

COURSE OUTCOMES:

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

CO1: Demonstrate the skill set of a project manager

CO2: Apply project management concepts by identifying and carrying out a real time project

UNIT I : PROJECTS, PROJECT MANAGEMENT AND PROJECT MANAGER (6)

Project Management - process context - interpersonal and behavioral context - organizational context - defining project success - responsibilities of project manager - common challenges expected to face - skill requirements and functional competencies - unofficial job duties - value of introspection and self awareness to the soft side

UNIT II : PROJECT DEFINITION, EFFECTIVE TEAM BUILDING (6)

Evolution of projects - understanding the problem - identification of optimum solution - development of solution and preliminary plan - formal launching of project - evaluation of political environment - mechanics of building a team - team leadership - fostering teamwork and synergism - getting the most from team members

UNIT III : PROJECT PLANNING, RISK AND UNCERTAINTY (6)

Project Planning - estimating - scope management - time management - cost management - project management software - understanding risk and uncertainty - managing risk - identifying what can hurt you - quantifying how badly you can get hurt - analyzing the biggest threats - responding to high-threat problems - accommodating uncertainty

UNIT IV : PROJECT CONTROL AND INTERFACES (6)

Project Control - Establishing a Baseline of Measurement - Information Needs - Information Gathering - ensuring Good Information - Analyzing the Information - Reacting to the Information - Project Interfaces - Roles of Internal Stakeholders and External Stakeholders - Other Interfaces - Considerations in Interface Management

UNIT V : PROJECT COMMUNICATION, DOCUMENTATION AND CONCLUSION (6)

Configuration plan - documentation and communication road map - methods of communicating - guidelines for effective communication - conducting high quality meetings - communication skills - key project documentation - early termination - key elements in project closure - punch list approach - project completion checklist

TOTAL : 30 PERIODS

TEXT BOOK:

1. Gary R. Heerkens, "Project Management", 2nd ed., McGraw-Hill Book Company , 2013

REFERENCES:

1. Harold Kerzner, "Project Management", 10th ed., Wiley India Pvt Ltd., 2013
2. John M Nicholas, Herman Steyn, "Project Management for Engineering, Business and Technology", Routledge Publications, 2012
3. Prasanna Chandra, "Projects : Planning, Analysis, Selecting, Financing, Implementation and Review", 7th ed., Tata McGraw Hill Education Private Ltd., 2009
4. Clifford F Gray, Eric W Larson, Gautam V Desai, "Project Management: The Managerial Process", 4th ed., Tata McGraw Hill Education Private Ltd., 2011

13GEZ14 QUALITY MANAGEMENT AND ECONOMICS

(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- To know the stages of quality management in an organization and economic aspects
- To understand the roles and responsibilities of an engineer in quality management.

COURSE OUTCOMES:

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

CO1: Demonstrate the skill set of engineer in quality management

CO2: Apply quality management concepts in an organization for process improvement

UNIT I : ORGANIZING AND PLANNING FOR QUALITY (6)

Categorizing duties - breaking categories into classifications - basic functional structure - authority, accountability and responsibility - authority principles - revise and adjust - communication - planning for quality - objectives - setting business metrics - planning - business quality, process and product quality, project, product verification and validation - policies, procedures and objectives - forms and records - blueprints - process flowcharting

UNIT II : CONTROLLING, STAFFING, MOTIVATING FOR QUALITY (6)

Introduction - organizational responsibility - role of quality management - quality report - activity reporting - journalizing procedure - posting - product performance reporting - analysis - controlling nonconformance identification - segregation - disposition - CAPA methodology - forecasting human resources needs - job descriptions - education and training - lead, coach and guide - leadership styles - rewards based upon performance-praise and censure fairly - motivating environment

UNIT III : SPECIAL TOPICS IN QUALITY (6)

Overview of statistical methods - risk analysis - reliability engineering - systems analysis - auditing - audit planning and scheduling - sampling plans - audit implementation steps - notification to auditee - opening meeting information, verification and evaluation - audit observations - audit supervision - audit follow up - preparation of the report - content of the report - reporting the audit - cost of quality

UNIT IV : INTRODUCTION TO ECONOMICS AND MARKET EFFICIENCY (6)

Ten principles of economics - people's interest and decision making - interaction of people - economy - Thinking like an economist - economist as scientist - economist as policy advisor - why economists disagree - consumers, producers and efficiency of markets - consumer and producer surplus - market efficiency - Supply, demand and government policies - controls on prices, taxes, subsidies

UNIT V : SUPPLY AND DEMAND (6)

Market forces of supply and demand - markets and competition - demand - supply - supply and demand together - elasticity and its applications - the theory of consumer choice - standard economic model, budget constraint, preferences, optimization, Consumer behavior - firms in competitive markets - production and costs - various measures of cost - Costs in the short run and in the long run - competitive market - profit maximization

TOTAL : 30 PERIODS

TEXT BOOKS:

1. Peter D. Mauch, "Quality Management", CRC Press, 2010
2. Gregory Mankiw N and Mark P. Taylor, "Economics", 3rd ed., Cengage Learning, 2010

REFERENCES:

1. David Hoyle, "Quality Management Essentials", 1st ed., Elsevier, 2007
2. Mohamed Zairi, Total Quality Management for Engineers", Wood Head publishing Limited, 1991
3. Irvin B. Tucker, "Economics for Today", 7th ed., Cengage Learning, 2011

LANGUAGE ELECTIVES

13GEY01 HINDI LANGUAGE
(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- To impart knowledge in Hindi.
- To introduce the language skills, vocabulary, grammar to the students.
- To introduce themselves and initiate a conversation.
- To develop the ability among the students to read and understand small texts written in Hindi.
- To enable the students to elementary conversational skills.

COURSE OUTCOME:

On completion of this course the students will be able to

CO1: Achieve proficiency in Hindi.
CO2: Develop their different skills in Hindi language.
CO3: Develop their skills in communicative Hindi.
CO4: Express their ideas in Hindi language.

UNIT I : BASIC SOUNDS & LETTERS/LETTER-SOUNDS **(6)**

Letters – Consonants & Vowels - Joining Words – Numbers - Gender.

UNIT II : GRAMMAR **(6)**

Basic Grammatical Structure- Usage of Noun, Pronoun and Verb – Basic sentence Pattern – Tenses – Phrases.

UNIT III : COMPOSITION **(6)**

Short story collections - Lesson – Letter Writing- Filling the blanks.

UNIT IV : READING **(6)**

Poem – Short-story – Newspaper - Letters.

UNIT V: SPEAKING **(6)**

Short Conversation – Self-introduction – Asking questions.

TOTAL : 30 PERIODS

TEXT/ REFERENCES BOOKS:

13GEY02 GERMAN LANGUAGE
(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

To enable students

- To introduce the language, phonetics and the special characters in German language
- To introduce German culture and traditions to the students.
- To introduce themselves and initiate a conversation..
- To develop the ability among the students to read and understand small texts written in German.
- To enable the students to elementary conversational skills.

COURSE OUTCOME:

On completion of this course the students will be able to

CO1: Achieve proficiency in German.

CO2: Identify German culture and traditions.

CO3: Read and Understand the text written in German.

CO4: Express their ideas in German.

UNIT I: **(6)**

Wichtige Sprachhandlungen: Phonetics – Sich begrüßen - Sich und andere vorstellen formell / informell - Zahlen von 1 bis 1 Milliarde - verstehen & sprechen.
Grammatik: regelmäßige Verben im Präsens - "sein" und haben im Präsens - Personalpronomen im Nominativ.

UNIT II: **(6)**

Wichtige Sprachhandlungen: Telefon Nummern verstehen und sprechen Uhrzeiten verstehen und sagen Verneinung "nicht und kein" (formell und informell).
Grammatik : Wortstellung – Aussagesatz – W-Frage und Satzfrage (Ja/Nein Frage) Nomen buchstabieren und notieren bestimmter und unbestimmter Artikel und Negativartikel im Nom. & Akkusativ.

UNIT-III: **(6)**

Wichtige Sprachhandlungen: Tageszeiten verstehen und über Termine sprechen -Verabredungen verstehen - Aufgaben im Haushalt verstehen.
Grammatik: Personalpronomen im Akkusativ und Dativ - W-Fragen "wie, wer, wohin,wo, was usw.- Genitiv bei Personennamen - Modalverben im Präsens "können, müssen, möchten".

UNIT IV: **(6)**

Wichtige Sprachhandlungen: Sich austauschen, was man kann, muss – Bezeichnungen Lebensmittel – Mengenangaben verstehen – Preise verstehen und Einkaufzettel schreiben
Grammatik: Wortstellung in Sätzen mit Modalverben – Konnektor "und" – "noch"- kein-------mehr – "wie viel, wie viele, wie alt, wie lange" –Possessivartikel im Nominativ.

UNIT V: **(6)**

Wichtige Sprachhandlungen: Freizeitanzeigen verstehen – Hobbys und Sportarten Anzeigen für Freizeitpartner schreiben bzw. darauf antworten – Vorlieben und Abneigungen ausdrucken
Grammatik: Verben mit Vokalwechsel im Präsens – Modalverben im Präsens " dürfen, wollen und mögen- "haben und sein" im Präteritum – regelmäßige Verben im Perfekt – Konnektoren "denn, oder, aber.

TOTAL : 30 PERIODS

TEXT/ REFERENCES BOOKS

1. Studio d A1. Deutsch als Fremdsprache with CD.(Kursbuch und Sprach training).

13GEY03 JAPANESE LANGUAGE
(*Common to All branches*)

L	T	P	C
2	0	0	2

OBJECTIVES:

- To help students learn the Japanese scripts.
- To make the students acquire basic conversational skills.
- To enable students to know about Japan and Japanese culture.
- To create an advantageous situation for the students to have better opportunity for employability by companies who have association with Japan.
- To enable the students to elementary conversational skills.

COURSE OUTCOME:

On completion of this course the students will be able to

CO1: Understand the Japanese scripts.
CO2: Understand the culture and traditions.
CO3: Read and Understand the text written in Japanese.
CO4: Express their ideas in Japanese in Written and Spoken form.

UNIT I: **(6)**

1. Introduction to Japanese language. Hiragana Chart 1 - vowels and consonants and related vocabulary.
2. Self introduction
3. Grammar – usage of particles wa, no, mo and ka and exercises
4. Numbers (1-100)
5. Kanji – introduction and basic kanjis – naka, ue, shita, kawa and yama
6. Greetings, seasons, days of the week and months of the year
7. Conversation – audio
8. Japan – Land and culture.

Conversation – audio

UNIT II: **(6)**

1. Hiragana Chart 1 (contd.) and related vocabulary
2. Grammar – usage of kore, sore, are, kono, sono, ano, arimasu and imasu. Particles – ni (location) and ga. Donata and dare.
3. Numbers (up to 99,999)
4. Kanji – numbers (1-10, 100, 1000, 10,000 and yen)
5. Family relationships and colours.
6. Conversation – audio
7. Festivals of Japan.

Conversation – audio

UNIT III: **(6)**

Hiragana Charts 2&3, double consonants, vowel elongation and related vocabulary
Grammar - particles ni (time), kara, made and ne. Koko, soko, asoko and doko.
Time expressions (today, tomorrow, yesterday, day before, day after)
Kanji – person, man, woman, child, tree and book
Directions – north, south, east and west.

UNIT IV: **(6)**

Grammar - directions,-kochira, sochira, achira and dochira. Associated vocabulary (mae, ushiro, ue, shita, tonari, soba, etc.)
Conversation – audio, Japanese art and culture like ikebana, origami, etc.

UNIT V: **(6)**

Kanji – hidari, migi, kuchi
Japanese sports and martial arts
Adjectives (present/past – affirmative and negative)
Conversation – audio

TOTAL=30 PERIODS

TEXT/ REFERENCES BOOKS

1. First lessons in Japanese, ALC Japan