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 Syllabus
for I YEAR
B.E –Electrical and Electronics Engineering [R15]

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

JUNE 2015

Approved by third Academic council

NANDHA ENGINEERING COLLEGE

(Autonomous Institution Affiliated to Anna University, Chennai)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

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, ERODE-52

REGULATIONS 2015

B.E – EEE [R15]

I & II SEMESTERS (FULL TIME) CURRICULUM AND SYLLABUS

SEMESTER I

Theory					
Course Code	Course Title	**L**	**T**	**P**	**C**
15EY101	Communicative English	1	0	2	2
15MY103	Linear Algebra and Multivariable Calculus	3	2	0	4
15PY101	Engineering Physics	3	0	0	3
15CY101	Engineering Chemistry	3	0	0	3
15MEC01	Engineering Graphics	2	0	2	3
15CSC01	Problem Solving and C Programming	3	0	0	3

PRACTICAL					
Course code	**Course Title**	**L**	**T**	**P**	**C**
15GY111	Physics and Chemistry Laboratory I	0	0	4	2
15GY112	Soft Skills - I	0	0	2	1
15CSC11	Computer Programming Laboratory	0	0	2	1
15GYC11	Engineering Practices Laboratory	0	0	4	2
	TOTAL	15	2	16	24

SEMESTER II

Theory					
Course Code	Course Title	**L**	**T**	**P**	**C**
15EY201	Professional English	1	0	2	2
15MY203	Differential Equations, Vector Calculus and Complex Variables	3	2	0	4
15PY203	Solid State Physics	3	0	0	3
15CY201	Environmental Science and Engineering	3	0	0	3
15CE201	Basics of Civil and Mechanical Engineering	3	0	0	3
15EE201	Electric Circuit Theory	3	2	0	4

PRACTICAL					
Course code	**Course Title**	**L**	**T**	**P**	**C**
15GY211	Physics and Chemistry Laboratory II	0	0	4	2
15GY212	Soft Skills - II	0	0	2	1
15EE211	Electric Circuits Laboratory	0	0	4	2
	TOTAL	16	4	12	24

15EY101 - COMMUNICATIVE ENGLISH
(Common to All branches)

L	T	P	C
1	0	2	2

OBJECTIVES:

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

COURSE OUTCOMES:

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

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

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

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

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

CO5: Develop their professional communication skills.

UNIT I: GRAMMAR **(9)**

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

UNIT II: VOCABULARY **(9)**

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

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

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

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

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

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

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

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

TEXT/ REFERENCES BOOKS:

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

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

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

15MY103 LINEAR ALGEBRA AND MULTIVARIABLE CALCULUS

(Common to EEE,ECE and E&I Branches)

L	T	P	C
3	2	0	4

OBJECTIVES:

- To develop the use of matrix algebra technique for practical application.
- To enable the students to learn about three dimensional Cartesian coordinates and discuss the problems in Straight line, Plane and Sphere.
- To understand effectively the series, the geometric aspect of curvature, maxima , minima concept as elegant application of differential equation.
- To familiarize the students with functions of several variables, which is applied in electrical and Communication branch of engineering.
- To acquiant the students with mathematical tools needed in evaluating multiple integrals and their usage.

COURSE OUTCOMES:

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

CO1: Equip the students in basic knowledge and understanding of Matrices.

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

CO3: To learn the method of solving differential equations of certain types, including systems of differential Equations.

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)**

Characteristics equation-Eigen values and Eigen vectors of a matrix-Properties (statement only)-Cayley-Hamilton theorem (excluding proof) and its applications-Orthogonal transformations of symmetric matrix to diagonal form-Quadratic form-Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT II -ANALYTICAL GEOMETRY OF 3-DIMENSIONS . **(9)**

Direction cosines and ratio's, angle between two lines-Equation of plane-Angle between two planes-Equation of straight lines, co-planar lines, skew lines-Equations of sphere, plane section of a sphere ,tangent plane , orthogonal spheres.

UNIT III – SERIES AND GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS. **(9)**

Series : Convergence and divergence- Comparison test- Ratio test- Curvature in Cartesian co-ordinates-Centre and Radius of curvature - Circle of curvature- Evolutes and Envelopes.

UNIT IV –FUNCTIONS OF SEVERAL VARIABLES. **(9)**

Functions of two variables, Partial derivatives, total derivatives- 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)**

Double and triple integrals in Cartesian and polar Co-ordinates- Change of order of integration-Change of variables from Cartesian to polar co-ordinates. **Applications:** Area as a double integral and volume as triple integral in Cartesian co-ordinates.

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

TEXT BOOKS:

1. Grewal.B.S ., "Higher Engineering Mathematics",40th Edition, Khanna Publishers, New Delhi,2007.
2. Erwin Kreyszig., " Advanced Engineering Mathematics ",John Wiley and sons (Wiley student Edison), 10th Edition,2011.
3. Veerarajan.T., "Engineering Mathematics"(for first year),Reprint Edition 2011,Tata McGraw-Hill, New Delhi.

REFERENCES:

1. Kandasamy.P, Thilagavathy. K andGunavathy. K," Engineering Mathematics" (for first year B.E/ B.Tech), Reprint Edition 2011,S.Chand and Co., New Delhi.
2. Bali.N.P., Manish Goyal," Engineering Mathematics", University Science Press, New Delhi, First Edition,2012.
3. Venkatasubramanian. N.K.,"Engineering Mathematics",Vikas Publishing House Private Ltd,(2000).
4. ManicavachagomPillai T.K., Natarajan T., Ganapathy K.S., "Algebra", Viswananthan Publishers.

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

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

15PY101 - ENGINEERING PHYSICS
(Common to All Branches)

L	T	P	C
3	0	0	3

OBJECTIVES:

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

COURSE OUTCOMES:

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

CO1: Acquire knowledge regarding Acoustics and ultrasonic.
CO2: Applying knowledge in the areas of laser and fiber optic technique.
CO3: Design the sensors using the knowledge of fiber optics
CO4: Gaining knowledge about wave, particle nature and matter waves
CO5: Analyze the different kind of crystal structures and gain knowledge about crystal growth.

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

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

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

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

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

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

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

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

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

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

UNIT V - CRYSTALOGRAPHY **(9)**

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

TOTAL (L:45) = 45 PERIODS

TEXT BOOKS:

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

REFERENCES:

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

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

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

15CY101 - ENGINEERING CHEMISTRY
(Common for all Branches)

L	T	P	C
3	0	0	3

OBJECTIVES:

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

COURSE OUTCOMES:

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

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

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

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

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

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

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

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

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

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

TOTAL (L:45) = 45 PERIODS

TEXT BOOKS:

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

REFERENCES:

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

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

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

15MEC01- ENGINEERING GRAPHICS

(Common to All B.E Programmes except MECH. Engg.)

L	T	P	C
2	0	2	3

OBJECTIVES:

- To learn to take data and transform it into graphic drawings
- To learn basic engineering drawing and standards related to technical drawing
- To understand and practice the drawings

COURSE OUTCOMES:

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

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

Concepts and Conventions:

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

UNIT I : GEOMETRICAL CONSTRUCTIONS AND PLANE CURVES (12)

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

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

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

UNIT III : PROJECTION OF SOLIDS (12)

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

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

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

UNIT V : ISOMETRIC, PERSPECTIVE PROJECTIONS & BUILDING DRAWING (12)

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

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

TEXT BOOK:

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

REFERENCES:

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

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

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

15CSC01- PROBLEM SOLVING AND C PROGRAMMING

(Common to All B.E Programmes except CSE & IT Branches)

L	T	P	C
3	0	0	3

OBJECTIVES :

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

COURSE OUTCOMES:

CO1: At the end of this course, the students will be able to
CO2: Understand the basic terminology used in computer programming.
CO3: Use different data types in a computer program.
CO4: Design programs involving decision structures, loops and functions.
CO5: Explain the difference between call by value and call by reference.
CO6: Understand the dynamics of memory by the use of pointers.

UNIT-I: INTRODUCTION TO COMPUTERS (9)

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

UNIT-II: PROBLEM SOLVING & PROGRAMMING (9)

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

UNIT-III: CONTROL STRUCTURES AND ARRAYS (9)

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

UNIT-IV: POINTERS & FUNCTIONS (9)

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

UNIT-V: STRUCTURES, UNIONS AND FILES (9)

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

TOTAL(L:45) : 45 HOURS

TEXT BOOKS:

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

REFERENCES:

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

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

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

15GY111 - PHYSICS AND CHEMISTRYLABORATORY- I

(Common to All Branches)

L	T	P	C
0	0	4	2

OBJECTIVES:

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

COURSE OUTCOMES:

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

CO1: Acquire the fundamental knowledge in optics such as interference, diffraction and to understand about the spectral instruments.
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 conductance, hardness producing ions, alkalinity, conductance, EMF and pH
CO5: Understand the impact of water quality and to solve engineering problems

LIST OF EXPERIMENTS:

PHYSICS LABORATORY- II

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

CHEMISTRY LABORATORY- II

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

.

TOTAL (P:60) = 60 PERIODS

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

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

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

L	T	P	C
0	0	2	1

OBJECTIVES:

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

COURSE OUTCOMES:

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

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

UNIT I **(6)**

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

UNIT II **(6)**

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

UNIT III **(6)**

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

UNIT IV **(6)**

Out of box thinking and General behaviours.

UNIT V **(6)**

Preparing Resume and Report.

TOTAL (P:30) = 30 PERIODS

REFERENCE:

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

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

Mapping of COs and POs												
	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
4								x		x		x
5								x		x		x

15CSC11 COMPUTER PROGRAMMING LABORATORY

(Common to All Branches except CSE & IT)

L	T	P	C
0	0	2	1

OBJECTIVES:

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

COURSE OUTCOMES:

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

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

Word Processing

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

Spread Sheet

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

RAPTOR –Tool

6. Drawing - flow Chart

C-Programming

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

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS

Hardware

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

Software

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

TOTAL (P:30) = 30 PERIODS

Mapping of Course Outcome and Programme Outcome

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

15GYC11 ENGINEERING PRACTICES LABORATORY

(Common to All Branches)

L	T	P	C
0	0	4	2

OBJECTIVES:

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

COURSE OUTCOMES:

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

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

CO2: 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.

CO3: Get familiarity with the testing of capacitors, diodes, transistors with Analog multimeter or Digital multimeter.

CO4: Understand the principles of electrical circuits and electronics, and analysis, synthesis, and experimental techniques for both analog and digital electronic circuits

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

GROUP-A (MECHANICAL AND CIVIL ENGINEERING)

I - CIVIL ENGINEERING PRACTICE (15)

Buildings:

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

Plumbing Works:

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

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

Carpentry using Power Tools only:

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

II - MECHANICAL ENGINEERING PRACTICE (15)

Welding:

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

Basic Machining:

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

Sheet Metal Work:

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

GROUP - B (ELECTRICAL AND ELECTRONICS)

ELECTRICAL ENGINEERING PRACTICE **(15)**

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

ELECTRONICS ENGINEERING PRACTICE **(15)**

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

TOTAL (P:60) : 60 PERIODS

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

Mapping of COs and POs												
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				
4	x				x	x		x				
5	x				x	x		x				

15EY201- PROFESSIONAL ENGLISH
(Common to All Branches)

L	T	P	C
1	0	2	2

OBJECTIVES:

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

COURSE OUTCOMES:

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

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

UNIT I: GRAMMAR **(9)**

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

UNIT II: VOCABULARY **(9)**

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

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

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

UNIT IV: READING **(9)**

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

UNIT V: WRITING **(9)**

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

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

TEXT/ REFERENCES BOOKS:

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

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

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

15MY203 - DIFFERENTIAL EQUATIONS,VECTOR CALCULUS AND COMPLEX VARIABLES

(Common to EEE,ECE and E&I Branches)

L	T	P	C
3	2	0	4

OBJECTIVES:

- To make the students acquire sound knowledge in solving ordinary differential equations.
- To acquaint the students with the concept of vector calculus needed in all engineering discipline.
- To understand the analytic function and their interesting properties.
- To know the basics of complex integration and the concept of contour integration which is important in evaluating the certain integrals.
- To understand the concept of Laplace transforms and its application to ordinary differential equations.

COURSE OUTCOMES:

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

CO1: To develop the fundamentals and basic concepts in Ordinary differential equation. Also to solve problems related to engineering applications by using these techniques.

CO2: Have a sound knowledge of Laplace transform and its properties and sufficient exposure to solution of certain linear differential equations using the Laplace transform techniques which have applications in other subjects of the current and higher semesters.

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 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.

UNIT I – ORDINARY DIFFERENTIAL EQUATIONS & ITS APPLICATIONS. **(9)**

Linear higher order differential equations with constant coefficients –Method of Variation of Parameters, Cauchy's and Legendre's equation- Simultaneous differential equations with constant coefficients. **Application of ODE:**Solution of specified differential equation connected with simple electric circuits(Differential equation and associated conditions need to be given).

UNIT II -LAPLACE TRANSFORMATIONS **(9)**

Laplace transform: Condition for existence, Transforms of elementary function - Basic properties-Transforms of derivatives and integrals - Transforms of periodic functions.

Inverse Laplace Transform: Convolution Theorem (Excluding proof) , Initial and Final Value Theorem-Solution of linear second order ordinary differential equation with Constant Coefficients using Laplace transformations**.**

UNIT III – ANALYTIC FUNCTIONS **(9)**

Functions of a complex variables –Analytic function-Necessary and sufficient Conditions of Cauchy's –Riemann equations, Properties of an analytic function, Harmonic Conjugate ,Construction of an Analytic function by Milne's Thomson Method, **Conformal Mapping :** $\omega = c+z$, cz, $1/z$ and Bilinear Transformation.

UNIT IV –COMPLEX INTEGRATIONS **(9)**

Statement of Cauchy's integral theorem and Cauchy's integral formula - Simple applications -Taylor's and Laurent's expansion - Singular points – Residues - Statement of Cauchy's Residue's theorem - Evaluation of Contour integration over unit Circle and semi Circle(Excluding Poles on real axis).

UNIT V – VECTOR CALCULUS **(9)**

Vector Differentiation: Scalar and Vector Valued function, Gradient, Directional derivatives, Divergence, Curl, Irrotational , Solenoidal and Scalar Potential.

Vector Integration: Line, surface, volume integrals, Green's,Stoke's and Gauss divergence theorem(only statements),Simple application involving square, rectangles, Cube, Parallelopiped**.**

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

TEXT BOOKS:

1. Grewal.B.S ., "Higher Engineering Mathematics",40th Edition, Khanna Publishers, New Delhi,2007.
2. Erwin Kreyszig., " Advanced Engineering Mathematics ",John Wiley and sons (Wiley student Edison), 10th Edition,2011.
3. Veerarajan.T., "Engineering Mathematics"(for first year),Reprint Edition 2011,Tata McGraw-Hill, New Delhi.

REFERENCES:

1. Kandasamy.P, Thilagavathy. K andGunavathy. K," Engineering Mathematics" (for first year B.E/ B.Tech), Reprint Edition 2011,S.Chand and Co., New Delhi.
2. Bali.N.P., Manish Goyal," Engineering Mathematics", University Science Press, New Delhi, First Edition,2012.

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

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

15PY203 - SOLID STATE PHYSICS

(Common to EEE, ECE& EIE branches)

L	T	P	C
3	0	0	3

OBJECTIVES:

- To provide the basic ideas in electrical conduction, conductors, semiconductors, dielectrics and nano technology.
- To understand the fundamental concepts on solid state physics.
- To provide the basic knowledge in dielectric materials and fabrication of integrated circuits.
- To update the recent development about modern engineering materials.

COURSE OUTCOMES:

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

CO1: Acquire knowledge about conductors, semiconductors and super conductors.
CO2: Classify the intrinsic and extrinsic semiconductors.
CO3: Understand the dielectrics and its applications.
CO4: Gain knowledge about fabrication of integrated circuits
CO5: Aware of recent trends in nanotechnology.

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

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

UNIT II - SEMICONDUCTING MATERIALS & SUPERCONDUCTING MATERIALS **(9)**

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

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

UNIT III - DIELECTRIC MATERIALS **(9)**

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

UNIT IV - FABRICATION PROCESS USING SEMICONDUCTOR AND DIELECTRICS **(9)**

Bulk crystal growth-Epitaxial growth- masking and etching-diffusion of impurities-selective diffusion-formation of PN junction- resistors- capacitors-inductors-isolation methods-metal semiconductor contact. Introduction to integrated circuit, monolithic and hybrid circuits, thin film and thick film technology. Definition of LSI, MSI, VLSI circuits.

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

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

TOTAL (L:45) = 45 PERIODS

TEXT BOOKS:

1. V.Rajendran, “Engineering Physics”, Tata McGraw-Hill. New Delhi.2011
2. P.K.Palanisami, “Physics for Engineers-Volume I”, Scitech publications (India) Pvt.Ltd, Chennai, 2002
3. M.N.Avadhanulu, P.G.Kshirsagar “A Text book of Engineering Physics”, S.Chand, 2011.

REFERENCES:

1. Jacob Millman, Charistos C Halkilas, Satyabrata Jit “Electronic Devices & Circuits”, Tata McGraw Hill Education Private Limited, 2010, Third Edition.
2. Ben G.Streetman, Sanjay Banerjee, “Solid State Electronic Devices”, Pearson Education, 2006, Fifth Edition.
3. G.Senthil Kumar, N.Iyandurai, “Physics-II”, VRB Publishers, 2005-2006, Revised Edition.
4. S.O. Pillai, “Solid State Physics”, New Age International Publications, New Delhi, 2010.

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

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

15CY201 - ENVIRONMENTAL SCIENCE AND ENGINEERING

(Common for All Branches)

L	T	P	C
3	0	0	3

OBJECTIVES:

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

COURSE OUTCOMES:

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

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

UNIT- II ECOSYSTEMS AND BIODIVERSITY (9)

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

UNIT - III ENVIRONMENTAL POLLUTION (9)

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

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT (9)

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

UNIT V HUMAN POPULATION AND THE ENVIRONMENT (9)

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

TOTAL (L: 45) = 45 PERIODS

TEXTBOOKS:

1. Anubha Kaushik and C.P. Kaushik, Environmental Science and Engineering, New Age International Publishers, New Delhi (2006)
2. "Elements of Environmental Science and Engineering", P.Meenakshmi, Prentice-Hall of India, New Delhi (2005).
3. Dr.A.Ravikrishnan,Environmental Science and Engineering.,Sri Krishna Hitech Publishing co. Pvt .Ltd., Chennai,13 th Edition (2012).

REFERENCES:

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

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

Mapping of COs and POs												
	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			
4	x		x				x	x	x			
5	x	x		x	x							

15CE201 - BASIC CIVIL AND MECHANICAL ENGINEERING
(Common to EEE and EIE branches)

L	T	P	C
3	0	0	3

OBJECTIVES:

- To demonstrate a basic level of professional skills needed to practice Civil or Construction Engineering.
- To solve fundamental Civil or Construction Engineering problems

COURSE OUTCOMES:

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

CO1: Describe the methods of surveying, evaluation of areas and Civil Engineering materials
CO2: List the building components and methods applicable to various structures.
CO3: Identify the sources of energy and their conversion techniques.
CO4: Explain the components of IC engines, fuel supply, cooling and lubricating systems
CO5: Demonstrate the working principles of Refrigeration and Air conditioning systems

A - Civil Engineering

UNIT I SURVEYING AND CIVIL ENGINEERING MATERIALS (9)

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

UNIT II - BUILDING COMPONENTS AND STRUCTURES (9)

Foundations: Types, Bearing capacity -Requirement of good foundations. Superstructure: Brick masonry -stone masonry -beams -columns -lintels -roof -flooring -plastering - Roads Classification of Rural and urban Roads.

B – Mechanical Engineering

UNIT I : SOURCES OF ENERGY (9)

Conventional and Non-Conventional Sources of Energy, Comparison of sources of Energy. Working principle of power plants-Thermal, Nuclear, Diesel and Hydro Electrical power plant, Non-Conventional Power Generation Systems-Solar, Wind, Tidal, Geothermal Power Plant.

UNIT II : INTERNAL COMBUSTION ENGINE (9)

Heat Engine-Classification of I.C Engines, Components of IC Engine, Four stroke petrol and Diesel Engine, Two stroke petrol and Diesel Engine, Comparison of four stroke and two stroke cycle Engines. Fuel supply system in petrol and diesel Engines. Cooling system and lubrication system of I.C Engines.

UNIT III : REFRIGERATION AND AIR CONDITIONING SYSTEM (9)

Principle of Refrigeration: Properties of Refrigerants, List of commonly used Refrigerants-Terminology. Principle of vapour compression and absorption system – Principle of Air Conditioning– Window and Split type room Air conditioner, Inverter type Air conditioner.

TOTAL (L:45) = 45 PERIODS

TEXT BOOKS:

1. Venugopal K. and Prabhu Raja V., "Basic Civil and Mechanical Engineering", 3rd Edition, Anuradha Publications, 2010.
2. Shanmugam G and Palanichamy M S, "Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Co., New Delhi, 2009.

REFERENCE:

1. Ramesh Babu.V, Text book on Basic Civil & Mechanical Engineering, VRP publication, 2009.

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

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

15EE201 - ELECTRIC CIRCUIT THEORY

(Common to EEE & EIE Branches)

L	T	P	C
3	2	0	4

OBJECTIVES:

- To motivate the students for solving AC and DC circuits
- To impart knowledge on finding the transient response of series and parallel AC and DC circuits
- To motivate the students for analyzing three phase 3 wire, three phase 4 wire circuits and the concept of power measurement

COURSE OUTCOMES:

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

CO1: Apply knowledge of theorems to analyze and design electric circuits.
CO2: Understand about the resonant circuits, tuned circuits, mutual conductivity and mutual inductance.
CO3: Understand in depth of transient response of RL, RC and RLC networks using Laplace and classical method of analysis
CO4: Identify transient and steady state response of the circuits subjected to step and sinusoidal excitations
CO5: Ability to solve problems in the topics listed above

UNIT I - BASIC CIRCUITS ANALYSIS **(9)**

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

UNIT II - NETWORK REDUCTION AND NETWORK THEOREMS FOR DC AND AC CIRCUITS **(9)**

Network reduction: Voltage and current division rule, Source transformation, Star delta conversion. Network theorems : Superposition Theorem , Thevenins Theorem , Norton Theorem, Maximum power transfer theorem, Reciprocity Theorem.

UNIT III - RESONANCE AND MAGNETIC COUPLED CIRCUITS **(9)**

Resonance : Types of resonance, Frequency response, Quality factor and Bandwidth - Coupled Circuits : Self and mutual inductance, Co-efficient of coupling – Tuned circuits: Single tuned circuits. Magnetic circuits: Terminologies, comparison between Electric and Magnetic circuits.

UNIT IV - TRANSIENT RESPONSE FOR DC AND AC CIRCUITS **(9)**

Transient response of RL, RC and RLC Circuits using Laplace transform for DC and AC sinusoidal inputs - Two port networks: Z, Y and h parameters.

UNIT V - THREE PHASE AC CIRCUITS **(9)**

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

TOTAL (L:45+T:30) : 60 PERIODS

TEXT BOOKS:

1. William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, “Engineering Circuits Analysis”, 8th ed., Tata McGraw Hill publishers, New Delhi, 2012.
2. David Bell, “Fundamentals of Electric circuits”, Oxford University Press, 7th ed., 2009

.

REFERENCES:

1. S.R. Paranjothi, "Electric Circuits Analysis," New Age International Ltd., New Delhi, 4thed., 2014.
2. A.Sudhakar and S.P. Shyarn Mohan, "Circuits and Network Analysis and Synthesis", Tata McGraw Hill publishers, 4th ed., 2010.
3. Charles K. Alexander and Mathew N.O. Sadiku, “Fundamentals of Electric Circuits", 5th ed., Tata McGraw Hill publishers, 2012.

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

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

15GY211 - PHYSICS AND CHEMISTRY LABORATORY- II
(Common to All Branches)

L	T	P	C
0	0	4	2

OBJECTIVES:

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

COURSE OUTCOMES:

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

CO1: Acquire the practical knowledge in various moduli.
CO2: Gain the practical knowledge about band gap of a semiconductor and optoelectronic devices and 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

LIST OF EXPERIMENTS:

PHYSICS LABORATORY- II

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

CHEMISTRY LABORATORY- II

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

.

TOTAL (P:60) = 60 PERIODS

Mapping of Course Outcome and Programme Outcome

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

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

L	T	P	C
0	0	2	1

OBJECTIVES:

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

COURSE OUTCOMES:

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

CO1: Narrate stories by their own.
CO2: Develop their leadership qualities for the betterment of the team.
CO3: Demonstrate the ability to evaluate an event or situation, identify the problem and alternate solutions, and make a recommendation
CO4: Acquire strategic knowledge about how to manage time.
CO5: Overcome stress making factors in society.

UNIT I **(6)**

Effective presentation strategies – Story telling – Visual communication.

UNIT II **(6)**

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

UNIT III **(6)**

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

UNIT IV **(6)**

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

UNIT V **(6)**

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

TOTAL(P:30) = 30 PERIODS

TEXT BOOK :

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

REFERENCES:

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

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

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

15EE211 - ELECTRIC CIRCUITS LABORATORY
(Common to EEE & EIE Branches)

L	T	P	C
0	0	4	2

OBJECTIVE:

To give hands on training for measuring DC /AC electrical parameters using instruments on static and to train the students to impart basic practical knowledge of electric circuits

COURSE OUTCOMES:

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

CO1: Analyze the circuits using various circuit theorems
CO2: Understand the concepts of various types of measurements
CO3: Design an electric system, components or process to meet desired needs within realistic constraints
CO4: Get an insight into solution of single phase and three phase power measurements
CO5: Use techniques, skills and modern engineering tools such as Matlab for necessary engineering practices

1. Experimental verification of Ohm's law
2. Experimental verification of Kirchhoff's voltage and current laws
3. Experimental verification of network theorems: Superposition, Thevenin, Norton.
4. Experimental verification of network theorems: Maximum power transfer and Reciprocity theorem.
5. Study of CRO and measurement of sinusoidal voltage, frequency.
6. Experimental determination of power in three phase circuits by two-watt meter method.
7. Design and Simulation of series resonance circuits by using MATLAB.
8. Design and Simulation of parallel resonance circuits by using MATLAB.
9. Simulation of low pass and high pass passive filters by using MATLAB.
10. Simulation of three phases balanced and unbalanced star networks by using MATLAB.

TOTAL (P:60) = 60 PERIODS

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

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

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 Syllabus
for
B.E. ELECTRICAL AND ELECTRONICS ENGINEERING [R15]
(3rd& 4th Semesters)

(This Curriculum and Syllabi are applicable to Students admitted from the academic year 2015-2016 to 2016-2017)

JUNE 2016

Approved by Fourth Academic council

NANDHA ENGINEERING COLLEGE

(Autonomous Institution Affiliated to Anna University, Chennai)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

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.

REGULATIONS 2015 (R-15)

I to VIII SEMESTER CURRICULUM

B.E.Electrical and Electronics Engineering

SEMESTER: I								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15EY101	Communicative English	HS	3	1	0	2	2
2.	15MY103	Linear Algebra and Multivariable Calculus	BS	5	3	2	0	4
3.	15PY101	Engineering Physics	BS	3	3	0	0	3
4.	15CY101	Engineering Chemistry	BS	3	3	0	0	3
5.	15MEC01	Engineering Graphics	ES	4	2	0	2	3
6.	15CSC01	Problem Solving and C Programming	ES	3	3	0	0	3
PRACTICALS								
7.	15GY111	Physics and Chemistry Laboratory – I	BS	4	0	0	4	2
8.	15CSC11	Computer Programming Laboratory	ES	2	0	0	2	1
9.	15GYC11	Engineering Practices Laboratory	ES	4	0	0	4	2
10.	15GY112	Soft Skills- I	EEC	2	0	0	2	1
			TOTAL	**33**	**15**	**2**	**16**	**24**

SEMESTER: II								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15EY201	Professional English	HS	3	1	0	2	2
2.	15MY203	Differential Equations, Vector Calculus and Complex Variables	BS	5	3	2	0	4
3.	15PY203	Solid State Physics	BS	3	3	0	0	3
4.	15CY201	Environmental Science and Engineering	HS	3	3	0	0	3
5.	15CE201	Basics of Civil and Mechanical Engineering	ES	3	3	0	0	3
6.	15EE201	Electric Circuit Theory	PC	5	3	2	0	4
PRACTICALS								
7.	15GY211	Physics and Chemistry Laboratory – II	BS	4	0	0	4	2
8.	15EE211	Electric Circuits Laboratory	PC	4	0	0	4	2
9.	15GY212	Soft Skills- II	EEC	2	0	0	2	1
			TOTAL	**32**	**16**	**4**	**12**	**24**

SEMESTER: III								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15MY303	Transform Techniques and Partial Differential Equations	BS	5	3	2	0	4
2.	15EE301	Semiconductor Devices and Circuits	PC	3	3	0	0	3
3.	15EE302	DC Machines and Transformers	PC	5	3	2	0	4
4.	15EE303	Electromagnetic Field Theory	PC	3	3	0	0	3
5.	15EE304	Power Plant Engineering	ES	3	3	0	0	3
6.	15IT306	Data Structures and Algorithms	ES	3	3	0	0	3
PRACTICALS								
7.	15EE311	Semiconductor Devices and Circuits Laboratory	PC	4	0	0	4	2
8.	15EE312	DC Machines and Transformers Laboratory	PC	4	0	0	4	2
9.	15IT314	Data Structures and Algorithms Laboratory	ES	4	0	0	4	2
10.	15GYC13	Soft Skills- Reading and Writing	EEC	2	0	0	2	0
			TOTAL	**36**	**18**	**4**	**14**	**26**

SEMESTER: IV								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15MY402	Numerical Methods	BS	5	3	2	0	4
2.	15EE401	AC Machines	PC	5	3	2	0	4
3.	15EE402	Analog Integrated Circuits	PC	3	3	0	0	3
4.	15EE403	Digital Logic System Design	PC	3	3	0	0	3
5.	15EE404	Transmission and Distribution	PC	3	3	0	0	3
6.	15IT405	Programming in C++	ES	3	3	0	0	3
PRACTICALS								
7.	15EE411	AC Machines Laboratory	PC	4	0	0	4	2
8.	15EE412	Analog and Digital Integrated Circuits Laboratory	PC	4	0	0	4	2
9.	15IT414	C++ Laboratory	ES	4	0	0	4	2
10.	15GYC12	Soft Skills- Listening and Speaking	EEC	2	0	0	2	0
			TOTAL	**36**	**18**	**4**	**14**	**26**

SEMESTER: V								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15EE501	Power System Analysis	PC	5	3	2	0	4
2.	15EE502	Communication Engineering	PC	3	3	0	0	3
3.	15EE503	Measurements and Instrumentation	PC	3	3	0	0	3
4.	15EE504	Control Systems	PC	5	3	2	0	4
5.	15GEC01	Principles of Management	HS	3	3	0	0	3
6.	E1	Elective I (PE)	PE	3	3	0	0	3
PRACTICALS								
7.	15EE511	Control Systems Laboratory	PC	4	0	0	4	2
8.	15EE512	Measurements and Instrumentation Laboratory	PC	4	0	0	4	2
9.	15PT511	Soft Skills V	EEC	2	0	0	2	0
			TOTAL	**32**	**18**	**4**	**10**	**24**

SEMESTER: VI								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15EE601	Power System Operation and Control	PC	5	3	2	0	4
2.	15EE602	Power Electronics	PC	3	3	0	0	3
3.	15EE603	Microprocessors and Microcontrollers	PC	3	3	0	0	3
4.	15EE604	High Voltage Engineering	PC	3	3	0	0	3
5.	E2	Elective II (PE)	PE	3	3	0	0	3
6.	E3	Open Elective I	PE	3	3	0	0	3
PRACTICALS								
7.	15EE611	Microprocessor and Microcontroller Laboratory	PC	4	0	0	4	2
8.	15EE612	Power Electronics Laboratory	PC	4	0	0	4	2
9.	15GE611	Comprehension	EEC	2	0	0	2	1
10.	15PT611	Soft Skills VI	EEC	2	0	0	2	0
			TOTAL	**32**	**18**	**2**	**12**	**24**

SEMESTER: VII								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15EE701	Electric Drives and Control	PC	3	3	0	0	3
2.	15EE702	Protection and Switch Gear	PC	3	3	0	0	3
3.	E4	Elective III (PE)	PE	3	3	0	0	3
4.	E5	Elective IV (PE)	PE	3	3	0	0	3
5.	E6	Elective V (PE)	PE	3	3	0	0	3
6.	E7	Open Elective II	PE	2	2	0	0	2
PRACTICALS								
7.	15EE711	Power System and Simulation Laboratory	PC	4	0	0	4	2
8.	15PT711	Extra Curricular Activities	EEC	2	0	0	2	0
			TOTAL	**23**	**17**	**0**	**6**	**19**

SEMESTER: VIII								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	E8	Elective VI (PE)	PE	3	3	0	0	3
2.	E9	Open Elective III	PE	2	2	0	0	2
PRACTICALS								
3.	15EE831	Project Work	EEC	24	0	0	24	12
			TOTAL	**29**	**5**	**0**	**24**	**17**

TOTAL NO. OF CREDITS: 184

***Course from the curriculum of other UG Programmes**

HUMANITIES AND SOCIAL SCIENCES (HS)								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1.	15EY101	Communicative English	HS	3	1	0	2	2
2.	15EY201	Professional English	HS	3	1	0	2	2
3.	15CY201	Environmental Science and Engineering	HS	3	3	0	0	3
4.	15GEC01	Principles of Management	HS	3	3	0	0	3

BASIC SCIENCES (BS)								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1.	15MY103	Linear Algebra and Multivariable Calculus	BS	5	3	2	0	4
2.	15PY101	Engineering Physics	BS	3	3	0	0	3
3.	15CY101	Engineering Chemistry	BS	3	3	0	0	3
4.	15GY111	Physics and Chemistry Laboratory – I	BS	4	0	0	4	2
5.	15MY203	Differential Equations, Vector Calculus and Complex Variables	BS	5	3	2	0	4
6.	15PY203	Solid State Physics	BS	3	3	0	0	3
7.	15GY211	Physics and Chemistry Laboratory – II	BS	4	0	0	4	2
8.	15GE301	Transforms and Boundary Value Problems	BS	5	3	2	0	4
9.	15MY402	Numerical Methods	BS	5	3	2	0	4

ENGINEERING SCIENCES (ES)								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1.	15MEC01	Engineering Graphics	ES	4	2	0	2	3
2.	15GYC11	Engineering Practices Laboratory	ES	3	0	0	3	2
3.	15CE201	Basics of Civil and Mechanical Engineering	ES	3	3	0	0	3
4.	15CSC01	Problem Solving and C Programming	ES	3	3	0	0	3
5.	15CSC11	Computer Programming Laboratory	ES	4	0	0	4	2
6.	15EE304	Power Plant Engineering	ES	3	3	0	0	3
7.	15IT306	Data Structures and Algorithms	ES	3	3	0	0	3
8.	15IT314	Data Structures and Algorithms Laboratory	ES	4	0	0	4	2
9.	15IT405	Programming in c++	ES	3	3	0	0	3
10.	15IT414	C++ Laboratory	ES	4	0	0	4	2

PROFESSIONAL CORE (PC)								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1.	15EE201	Electric Circuits Theory	PC	5	3	2	0	4
2.	15EE211	Electric Circuits Laboratory	PC	4	0	0	4	2
3.	15EE301	Semiconductor Devices and Circuits	PC	3	3	0	0	3
4.	15EE302	DC Machines and Transformers	PC	5	3	2	0	4
5.	15EE303	Electromagnetic Field Theory	PC	3	3	0	0	3
6.	15EE311	Semiconductor Devices and Circuits Laboratory	PC	4	0	0	4	2
7.	15EE312	DC Machines and Transformers Laboratory	PC	4	0	0	4	2
8.	15EE401	AC Machines	PC	5	3	2	0	4
9.	15EE402	Analog Integrated Circuits	PC	3	3	0	0	3
10.	15EE403	Digital Logic System Design	PC	3	3	0	0	3
11.	15EE404	Transmission & Distribution	PC	3	3	0	0	3
12.	15EE411	Ac Machines laboratory	PC	4	0	0	4	2
13.	15EE412	Analog and Digital Integrated Circuits Laboratory	PC	4	0	0	4	2
14.	15EE501	Power System Analysis	PC	5	3	2	0	4
15.	15EE502	Communication Engineering	PC	3	3	0	0	3
16.	15EE503	Measurements and Instrumentation	PC	3	3	0	0	3
17.	15EE504	Control Systems	PC	5	3	2	0	4
18.	15EE511	Control Systems Laboratory	PC	4	0	0	4	2
19.	15EE512	Measurements and Instrumentation Laboratory	PC	4	0	0	4	2
20.	15EE601	Power System Operation and Control	PC	5	3	2	0	4
21.	15EE602	Power Electronics	PC	3	3	0	0	3
22.	15EE603	Microprocessors and Microcontrollers	PC	3	3	0	0	3
23.	15EE604	High Voltage Engineering	PC	3	3	0	0	3
24.	15EE611	Microprocessor and Microcontroller Laboratory	PC	4	0	0	4	2
25.	15EE612	Power Electronics Laboratory	PC	4	0	0	4	2
26.	15EE701	Electric Drives and Control	PC	3	3	0	0	2
27.	15EE702	Protection and Switch Gear	PC	3	3	0	0	3
28.	15EE711	Power System and Simulation Laboratory	PC	4	0	0	4	2

PROFESSIONAL ELECTIVES (PE) & OPEN ELECTIVES (OE)								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1.	E1	Elective I (PE)	PE	3	3	0	0	3
2.	E2	Elective II (PE)	PE	3	3	0	0	3
3.	E3	Elective III (OE)	OE	3	3	0	0	3
4.	E4	Elective IV (PE)	PE	3	3	0	0	3
5.	E5	Elective V (PE)	PE	3	3	0	0	3
6.	E6	Elective V I (PE)	PE	3	3	0	0	3
7.	E7	Elective V II (OE)	OE	2	2	0	0	2
8.	E8	Elective VIII (PE)	PE	3	3	0	0	3
9.	E9	Elective IX (OE)	OE	2	2	0	0	2
EMPLOYABILITY ENHANCEMENT COURSES (EEC)								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1.	15GY112	Soft Skills- I	EEC	2	0	0	2	1
2.	15GY212	Soft Skills- II	EEC	2	0	0	2	1
3.	15GYC13	Soft Skills- Reading and Writing	EEC	2	0	0	2	0
4.	15GYC12	Soft Skills- Listening and Speaking	EEC	2	0	0	2	0
5.	15GY511	Soft Skills- V	EEC	2	0	0	2	0
6.	15GE611	Comprehension	EEC	2	0	0	2	1
7.	15GY611	Soft Skills- VI	EEC	2	0	0	2	0
8.	15PT711	Extra Curricular Activities	EEC	2	0	0	2	0
9.	15EE831	Project Work	EEC	24	0	0	24	12

SUMMARY									
SL. No.	**SUBJECT AREA**	**CREDITS AS PER SEMESTER**							**CREDITS TOTAL**
		I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**
1.	**HS**	**2**	**5**	**-**	**-**	**3**	**-**	**-**	**-**	**10**
2.	**BS**	**12**	**9**	**4**	**4**	**-**	**-**	**-**	**-**	**29**
3.	**ES**	**9**	**3**	**8**	**5**	**-**	**-**	**-**	**-**	**25**
4.	**PC**	**-**	**6**	**14**	**17**	**18**	**17**	**8**	**-**	**80**
5.	**PE**	**-**	**-**	**-**	**-**	**3**	**3**	**9**	**5**	**20**
6.	**OE**	**-**	**-**	**-**	**-**	**-**	**3**	**2**	**-**	**5**
7.	**EEC**	**1**	**1**	**0**	**0**	**0**	**1**	**0**	**12**	**15**
	TOTAL	**24**	**24**	**26**	**26**	**24**	**24**	**19**	**17**	**184**
	Non Credit/Mandatory	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**0**

LIST OF PROFESSIONAL ELECTIVES (PE)

THEORY					
Course Code	**Course Title**	**L**	**T**	**P**	**C**
15EEX01	Computer Communication Networks	3	0	0	3
15EEX02	Advanced Control System	3	0	0	3
15EEX03	Semiconducting Materials and Devices	3	0	0	3
15EEX04	Fiber Optics and Laser Instruments	3	0	0	3
15GEC04	Total Quality Management	3	0	0	3
15EEX05	Microcontroller Based System Design	3	0	0	3
15EEX06	Solid State Relays	3	0	0	3
15GEC08	Industrial Management and Economics	3	0	0	3
15EEX07	Power Quality	3	0	0	3
15EEX08	Cryptography	3	0	0	3
15EEX09	Energy Management and Auditing	3	0	0	3
15EEX10	Special Electrical Machines	3	0	0	3
15GEC03	Professional Ethics and Human Values	3	0	0	3
15EEX11	Fundamentals of Electric Power Utilization	3	0	0	3
15EEX12	Solar Energy Utilization	3	0	0	3
15EEX13	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**
15CEZ01	Industrial Safety Engineering	3	0	0	3
15CEZ02	Human Behaviors at Work	3	0	0	3
15CEZ03	Air Pollution Management	3	0	0	3
15CEZ04	Building Services	3	0	0	3
15CSZ01	Computer Networks	3	0	0	3
15CSZ02	Software Engineering	3	0	0	3
15CSZ03	Data Structures	3	0	0	3
15CSZ04	Open Source Software	3	0	0	3
15CSZ05	Information Security	3	0	0	3
15ECZ01	Avionics	3	0	0	3
15ECZ02	Sensors and transducers	3	0	0	3
15ECZ03	Modern wireless communication system	3	0	0	3
15ECZ04	Radar and Navigational Aids	3	0	0	3
15EEZ01	Renewable Energy Technology	3	0	0	3

15EEZ02	PLC and Automation	3	0	0	3
15EEZ03	Automotive Electronics	3	0	0	3
15EEZ04	Utilization and Conservation of Electrical Energy	3	0	0	3
15EIZ01	Autotronix	3	0	0	3
15EIZ02	Fiber Optic Sensors	3	0	0	3
15EIZ03	Industrial Automation	3	0	0	3
15EIZ04	Ultrasonic Instrumentation	3	0	0	3
15ITZ01	PC Hardware and Trouble Shooting	3	0	0	3
15ITZ02	Essentials of Information Technology	3	0	0	3
15ITZ03	Developing Mobile Apps	3	0	0	3
15ITZ04	Software Project Management	3	0	0	3
15MEZ01	Six Sigma	3	0	0	3
15MEZ02	Essentials of Radio Frequency Identification	3	0	0	3
15MEZ03	Electric Vehicle Technology	3	0	0	3
15MEZ04	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**
15GEZ01	Sustainable Development	2	0	0	2
15GEZ02	Waste Management	2	0	0	2
15GEZ03	Design Thinking	2	0	0	2
15GEZ04	Big Data Analytics	2	0	0	2
15 GE Z05	Robo Design	2	0	0	2
15 GE Z06	Creativity Innovation and New Product Development	2	0	0	2
15GEZ07	Energy Auditing	2	0	0	2
15GEZ08	Energy Conservation	2	0	0	2
15GEZ09	Law for Engineers	2	0	0	2
15GEZ10	Advanced Mathematics for Engineers	2	0	0	2
15GEZ11	Disaster Management	2	0	0	2
15GEZ12	Industrial Psychology	2	0	0	2
15GEZ13	Project Management	2	0	0	2
15GEZ14	Quality Management and Economics	2	0	0	2

GROUP - III

LIST OF TWO CERDIT LANGUAGE ELECTIVES					
Course code	**Course Title ***	**L**	**T**	**P**	**C**
15GEY01	Hindi Language	2	0	0	2
15GEY02	German Language	2	0	0	2
15GEY03	Japanese Language	2	0	0	2

This course is applicable from third semester onwards

TOTAL CREDITS =26+25+26+26+22+23+19+17=184 CREDITS

***PE- Professional Elective.**

Approved by Fourth Academic council

15MY303	TRANSFORM TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS (Common to B.E-EEE, ECE & EIE Branches)	L	T	P	C
		3	2	0	4

OBJECTIVE:

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

COURSE OUTCOMES:

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

C01: Solve the engineering problems in terms of Fourier analysis.
C02: Know the formation of partial differential equations.
C03: Apply the partial differential equations to solve the various electrical and electronics application oriented problems
C04: Solve the problems using Fourier integral theorem and convolution theorem technique.
C05: Formulate the difference equations and solve them using Z – transform techniques.

UNIT I FOURIER SERIES (9)

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

UNIT II PARTIAL DIFFERENTIAL EQUATIONS (9)

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations of the types f(p,q) = 0,Clairaut's form and Separable form – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients of homogeneous types.

UNIT III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS (9)

Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation (Zero and Non-zero Velocity) – One dimensional heat equation (Temperature Reduced to zero and Non-zero boundary conditions) – Steady state solution of two-dimensional heat equation (Finite and infinite Plate).

UNIT IV FOURIER TRANSFORMS (9)

Fourier integral theorem (statement only) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem - Parseval's identity (Excluding proof).

UNIT V Z -TRANSFORM AND DIFFERENCE EQUATIONS (9)

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

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

TEXT BOOKS:

1. Singaravelu.A., "Transforms and Partial Differential Equations", Meenakshi Agency.Rev.Ed, 2013.
2. Kandasamy, P., Thilagavathy, K., and Gunavathy, K., "Engineering Mathematics; Volume III", S. Chand & Co Ltd., 2008.

REFERENCES:

1. Goyal. Manish and Bali, N.P, "A Textbook of Engineering mathematics", 6th ed., Laxmi Publication (P) Ltd. New Delhi, 2012.
2. Grewal, B.S. "Higher Engineering Mathematics", 42nd ed., Khanna publishers, New Delhi, 2012.
3. Kreyszig, Erwin. "Advanced Engineering Mathematics", 9th ed., Wiley Publications, New Delhi, 2006.
4. Veerarajan,T. "Engineering mathematics (for III Semester)", 3rd ed., Tata Mc Graw Hill, New Delhi, 2005.

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

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

Approved by Fourth Academic council

15EE301	SEMICONDUCTOR DEVICES AND CIRCUITS (Common to B.E-EEE & EIE Branches)	L	T	P	C
		3	0	0	3

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 THE 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 THE FIELD EFFECT TRANSISTOR **9**

MOS Field Effect Transistor - MOSFET DC circuit analysis - MOSFET applications –Junction Field Effect Transistor: types, operation- MOSFET logic configurations: NMOS, PMOS, CMOS and 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. Bell, "Electronic Devices and Circuits", Prentice Hall of India, New Delhi, 2003.
2. T. F. Boghert, "Electronic Devices and Circuits", Pearson Education, 6th ed., Delhi, 2003.
3. B. G. Streetman and S. Banerjee, "Solid State Electronic Devices", Pearson Education, Delhi, 2002.
4. D. A. Neamen, "Electronic Circuit Analysis and Design", 2nd ed., Tata McGraw-Hill, New Delhi, 2002.

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

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

Approved by Fourth Academic council

15EE302	DC MACHINES AND TRANSFORMERS	L	T	P	C
		3	2	0	4

OBJECTIVE:

To realize the concept of Energy conversion of electro mechanical devices, Select proper DC Machine for different applications and Estimate transformer parameters and its performance

COURSE OUTCOMES:

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

CO1: Revise the working principles of electrical machines using the concepts of electromechanical energy conversion principles and obtain terminology for generated voltage and torque developed in DC Machines.

CO2: Illustrate the construction and working principles of DC machines as Generator types, resolve of their no-load/load characteristics.

CO3: Learn types, starting – starters and methods of speed control of DC motors.

CO4: Disseminate the constructional details, the principle of operation, calculation of performance, Auto transformers and three phase transformer connections.

CO5: Analyze the various losses and efficiency taking place in DC Machines and transformers and to revision the different testing methods to arrive at their performance.

UNIT I BASIC CONCEPTS OF ROTATING MACHINES **9**

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

UNIT II DC GENERATORS **9**

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 – Applications.

UNIT III DC MOTORS **9**

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 – Applications.

UNIT IV TRANSFORMERS **9**

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

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 (L:45 + T:30) : 75 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)

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

Approved by Fourth Academic council

15EE303	ELECTROMAGNETIC FIELD THEORY	L	T	P	C
		3	0	0	3

OBJECTIVE:

To 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 electromagnetic waves and poynting vector.

UNIT I INTRODUCTION **9**

Sources and effects of electromagnetic fields – Introduction to vector algebra – Co-ordinate systems – Vector calculus: Gradient , divergence and curl – Divergence theorem – Stoke's theorem.

UNIT II ELECTROSTATICS **9**

Coulombs law – Electric field intensity –Charge distribution – Electric Field due to straight conductor and circular disc – Electric flux density – Gauss's law and its applications –Potential – Electric dipole – Energy density in electrostatic field – Conductors – Dielectric –Boundary conditions at the interface of conductor and dielectric – Poisson's and laplace's equation – Capacitors – Energy stored in a capacitor.

UNIT III MAGNETOSTATICS **9**

Biot-Savart's law – Ampere's circuital law –Magnetic flux and magnetic flux density – Scalar and vector magnetic potentials – Force – Torque – Magnetic materials – Magnetic boundary conditions – Self and mutual inductance – Inductance of solenoid and toroid – Energy density in magnetic field.

UNIT IV ELECTROMAGNETIC FIELDS **9**

Faraday's laws – Transformer and motional emf – Conduction and displacement current – Maxwell's equation in point form and integral form.

UNIT V ELECTROMAGNETIC WAVES AND ITS APPLICATIONS **9**

Introduction – Electromagnetic wave equation – Wave equation for free space – Poynting theorem – Standing wave ratio – Antenna and its types – Antenna measurements.

TOTAL (L:45) : 45 PEROIDS

TEXT BOOKS:

1. Mathew O Sadiku, "Elements of Electromagnetics", Oxford University press, New York, 6th ed., 2014.
2. William H Hayt, "Engineering Electromagnetics", Tata McGraw Hill, New Delhi, 7th ed., 2011.
3. Gangadhar.K.A and Ramanathan.P.M, "Electromagnetic Field Theory", Khanna Publishers, 2009.

REFERENCES:

1. David J Griffith, "Introduction to Electrodynamics", Pearson Education, 4th ed., 2012.
2. Hayt, W.H and Buck, John A, "Engineering Electromagnetics", 7th ed., Tata McGraw- Hill, New Delhi, 2009.
3. Ashutosh Pramanik, "Electromagnetism – Theory and Applications", Prentice-Hall of India Private Limited, New Delhi, 2006.
4. Fawwaz. T.Ulaby, "Electromagnetics for Engineers", Pearson Education, 2005.

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

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

15EE304	POWER PLANT ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVE:

Providing an overview of various power plants and enables the students with broad understanding of electricity generation.

COURSE OUTCOMES:

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

CO1 : Understand the different types of power plant
CO2 : Analyze the issues related with power plants
CO3 : Acquire knowledge about nuclear power plants
CO4 : Analyze the operation of various renewable energy sources
CO5 : Know about tariff structure and Environmental issuses

UNIT I THERMAL POWER PLANTS **9**

Basic thermodynamic cycles- Various components of steam power plant – Layout - Pulverized coal burners- Fluidized bed combustion - Coal handling systems - Ash handling systems - Forced draft and induced draft fans – Boilers - Feed pumps - Super heater- Regenerator - Condenser- Dearearators - Cooling tower.

UNIT II GAS AND DIESEL POWER PLANTS **9**

Open and closed cycle gas turbine: work output & thermal efficiency, methods to improve performance-reheating, intercooling, regeneration - Advantage and disadvantages.
Diesel engine power plant - Component and layout.

UNIT III NUCLEAR POWER PLANTS **9**

Principles of nuclear energy- Fission reactions - Nuclear reactor - Nuclear power plants

UNIT IV POWER FROM RENEWABLE ENERGY **9**

Hydro Electric Power Plants: Classification, Layout including Turbines - Principle, Construction and working of Wind, Tidal and Solar Power systems.

UNIT V ENERGY, ECONOMIC AND ENVIRONMENTAL ISSUES OF POWER PLANTS **9**

Power tariff types - Load distribution parameters - Load curve - Comparison of site selection criteria - Capital & operating Cost of different power plants - Pollution control technologies including Waste Disposal Options for Coal and Nuclear Power Plants.

TOTAL (L:45): 45 PERIODS

TEXT BOOKS:

1. Nag P.K., "Power Plant Engineering",Tata-McGraw Hill, 4th ed.,2014.
2. El-Wakil M.M. " Power Plant Technology", Tata Mc-Graw Hill, 2nd ed., New Delhi, 2011.

REFERENCES:

1. R.K.Rajput, "Power Plant Engineering", Laxmi Publications, 2013.
2. G.D.Rai, "Introduction to Power Plant Technology", Khanna Publishers, New Delhi, 2013.
3. G.R.Nagpal, "Power Plant Engineering", Khanna Publishers, 16th ed., New Delhi, 2012.

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

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

Approved by Fourth Academic council

15IT306	DATA STRUCTURES AND ALGORITHMS	L	T	P	C
	(Common to ECE, EEE & EIE Branches)	3	0	0	3

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

UNIT I INTRODUCTION **9**

Data structures – Abstract Data Type (ADT) – List ADT: Singly linked list – Doubly linked list – Circular linked list – Applications of linked list. Stack ADT – Stack model – Operations on stack – Implementation and applications. Queue ADT – Queue model – Operations on queue - Implementation and applications Priority Queues.

UNIT II HASHING AND TREES **9**

Introduction – Separate chaining – Open addressing - Rehashing - Extendible hashing. Binary Tree – Representation of a binary tree – Expression tree – Search tree ADT – Tree traversal – AVL tree – Single rotation – Double rotation.

UNIT III GRAPHS **9**

Basic terminologies – Representation of graph – Topological sort – Graph traversal - Breadth first traversal – Depth first traversal. Shortest path algorithm – Unweighted shortest path algorithm – Weighted shortest path algorithm – Minimum spanning tree – Prim's algorithm – Kruskal's algorithm.

UNIT IV SORTING **9**

Introduction – Insertion sort – Shell sort – Heap sort – Merge sort – Quick sort – Radix sort. External sorting – Two way merge – Multi way merge – polyphase merge. Searching – Linear search – Binary search.

UNIT V BASIC CONCEPTS OF ALGORITHMS **9**

Algorithm analysis – Time space Trade off - Divide and Conquer: Binary search-Merge sort-Dynamic programming: All pair shortest paths – Traveling sales person problem.

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. Mark Allen Weiss, “Data structures and algorithm analysis in C”, Pearson Education, 2015/PHI.
2. Aaron M. Tenenbaum, Yeedidyah Langsam and Moshe J. Augenstein, “Data structures using C, Pearson Education, 2009 / PHI.
3. Prabhakar Gupta, Vineet Agarwal, Manish varshney, “Design and Analysis of Algorithms”, PHI Learning Private Ltd.

REFERENCES:

1. Robert Kruse, C. L.Tondo, Bruce Lung, Shashi Magalla,“ Data Structures and Program Design in C”, Pearson Education.
2. A.A.Putnambekar “Data Structures” Technical Publications.

Mapping of Course Outcome and Programme Outcome

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

15EE311 **SEMICONDUCTOR DEVICES AND CIRCUITS LABORATORY** **L T P C**

(Common to EEE & EIE Branches) **0 0 4 2**

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. Characteristics of PN Junction Diode
2. Characteristics of Zener Diode
3. Verify a Clipper and Clamper Circuits With its Characteristics
4. Verify a Single Phase Half Wave & Full Wave Rectifiers With and Without Filters
5. Verify a Shunt Voltage Regulator
6. Characteristics of Common Emitter Configuration
7. Characteristics of Common Base Configuration
8. Characteristics of Common Collector Configuration
9. Characteristics of JFET
10. Characteristics of MOSFET

TOTAL(P:60): 60 PERIODS

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

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

15EE312 **DC MACHINES AND TRANSFORMERS LABORATORY**

L	T	P	C
0	0	4	2

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 shunt motors
4. Load characteristics of DC series motors
5. Speed control of DC shunt motors
6. Swinburnes test.

EXPERIMENTS ON TRANSFORMERS:

7. Load test on single phase transformer.
8. Open circuit and short circuit test on single phase transformer.
9. Parallel operation of single phase transformer.
10. Study of Scott connection of transformer.

TOTAL(P:60): 60 PERIODS

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

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

15IT314	DATA STRUCTURES AND ALGORITHMS LABORATORY (Common to ECE, EEE & EIE Branches)	L	T	P	C
		0	0	4	2

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. a) Singly Linked List b) Doubly Linked List
2. Application of Stack – Conversion of Infix to Postfix
3. Binary Search Tree
4. Tree Traversals
5. Priority Queue Using Heap
6. Dijkstra's Algorithm
7. Quick Sort
8. a) Linear Search b)Binary Search
9. a) Depth First Search b) Breadth First Search
10. Travelling salesman Problem

TOTAL(P:60): 60 PERIODS

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

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

15GYC13 - SOFT SKILLS – READING AND WRITING

L	T	P	C
0	0	2	0

OBJECTIVES:

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

COURSE OUTCOMES:

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

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

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

CO3. Interpret effectively through writing for a variety of purposes

UNIT I: Grammar **(10)**

Articles – Adjectives – Conjunctions – Prepositions – Idioms & Phrases

UNIT II: Reading **(10)**

Part I: Matching 7 sentences to four short texts

Part II: Text with sentences missing

Part III: Text with multiple choice questions

Part IV: Text with multiple choice gaps

Part V: Identification of additional unnecessary words in text

UNIT III: Writing **(10)**

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

Part II: Report Writing, Complaint Letter, Writing Proposals

TOTAL (P:30) = 30 PERIODS

REFERENCES:

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

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

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

15MY402 NUMERICAL METHODS

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

L	T	P	C
3	2	0	4

OBJECTIVES:

The broad objectives are to learn about existence and uniqueness criteria for numerical methods, to learn about convergences criteria and to be aware of reasons why numerical methods may fail.
The specific objectives are:

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

COURSE OUTCOMES:

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

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

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

UNIT II INTERPOLATION AND APPROXIMATION (9)

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

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION (9)

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

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

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

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

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

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

TEXT BOOKS:

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

REFERENCES:

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

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

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

Approved by Fourth Academic council

15EE401 AC MACHINES

L	T	P	C
3	2	0	4

OBJECTIVE:

- To study about the construction, principle of operation and performance of alternators, synchronous motors, single phase and three phase induction motors, various starting methods, speed control of three phase induction motor and single phase induction motors, construction and principle of operation of special machines.

COURSE OUTCOMES:

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

CO 1: To impart knowledge on Construction and performance of salient and non – salient type synchronous generators
CO 2: To impart knowledge on Principle of operation and performance of synchronous motor.
CO 3: To impart knowledge on Construction, principle of operation and performance of induction machines
CO 4: To impart knowledge on Starting and speed control of three-phase induction motors
CO 5: To impart knowledge on Construction, principle of operation and performance of single phase induction motors and special machines

UNIT I SYNCHRONOUS GENERATOR (9)

Constructional details – Types of rotors – Winding factors - EMF equation – Synchronous reactance – Armature reaction – Voltage regulation – EMF, MMF and ZPF methods - Synchronizing and parallel operation – Synchronizing torque – Two reaction theory – Slip test - Capability Curves.

UNIT II SYNCHRONOUS MOTOR (9)

Constructional details - Principle of operation – Torque equation – Operation on infinite bus bars - V and Inverted V curves – Input and output power equations – Starting methods – Current loci for constant power input, constant excitation and constant power developed - Synchronous condenser.

UNIT III THREE PHASE INDUCTION MOTOR (9)

Constructional details – Types of rotors – Principle of operation – Slip – Equivalent circuit – Torque-Slip 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 induction motors –Induction generators

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

Need for starters – Types of starters – DOL, Star-delta, Auto transformer and Rotor resistance starters – Speed control – Voltage control, Frequency control, Pole changing, V/f control and Rotor resistance control – Cascaded connection- – Slip power recovery scheme.

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

Constructional details of single phase induction motor – Double field revolving theory and operation –Equivalent circuit – No load and blocked rotor test – Performance analysis – Starting methods – Shaded pole induction motor – Repulsion motor - Universal motor - Switched Reluctance Motor – BLDC Motors.

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

TEXT BOOKS:

1. Gupta. J.B., "Electrical Machines (AC & DC Machines)", 4th ed., S K Kataria & Sons, New Delhi, 2012.
2. Rajput. R.K., "Electrical Machines", 5th Edition, Laxmi Publications, New Delhi, 2008.

REFERENCE BOOKS:

1. Kothari D.P.,Nagrath I.J, "Electric Machines", 5th Edition, Tata McGraw Hill Publishing Company, New Delhi, 2011.
2. Fitzgerald, A.E., Kingsley, Charles and Umans, Stephen. D., "Electric Machinery", 6th Edition, Tata McGraw Hill Publishing Company, New Delhi, 2010.
3. Langsde of, Alexander S., "Theory of Alternating Current Machinery", 2nd ed., Tata McGraw Hill Publishing Company, New Delhi, 2004.

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

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

15EE402	ANALOG INTEGRATED CIRCUITS (Common to EEE & EIE Branches)	L	T	P	C
		3	0	0	3

OBJECTIVE:

To understand the function and fabrication process of ICs, impart knowledge in the concepts of functional building blocks of different types of ICs and to use in industrial applications

COURSE OUTCOMES:

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

CO1 : Know about IC fabrication procedure.
CO2 : Impart knowledge on OP-AMP and its characteristics
CO3 : Get adequate knowledge on OP-AMP application
CO4 : Understand low-power high-performance techniques in digital circuit design.
CO5 : Apply the concepts of IC's in the design of various circuits

UNIT I IC FABRICATION **9**

IC classification - Fundamental of monolithic IC technology: epitaxial growth, masking and etching, diffusion of impurities - Realization of monolithic ICs and packaging - Fabrication of diodes, capacitance, resistance.

UNIT II CHARACTERISTICS OF OPAMP **9**

Ideal OP-AMP characteristics: DC characteristics, AC characteristics - Differential amplifier - Frequency response of OP-AMP - Basic applications of op-amp – Inverting and Non-inverting Amplifiers - V/I & I/V converters – Summer - Differentiator and integrator

UNIT III APPLICATIONS OF OPAMP **9**

Instrumentation amplifier - Comparators – Multivibrators - Clippers – Campers - Peak detector - D/A converter(R- 2R ladder and weighted resistor types) - A/D converters using op amps.

UNIT IV UNIQUE ICs **9**

Functional block, characteristics & application circuits with 555 Timer – IC 566 voltage controlled oscillator - IC 565 phase lock loop.

UNIT V APPLICATIONS OF ICs **9**

IC voltage regulators LM78XX - Fixed voltage regulators LM317 - 723 Variable voltage regulators - Switching regulator – LM 380 power amplifier.

TOTAL(L:45) : 45 PERIODS

TEXTBOOKS:

1. D. Roy Choudhury, Shail B. Jain, "Linear Integrated Circuits" , Fourth Edition New Age International, 4th ed., 2011
2. Ramakant A. Gayakwad, "Op-Amps and Linear Integrated Circuits", Fourth Edition, Pearson Education Asia Ltd, 4th ed., 2009.

REFERENCES:

1. Jacob Millman, Christos C.Halkias, "Integrated Electronics - Analog and Digital Circuits System", McGraw Hill Education, 2nd ed., 2011.
2. Robert F.Coughlin, Frederick F.Driscoll, "Operational-Amplifiers and Linear Integrated Circuits", 6th ed., Pearson Education, 2003.
3. David A.Bell , "Operational Amplifiers and Linear ICs", 2nd ed., Prentice Hall of India, New Delhi, 2006.

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

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

15EE403 **DIGITAL LOGIC SYSTEM DESIGN**
(Common to EEE & EIE Branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

To introduce the fundamentals of digital circuits, combinational and sequential circuit.

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 : Introduce digital simulation techniques for development of application oriented logic circuit

UNIT I INTRODUCTION TO BOOLEAN ALGEBRA **9**

Number systems-Binary arithmetic– Logic gates- Binary codes–Boolean algebra and theorems-Boolean functions–Canonical and standard forms -Simplifications of boolean functions using Karnaugh map and Quine Mc-Clusky methods.

UNIT II COMBINATIONAL LOGIC CIRCUITS AND ITS APPLICATIONS **9**

Introduction- Adder and subtractor circuits – Code converters - Decoders and encoders -Multiplexers and demultiplexers.

UNIT III SEQUENTIAL LOGIC CIRCUITS **9**

Synchronous sequential circuits – Flip flops – Shift registers – Counters - Analysis and design procedures - State reduction and state assignment-Introduction to asynchronous sequential circuits.

UNIT IV PROGRAMMABLE LOGIC DEVICES, MEMORY AND LOGIC FAMILIES **9**

Programmable logic devices: PLA, PAL and FPGA –Memories: RAM organization, ROM organization, PROM, EPROM, EEPROM- Logic families: RTL, DTL, TTL, ECL and CMOS.

UNIT V SYSTEM DESIGN USING VHDL **9**

VHDL operators – Arrays – Packages –Data flow, behavioral and structural modeling – Realization of combinational and sequential circuits using HDL (Adders, subtractors, multiplexers, de-multiplexers, flip-flops, counters, shift registers).

TOTAL(L:45): 45 PERIODS

TEXT BOOKS:

1. M.Morris Mano, "Digital Design", 3rd ed., Pearson Education, 2013.
2. Raj Kamal A **"**Digital Systems Principles and Design**",** Pearson Education, Anna Univ.Edition, 2012.

REFERENCES:

1. Charles H.Roth Jr , Larry L. Kinney, "Fundamentals of Logic Design" ,7th ed.,Thomson Learning, 2014.
2. Charles H. Roth, Jr.,Lizy Kurian John, "Digital System Design using VHDL", CL Engineering/Cengage Learning India ,2012.
3. Nripendra N Biswas, "Logic Design Theory", PHI Learning, 2010**.**

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

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

15EE404	TRANSMISSION AND DISTRIBUTION	L	T	P	C
		3	0	0	3

OBJECTIVE:

To introduce the essentials of interconnected electric power systems and to give a comprehensive overview of the terminology, electrical concepts, design considerations, construction practices, operational aspects of transmission and distribution systems.

COURSE OUTCOMES:

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

CO 1: To impart knowledge on the basics of transmission and distribution of power system
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 **9**

Structure of electric power system – Transmission and distribution – Introduction to HVAC and HVDC transmission - Comparison between HVAC and HVDC – Distributed and Concentrated loads –Types of AC and DC distributors.

UNIT II TRANSMISSION LINE PARAMETERS **9**

Parameters of transmission lines –Types of conductors – Resistance, inductance and capacitance of single phase, three phase, Symmetrical and unsymmetrical transposed conductors – Self and mutual GMD - Skin and proximity effects - Interference with neighboring communication circuits – Corona discharges.

UNIT III MODELLING AND PERFORMANCE OF TRANSMISSION LINES **9**

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 – Voltage control - Ferranti effect.

UNIT IV INSULATORS AND CABLES **9**

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.

UNIT V MECHANICAL DESIGN OF LINES AND GROUNDING **9**

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(L:45): 45 PERIODS

TEXT BOOKS:

1. B.R.Gupta, S.Chand, "Power System Analysis and Design", New Delhi, 7th Revised ed., 2014.
2. S.N. Singh, "Electric Power Generation, Transmission and Distribution", Prentice Hall of India Pvt. Ltd, New Delhi, Second Edition, 2011.

REFERENCES:

1. G.Ramamurthy, "Handbook of Electrical power Distribution", Universities Press, 2013.
2. TorenGonen, "Electrical Power Distribution", CBC, 2010
3. D.P.Kothari, I.J. Nagarath, "Power System Engineering", Tata McGraw-Hill Publishing Company limited, New Delhi, 2nd ed., 2008.
4. V.K.Mehta, Rohit Mehta, "Principles of Power System", S.Chand Publication, 2005.

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

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

15IT405	PROGRAMMING IN C++ (Common to EEE & EIE Branches)	L	T	P	C
		3	0	0	3

OBJECTIVE :

To learn the fundamental programming concepts and methodologies which are essential for students to implement good C++ programs.

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 **9**

Introduction to C++ - Object oriented programming concepts- C++ fundamentals - Data types - Access modifier - Classes and objects - Function and data members - Default arguments - Friend function- Static members.

UNIT II CONSTRUCTORS AND STATIC POLYMORPHISM **9**

Constructors-Default constructor- Parameterized constructors- Constructors with dynamic allocation-Copy constructors-Destructors-Static polymorphism – Function overloading –Operator overloading-Unary and binary operator overloading – Overloading assignment operator - Overloading through friend functions.

UNIT III TEMPLATES AND EXCEPTION HANDLING **9**

Generic programming -Templates - Class template - Function template - Class template with multiple parameters-Function template with multiple parameters. Exception handling -try-catch-throw paradigm -Exception specification.

UNIT IV INHERITANCE AND RUNTIME POLYMORPHISM **9**

Inheritance - Public, private, and protected derivations - Classification-Multiple inheritance - Virtual base class - Runtime polymorphism - Virtual functions - Virtual destructor.

UNIT V I/O STREAMS AND FILE HANDLING **9**

Unformatted andformatted I/O - I/O manipulators - Files handling - Binary and ASCII files-Sequential and random access- Standard template library.

TOTAL(L:45): 45 PERIODS

TEXT BOOKS:

1. B. Trivedi, “Programming with ANSI C++”, Second Edition, Oxford University Press, 2013
2. K.R.Venugopal, Rajkumar,T.Ravishankar,”Mastering C++,” 4th edition, TataMcGraw Hill,2008

REFERENCES:

1. Ira Pohl, “Object Oriented Programming using C++”, Pearson Education, Second Edition Reprint 2004.
2. Rajesh K. Shukla,”Object Oriented Programming in C++”,Wiley India Pvt Ltd,2008.
3. E.Balagurusamy, “Object Oriented Programming with C++”, Mcgraw Hill Education,Sixth Edition.

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

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

Approved by Fourth Academic council

15EE411 **AC MACHINES LABORATORY**

L	T	P	C
0	0	4	2

OBJECTIVE:

The laboratory experiments offered to the student for verifying the theory studied in AC machines and understand the concepts 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.

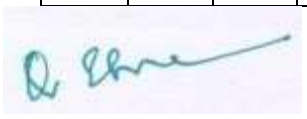
LIST OF EXPERIMENTS:

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 motors.

TOTAL(P:60) : 60 PERIODS

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

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



15EE412 **ANALOG AND DIGITAL INTERGRATED CIRCUITS LABORATORY**
(Common to EEE & EIE Branches)

L	T	P	C
0	0	4	2

OBJECTIVE:

To know about the characteristics and applications of OP-AMP, 555 IC and logic gates

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. Inverting and Non-Inverting amplifier using OP-AMP
2. Differentiator and integrator using OP-AMP
3. Monostable multivibrator using 555 IC
4. Astable multivibrator using 555 IC
5. Verification of logic gates
6. Verification of Half subtractor and Half adder
7. Verification of binary to gray code and gray to binary code converter.
8. Verification of Multiplexer and Demultiplexer
9. Verification of encoder and decoder
10. Verification of Parity checker and Parity generator.

TOTAL(P:60) : 60 PERIODS

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

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

15IT414	C++ LABORATORY	L	T	P	C
		0	0	4	2

(Common to EEE & EIE Branches)

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 C++ data types, operators and statements.
2. Program illustrating classes, objects, functions and data members.
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. Program illustrating

   a) Functionoverloading

   b) Operator overloading (Binary operators, Unary operators etc.)
6. Programs illustrating class and function templates.
7. Write programs illustrating how exceptions are handled (ex: division-by-zero, overflow and underflow in stack etc)
8. Programs illustrating the various forms of inheritance: Ex. single, multiple, multilevel, hierarchical inheritance etc.
9. Write a program illustrating the use of virtual functions.
10. Write programs to illustrating file handling operations

Ex. a) Writing the contents to a text files, b) Displaying the contents of the file etc.

TOTAL(P:60) : 60 PERIODS

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

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

Approved by Fourth Academic council

15GYC12- SOFT SKILLS – LISTENING AND SPEAKING

L	T	P	C
0	0	2	0

OBJECTIVES:

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

COURSE OUTCOMES:

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

CO1 : Apply the knowledge of basic grammar to classify the types of verbs and questions and to construct the sentences
CO2 : Develop the listening skills through note completion, matching and multiple choice modes
CO3 **:** Organize a presentation on the given topic.

UNIT I: Grammar **(10)**

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

UNIT II: Listening **(10)**

Part I: Note completion

Part II: Matching

Part III: Multiple Choice

UNIT III: Speaking **(10)**

Part I: Self-Introduction

Part II: Short Talk on Business Topics

Part III: Topic Discussion in Pairs

TOTAL (P:30) = 30 PERIODS

REFERENCES:

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

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

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1										x		
2							x	x	x	x		x
3							x	x		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 [R15]
(5th to 8th Semesters)

(This Curriculum and Syllabi are applicable to Students admitted from the academic year [2015-2016] to [2016-2017])

JUNE 2018

Approved by Sixth Academic Council

EEE Department PEOs and POs

PROGRAMME EDUCATIONAL OBJECTIVEs:

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.

PROGRAM OUTCOMES:

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

a-l	GRADUATE ATTRIBUTEs	PO No.	PROGRAMME OUTCOMEs
a	Engineering Knowledge	PO1	Apply knowledge of mathematics, science and engineering to domain specific applications.
b	Problem Analysis	PO2	Identify, analyze and formulate Electrical and Electronics Engineering problems based on the knowledge of basic sciences and engineering.
c	Design and Development of Solutions	PO3	Design and develop Electrical and Electronic Engineering based solutions to meet the desired requirements.
d	Investigation of Complex Problems	PO4	Investigate complex problems in the areas of power, control and energy to provide suitable solutions.
e	Modern Tool Usage	PO5	Use the techniques, skills and modern engineering tools necessary for real world applications within realistic constraints.
f	The Engineer and Society	PO6	Apply engineering solutions in societal and global contexts.
g	Environment and Sustainability	PO7	Understand the impact of the solutions on the environment to ensure sustainability.
h	Ethics	PO8	Understanding of professional and ethical responsibility.
i	Individual and Team Work.	PO9	Function as an individual and as a part of multidisciplinary team to accomplish a common goal.
j	Communication	PO10	Communicate effectively in both verbal and written forms.
k	Project Management and Finance	PO11	Ability to use engineering and management principles, to manage projects and in multidisciplinary environments.
l	Lifelong Learning	PO12	Recognition of the need for and ability to engage in lifelong learning.

PROGRAMME SPECIFIC OUTCOMES:

PSO 1: Demonstrate knowledge and competence in the application of basic sciences, mathematics and fundamentals of electrical and electronics systems

PSO 2: Ability to explore complex engineering problems

PSO 3: Demonstrate the ability to communicate correctly, effectively work in a team and develop good personality

PSO 4: Apply appropriate techniques and modern engineering tools in core areas to engage in lifelong learning.

NANDHA ENGINEERING COLLEGE (AUTONOMOUS), ERODE – 638 052

REGULATIONS – 2015 **CHOICE BASED CREDIT SYSTEM**

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

CURRICULAM **I - VIII SEMESTERS** **SYLLABUS:** **VII & VIII SEMESTERS**

SEMESTER: I								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15EY101	Communicative English	HS	3	1	0	2	2
2.	15MY103	Linear Algebra & Multivariable Calculus	BS	5	3	2	0	4
3.	15PY101	Engineering Physics	BS	3	3	0	0	3
4.	15CY101	Engineering Chemistry	BS	3	3	0	0	3
5.	15MEC01	Engineering Graphics	ES	4	2	0	2	3
6.	15CSC01	Problem Solving and C Programming	ES	3	3	0	0	3
PRACTICALS								
7.	15GY111	Physics and Chemistry Laboratory – I	BS	4	0	0	4	2
8.	15CSC11	Computer Programming Laboratory	ES	2	0	0	2	1
9.	15GYC11	Engineering Practices Laboratory	ES	4	0	0	4	2
10.	15GY112	Soft Skills- I	EEC	2	0	0	2	1
			TOTAL	**33**	**15**	**2**	**16**	**24**

SEMESTER: II								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15EY201	Professional English	HS	3	1	0	2	2
2.	15MY203	Differential Equations, Vector Calculus and Complex Variables	BS	5	3	2	0	4
3.	15PY203	Solid State Physics	BS	3	3	0	0	3
4.	15CY201	Environmental Science and Engineering	HS	3	3	0	0	3
5.	15CE201	Basics of Civil and Mechanical Engineering	ES	3	3	0	0	3
6.	15EE201	Electric Circuit Theory	PC	5	3	2	0	4
PRACTICALS								
7.	15GY211	Physics and Chemistry Laboratory – II	BS	4	0	0	4	2
8.	15EE211	Electric Circuits Laboratory	PC	4	0	0	4	2
9.	15GY212	Soft Skills- II	EEC	2	0	0	2	1
			TOTAL	**32**	**16**	**4**	**12**	**24**

SEMESTER: III								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15MY303	Transform Techniques and Partial Differential Equations	BS	5	3	2	0	4
2.	15EE301	Semiconductor Devices and Circuits	PC	3	3	0	0	3
3.	15EE302	DC Machines and Transformers	PC	5	3	2	0	4
4.	15EE303	Electromagnetic Field Theory	PC	3	3	0	0	3
5.	15EE304	Power Plant Engineering	ES	3	3	0	0	3
6.	15IT306	Data Structures and Algorithms	ES	3	3	0	0	3
PRACTICALS								
7.	15EE311	Semiconductor Devices and Circuits Laboratory	PC	4	0	0	4	2
8.	15EE312	DC Machines and Transformers Laboratory	PC	4	0	0	4	2
9.	15IT314	Data Structures and Algorithms Laboratory	ES	4	0	0	4	2
10.	15GYC13	Soft Skills- Reading and Writing	EEC	2	0	0	2	0
			TOTAL	**36**	**18**	**4**	**14**	**26**

SEMESTER: IV								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15MY402	Numerical Methods	BS	5	3	2	0	4
2.	15EE401	AC Machines	PC	5	3	2	0	4
3.	15EE402	Analog Integrated Circuits	PC	3	3	0	0	3
4.	15EE403	Digital Logic System Design	PC	3	3	0	0	3
5.	15EE404	Transmission & Distribution	PC	3	3	0	0	3
6.	15IT405	Programming in C++	ES	3	3	0	0	3
PRACTICALS								
7.	15EE411	AC Machines Laboratory	PC	4	0	0	4	2
8.	15EE412	Analog and Digital Integrated Circuits Laboratory	PC	4	0	0	4	2
9.	15IT414	C++ Laboratory	ES	4	0	0	4	2
10.	15GYC12	Soft Skills- Listening and Speaking	EEC	2	0	0	2	0
			TOTAL	**36**	**18**	**4**	**14**	**26**

SEMESTER: V								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15EE501	Power System Analysis	PC	5	3	2	0	4
2.	15EE502	Microprocessors and Microcontrollers	PC	3	3	0	0	3
3.	15EE503	Measurements and Instrumentation	PC	3	3	0	0	3
4.	15EE504	Control Systems	PC	5	3	2	0	4
5.	E 1	Elective I (PE)	PE	3	3	0	0	3
PRACTICALS								
6.	15EE511	Control and Instrumentation Laboratory	PC	4	0	0	4	2
7.	15EE512	Microprocessors and Microcontrollers Laboratory	PC	4	0	0	4	2
8.	15GY511	Soft Skills Aptitude and Reasoning-I	EEC	2	0	0	2	0
			TOTAL	**29**	**15**	**4**	**10**	**21**

SEMESTER: VI								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15EE601	Power System Operation and Control	PC	3	3	0	0	3
2.	15GEC01	Principles of Management	HS	3	3	0	0	3
3.	15EE602	Power Electronics	PC	3	3	0	0	3
4.	15EE603	Real Time Embedded Systems	PC	3	3	0	0	3
5.	E 2	Elective II (PE)	PE	3	3	0	0	3
6.	E 3	Elective III (PE)	PE	3	3	0	0	3
PRACTICALS								
7.	15EE611	Power Electronics Laboratory	PC	4	0	0	4	2
8.	15GE611	Comprehension	EEC	2	0	0	2	1
9.	15GY611	Soft Skills Aptitude and Reasoning-II	EEC	2	0	0	2	0
			TOTAL	**26**	**18**	**0**	**8**	**21**

SEMESTER: VII								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15EE701	Protection and Switch Gear	PC	3	3	0	0	3
2.	E 4	Elective IV(PE)	PE	3	3	0	0	3
3.	E 5	Elective V (PE)	PE	3	3	0	0	3
4.	E 6	Elective VI (PE/OE)	PE/OE	3	3	0	0	3
5.	E 7	Elective VII (OE)	OE	3	3	0	0	3
PRACTICALS								
6.	15EE711	Power System and Simulation Laboratory	PC	4	0	0	4	2
7.	15GE711	Personality and Character Development	EEC	2	0	0	1	0
8.	15EE731	Project Work-I	EEC	8	0	0	8	4
			TOTAL	**29**	**15**	**0**	**13**	**21**

SEMESTER: VIII								
SL.NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	E 8	Elective VIII (PE)	PE	3	3	0	0	3
2.	E 9	Elective IX (OE)	OE	3	3	0	0	3
PRACTICALS								
3.	15EE831	Project Work-II	EEC	16	0	0	16	8
			TOTAL	**22**	**6**	**0**	**16**	**14**

TOTAL NO. OF CREDITS: 177

PROFESSIONAL ELECTIVES (PE)								
SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	15EEX01	Communication Engineering	PE	3	3	0	0	3
2.	15EEX02	Computer Networks and Protocols	PE	3	3	0	0	3
3.	15EEX03	Fundamentals of Electric Power Utilization	PE	3	3	0	0	3
4.	15EEX04	Semiconducting Materials and Devices	PE	3	3	0	0	3
5.	15EEX05	Design of Electrical Machines	PE	3	3	0	0	3
6.	15EEX06	Discrete Time Systems and Signal Processing	PE	3	3	0	0	3
7.	15EEX07	Vehicular Electric Power System	PE	3	3	0	0	3
8.	15EEX08	Renewable Power Generation Systems	PE	3	3	0	0	3
9.	15EEX09	Fibre Optics and Laser Instruments	PE	3	3	0	0	3
10.	15EEX10	Power Semiconductor Devices and Applications	PE	3	3	0	0	3
11.	15EEX11	Special Electrical Machines	PE	3	3	0	0	3
12.	15EEX12	Power Quality	PE	3	3	0	0	3
13.	15EEX13	Electric Drives and Control	PE	3	3	0	0	3
14.	15EEX14	PLC and Automation	PE	3	3	0	0	3
15.	15EEX15	Advanced Control Systems	PE	3	3	0	0	3
16.	15EEX16	Flexible AC Transmission Systems	PE	3	3	0	0	3
17.	15EEX17	High Voltage Engineering	PE	3	3	0	0	3
18.	15EEX18	Solar Energy Utilization	PE	3	3	0	0	3
19.	15EEX19	Solid State Relays	PE	3	3	0	0	3
20.	15EEX20	Analysis of Inverters	PE	3	3	0	0	3
21.	15EEX21	Power System Dynamics	PE	3	3	0	0	3
22.	15EEX22	Energy Management and Auditing	PE	3	3	0	0	3
23.	15EEX23	Power Switching Converters	PE	3	3	0	0	3
24.	15EEX24	Smart Grid	PE	3	3	0	0	3
25.	15EEX25	Medical Instrumentation	PE	3	3	0	0	3
26.	15EEX26	Computer Architecture	PE	3	3	0	0	3
27.	15IT504	Fundamentals of Java programming	PE	3	3	0	0	3
28.	15ITC01	Internet of Things	PE	3	3	0	0	3
29.	15GEC03	Professional Ethics and Human Values	PE	3	3	0	0	3
30.	15GEC04	Total Quality Management	PE	3	3	0	0	3

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

33.	15PYZ01	Nanomaterials	OE	3	3	0	0	3
34.	15PYZ02	Nuclear physics and reactors	OE	3	3	0	0	3
35.	15PYZ03	Space science and technology	OE	3	3	0	0	3
36.	15CYZ01	Chemistry for engineers	OE	3	3	0	0	3
37.	15CYZ02	Soil chemistry	OE	3	3	0	0	3
38.	15CYZ03	Organic chemistry	OE	3	3	0	0	3

VALUE ADDED COURSE								
Sl. No	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1.	15GEY01	Communicative Hindi	OE	2	2	0	0	0
2.	15GEY02	Fundamentals of German	OE	2	2	0	0	0
3.	15GEY03	Basics of Japanese	OE	2	2	0	0	0

SUMMARY										
SL. No.	**SUBJECT AREA**	**CREDITS AS PER SEMESTER**								**CREDITS TOTAL**
		I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	
1.	**HS**	**2**	**5**	**-**	**-**	**-**	**3**	**-**	**-**	**10**
2.	**BS**	**12**	**9**	**4**	**4**	**-**	**-**	**-**	**-**	**29**
3.	**ES**	**9**	**3**	**8**	**5**	**-**	**-**	**-**	**-**	**25**
4.	**PC**	**-**	**6**	**14**	**17**	**18**	**11**	**5**	**-**	**71**
5.	**PE**	**-**	**-**	**-**	**-**	**3**	**6**	**9**	**3**	**21**
6.	**OE**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**6**
7.	**EEC**	**1**	**1**	**-**	**-**	**-**	**1**	**4**	**8**	**15**
	TOTAL	**24**	**24**	**26**	**26**	**21**	**21**	**21**	**14**	**177**

15EE501 - POWER SYSTEM ANALYSIS

L	T	P	C
3	1	0	4

OBJECTIVE:

- To understand the concept of Load flow analysis, Fault analysis and Stability analysis.

COURSE OUTCOMES:

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

CO1: Understand the concept of power system

CO2: Acquire knowledge about Power flow analysis

CO3: Analyze various types of symmetrical faults

CO4: Acquire knowledge various types of unsymmetrical faults

CO5: Analyze the stability of the power system

UNIT I INTRODUCTION **12**

Need for system planning and operational studies – Structure of a power system.- Single line diagram –per unit analysis – Generator – transformer – transmission line and load representation for different power system studies.- construction of Y-bus using inspection and singular transformation methods –Formulation of z-bus Matrix-Impedance and Reactance Diagram.

UNIT II POWER FLOW ANALYSIS **12**

Importance of power flow analysis in planning and operation of power systems - classification of buses – development of power flow model in complex variables form – solution of power flow equation using Gauss-Seidel method and Newton-Raphson method .

UNIT III FAULT ANALYSIS – SYMMETRICAL FAULT ANALYSIS **12**

Importance of short circuit study – assumptions in fault analysis – analysis using Thevenin's theorem – Z-bus building algorithm – fault analysis using Z-bus – computations of short circuit capacity, post fault voltage and currents.

UNIT IV FAULT ANALYSIS – UNSYMMETRICAL FAULT ANALYSIS **12**

Introduction to symmetrical components – sequence impedances – sequence circuits of synchronous machine, transformer and transmission lines – sequence networks- Analysis of single line to ground, line to line and double line to ground faults using Thevenin's theorem and Z-bus matrix.

UNIT V STABILITY ANALYSIS **12**

Importance of stability analysis in power system planning and operation – classification of power system stability – voltage stability –Development of swing equation – equal area criterion – determination of critical clearing angle and time – solution of swing equation by modified Euler method and Runge-Kutta method.

TOTAL : 60 PERIODS

TEXT BOOKS:

1. Nagrath I.J. and Kothari D.P., 'Modern Power System Analysis', Tata McGraw-Hill, Fourth Edition, 2011.
2. John J. Grainger and W.D. Stevenson Jr., 'Power System Analysis', Tata McGraw-Hill, Sixth reprint, 2010.
3. P. Venkatesh, B.V. Manikandan, S. Charles Raja, A. Srinivasan, ' Electrical Power Systems- Analysis, Security and Deregulation', PHI Learning Private Limited, New Delhi, 2012.

REFERENCES:

1. Hadi Saadat, 'Power System Analysis', Tata McGraw Hill Education Pvt. Ltd., New Delhi, 21st reprint, 2010.
2. Kundur P., 'Power System Stability and Control, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 10th reprint, 2010.
3. J. Duncan Glover, Mulukutla S. Sarma, Thomas J. Overbye, ' Power System Analysis & Design', Cengage Learning, Fifth Edition, 2012.
4. Olle. I. Elgerd, 'Electric Energy Systems Theory – An Introduction', Tata McGraw Hill Publishing Company Limited, New Delhi, Second Edition, 2012.
5. C.A.Gross, "Power System Analysis," Wiley India, 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								
3		X		X								
4		X		X								
5		X		X								

15EE502 - MICROPROCESSORS AND MICROCONTROLLERS

L	T	P	C
3	0	0	3

(Common to EEE and E&I Branches)

OBJECTIVE:

- To impart 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 8085 processor

CO2: Develop skills in writing assembly language program

CO3: Impart knowledge on interfacing the external devices to the processor according to the user requirements

CO4: Understand the internal structure and instruction set of 8051 controller

CO5: Develop simple applications on microcontroller based systems

UNIT I 8085 PROCESSOR **9**

Functional Building Blocks – Signals – 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", 2nd ed., Prentice Hall of India, 2014.
2. Soumitra Kumar Mandal, Microprocessor & Microcontroller Architecture, Programming & Interfacing using 8085, 8086, 8051, McGraw Hill Education, 2013.

REFERENCES:

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

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

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

15EE503 - MEASUREMENTS AND INSTRUMENTATION

L	T	P	C
3	0	0	3

OBJECTIVE:

- To impart knowledge in electrical measurements and instrumentation techniques and to learn the principle of working and calibration of electrical and electronic measuring devices.

COURSE OUTCOMES:

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

CO1: Know the basic concept of measuring principles and indicating instruments

CO2: Acquire knowledge about fundamentals of electrical and electronic instruments

CO3: Analyze the various measurement techniques of R, L and C using bridges

CO4: Learn the importance of various storage and display devices and also transducers in measurement

CO5: Demonstrate about the modern measurement techniques

UNIT I INTRODUCTION AND INDICATING INSTRUMENTS **9**

Importance of Measurement –Methods of Measurement – Functional elements of an instrument System – Moving iron: attraction and repulsion type instruments, Moving coil instruments – Permanent magnet moving coil instruments, Dynamometer type moving coil Instruments.

UNIT II ELECTRICAL AND ELECTRONICS INSTRUMENTS **9**

Principle and types of analog and digital voltmeters, ammeters- Dynamometer type wattmeter :Torque expression- Single and three phase Energy meters, Calibration of energy meters – Measurement of power using Instrument Transformers – Power factor meter

UNIT III MEASUREMENTS OF R, L AND C USING BRIDGES **9**

Classification of Resistances – Measurement of Medium Resistance – Wheatstone Bridge – Limitations of Wheatstone Bridge – Low Resistance – Kelvin's Double Bridge – High Resistance – Meggar (Earth tester) – A.C.Bridges Introduction – Sources and Detectors – Measurement of Self Inductance & Capacitance: Maxwell's Inductance Bridge ,capacitance Bridge,Wien's Bridge.

UNIT IV SIGNAL GENERATORS AND TRANSDUCERS **9**

Function generators – Frequency synthesizer – Harmonic distortion analyzer – Classification of transducers –Selection of transducers -. Temperature transducers- RTD, thermister, Thermocouple – Displacement transducer – Inductive, capacitive, LVDT ,-Piezo electric and Hall effect transducer

UNIT V MODERN MEASUREMENT TECHNIQUES 9

Elements of data acquisition system – Computer controlled instrumentation – Fiber optic measurements for power and system loss – Optical time domain Reflectometer- Smart meter.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. A.K. Sawhney, "A Course in Electrical & Electronic Measurements & Instrumentation", Dhanpat Rai and Co, 2013.
2. Ernest O.Doebelin, Dhanesh N Manik, "Measurement systems", McGraw Hill education (P) Ltd., New Delhi, 2012.

REFERENCES:

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

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

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

15EE504 - CONTROL SYSTEMS

L	T	P	C
3	2	0	4

OBJECTIVE:

- To introduce the basic concepts of physical systems and odelling. To impart in-depth analysis of system dynamics in time-domain and frequency domain using classical techniques and state-space models.

COURSE OUTCOMES:

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

CO1: Understand the use of transfer function models for analysis physical systems and introduce the control system components.

CO2: Provide adequate knowledge in the time response of systems and steady state error analysis.

CO3: Accord basic knowledge in obtaining the open loop and closed–loop frequency responses of systems.

CO4: Introduce stability analysis and design of compensators

CO5: Introduce state variable representation of physical systems and study the effect of state feedback

UNIT I SYSTEMS AND THEIR REPRESENTATIONS 12

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

UNIT II TIME RESPONSE ANALYSIS 12

Time response – Time domain specifications – Types of test inputs – I and II order system response–Steady state error, error constants, generalized error coefficient – Root locus construction –Introduction to P, PI, PID controllers-Effects of P, PI, PID modes of feed back control.

UNIT III FREQUENCY RESPONSE ANALYSIS AND DESIGN 12

Frequency Response –Bode plot – Polar plot – Nyquist stability criterion. Correlation between frequency domain and time domain specifications.

UNIT IV STABILITY AND COMPENSATOR DESIGN 12

Stability – Concept and definition, Characteristic equation – Location of poles – Routh Hurwitz criterion - Design of lag, lead, lag-lead series networks Lag/Lead compensator design using bode plots.

UNIT V STATE-SPACE ANALYSIS **12**

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

TOTAL = 60 PEROIDS

TEXT BOOKS:

1. Gopal M, "Control Systems – Principles and Design" Tata McGraw-Hill, New Delhi, 2012.
2. Norman S Nise, "Control System Engineering ", John Wiley & Sons, New Delhi, 2012.

REFERENCES:

1. Nagrath I J and Gopal M, "Control System Engineering", New Age International, New Delhi, 2011.
2. Benjamin Kuo, "Automatic Control Systems", Prentice Hall of India, New Delhi, 2010.
3. Ogata K, "Modern Control Engineering", Prentice Hall of India, 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	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

15EE511 - CONTROL AND INSTRUMENTATION LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVE:

- To provide knowledge on analysis and design of control system and learn to use 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: Study the simulation of system and stability

CO2: Determine the transfer function of DC motor and design the Stepper motor control system

CO3: Measure unknown resistance, capacitance and inductance

CO4: Apply basic knowledge of measurement systems towards measurements, including error analysis, interpretation, experimental uncertainty, calibration, etc.

CO5: Evaluate the methodologies for minimizing measurement errors and to identify measurement uncertainty components

LIST OF EXPERIMENTS:

1. Digital simulation of first order system and second order system
2. Digital simulation of Simulation of P, PI and PID controllers
3. Determination of transfer function of armature controlled DC motor
4. Determination of transfer function of separately excited DC generator
5. Stepper motor control system
6. Measurement of resistance by Wheatstone bridge
7. Measurement of inductance using Anderson's bridge
8. Measurement of capacitance using Schering's bridge
9. Measurement of displacement using LVDT
10. Measurement of gain using Instrumentation amplifiers.

TOTAL =60 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							
4												
5												

15EE512 - MICROPROCESSORS AND MICROCONTROLLERS LABORATORY **L T P C**

(Common to EEE and E&I Branches) **0 0 4 2**

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) Parallel Communication Interface(8255)
   (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.

TOTAL: 60 PERIODS

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

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

15GY511 - SOFT SKILLS APTITUDE AND REASONING – I

L	T	P	C
0	0	2	0

OBJECTIVES:

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

COURSE OUTCOMES:

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

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

UNIT I : SOFT SKILLS **(10)**

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

UNIT II : APTITUDE **(10)**

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

UNIT III : REASONING **(10)**

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

TOTAL: 30 PERIODS

TEXT BOOKS:

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

REFERENCES:

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

Mapping of course Outcome and Programme Outcome

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

15EE601 - POWER SYSTEM OPERATION AND CONTROL

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand and analyze power system operation, stability, control and protection

COURSE OUTCOMES:

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

CO1: Know the basic concepts of power system operation and control

CO2: Model power-frequency dynamics and to design power-frequency controller

CO3: Acquire knowledge on reactive power-voltage control

CO4: Study the economic operation of power system

CO5: Learn about SCADA and its application for real time operation and control of power systems

UNIT I INTRODUCTION **9**

An overview of power system operation and control: plant level and system level controls (block diagram approach only) – load Characteristics: load curves and load-duration curve –diversity and load factor – load forecasting: quadratic and exponential curve fitting techniques.

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

Basics of speed governing mechanism and modeling – speed-load characteristics – load sharing in parallel operation – control area concept – LFC control of a single-area system – static and dynamic analysis of uncontrolled and controlled cases.

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

Automatic Voltage Regulator (AVR)-Generation and absorption of reactive power – basics of reactive power control – excitation systems – modeling – static and dynamic analysis – stability compensation – methods of voltage control: tap changing transformer, SVC (TCR + TSC) and STATCOM.

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 (No derivation of loss coefficients) – 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 for computer control of power systems – concept of energy control centre – functions – system monitoring – data acquisition and control – system hardware configuration – SCADA and EMS functions –- state transition diagram.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Allen. J. Wood and Bruce F. Wollenberg, 'Power Generation, Operation and Control', John Wiley & Sons, Inc., Reprint 2012.
2. Abhijit Chakrabarti, Sunita Halder, 'Power System Analysis Operation and Control', PHI learning Pvt. Ltd., New Delhi, Third Edition, 2010.

REFERENCES:

1. Nagrath I.J. and Kothari D.P., 'Modern Power System Analysis', Tata McGraw-Hill, Fourth Edition, 2011.
2. Kundur P., 'Power System Stability and Control, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 10th reprint, 2010.
3. Hadi Saadat, 'Power System Analysis', Tata McGraw Hill Education Pvt. Ltd., New Delhi, 21st reprint, 2010.
4. N.V.Ramana, "Power System Operation and Control," Pearson, 2011.
5. C.A.Gross, "Power System Analysis," Wiley India, 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						
2	X	X	X	X								
3	X	X	X	X			X					
4		X		X		X						
5					X	X						X

15GEC01 - PRINCIPLES OF MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVE:

- To provide knowledge on planning, organizing, leading and controlling at different conditions in organizations.

COURSE OUTCOMES:

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

CO1: Acquire comprehensive knowledge on management concepts.

CO2: Learn about the planning under different conditions and situations.

CO3: Accomplish organizing of the human resources.

CO4: Obtain employees motivation and project managements in working environments.

CO5: Do the budgetary and non-budgetary control of projects.

UNIT I - OVERVIEW OF MANAGEMENT **9**

Definition of management – Science & Art – Management & Administration - Role of managers – Evolution of Management thoughts – Contribution of Taylor and Fayol – Functions of management – Strategies for International business.

UNIT II - PLANNING **9**

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

UNIT III - ORGANIZING **9**

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

UNIT IV - DIRECTING **9**

Creativity and Innovation - Motivation and Satisfaction - Motivation Theories - Leadership – Types of Leadership –Job enrichment - Communication - hurdles to effective communication – Organization Culture - Elements and types of culture - Managing cultural diversity.

UNIT V - CONTROLLING **9**

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

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOK:

1. Harold Koontz, Heinz Weihrich, "Essentials of Management", Tata McGrawHill, 8th edition Second Reprint 2010.

REFERENCES:

1. Andrew J. Dubrin, "Essentials of Management", Thomson Southwestern, 9th ed., 2012.
2. Stephen P. Robbins and Mary Coulter, "Management", Prentice Hall of India, 10th Edition, 2010.
3. Charles W L Hill, Steven L Mc Shane, "Principles of Management", Mc Graw Hill Education, Special Indian Edition, 2008.
4. Hellriegel, Slocum & Jackson, "Management - A Competency Based Approach", Thomson South Western, 10th edition, 2007.
5. Harold Koontz, Heinz Weihrich and Mark V Cannice, "Management - A global & Entrepreneurial Perspective", Tata Mc Graw Hill, 12th ed., 2007.

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

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

15EE602 - POWER ELECTRONICS

L	T	P	C
3	0	0	3

OBJECTIVE:

- To enable the students to understand the problems faced by modern power industries and how power electronics can overcome these problems.

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 concepts of various converters.

CO3: Work in teams and independently for the design, development and testing of power electronics.

CO4: Understand the basic requirements of industrial power electronics by using the concept of inverters.

CO5: Model and simulate the various types of AC-AC 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 (both 120^0 mode and 180^0 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

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)

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	
4			X	X	X		X					X
5			X		X							X

15EE603 - REAL TIME EMBEDDED SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVE:

- To acquire the knowledge on embedded system architecture and its accessing protocols to implement the design methodologies by using hardware and software.

COURSE OUTCOMES:

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

CO1: Understand the concept of composition, design and implementation of embedded systems

CO2: Learn the interfacing techniques between processors and peripheral devices related to embedded system

CO3: Know the concept of communication protocols and apply advanced technical knowledge in multiple contexts

CO4: Acquire the basic concepts of system programming like operating system, assembler, compliers and to understand the management tasks needed for developing embedded system

CO5: Use various testing tools for hardware- software debugging and learn its applications

UNIT I INTRODUCTION TO EMBEDDED SYSTEM **9**

Embedded system, Functional building blocks of embedded system, Challenges in embedded system, Embedded system design processes, Applications of embedded systems.

UNIT II PROCESSOR AND MEMORY ORGANIZATION **9**

Structural units in a processor selection for an embedded system, Interrupts, Memory, Segments and blocks, Direct Memory Access, Interfacing with I/O Devices.

UNIT III COMMUNICATION PROTOCOLS **9**

Introduction to Serial/Parallel Communication, Serial communication protocols: Inter Integrated Circuits, Controller Area Network, Universal Serial Bus, RS232 standard, Parallel communication protocols : ISA, PCI, ARM bus- IoT: Web connectivity.

UNIT IV RTOS FOR EMBEDDED SYSTEMS **9**

Introduction to RTOS, Tasks and Task States, Interrupt Service Routines , Semaphores, Mutex, Message Queues, Mailboxes, Pipes, Scheduling policies, Inter process communication.

UNIT V REAL TIME OPERATING SYSTEM TOOLS AND CASE STUDIES 9

Introduction to µC/ OS II and VX works, Case study of coding for an automatic chocolate vending machine ,Case study of an embedded system for an adaptive cruise control system in a car, Case study of an embedded system for a smart card.

TOTAL = 45 PERIODS

TEXT BOOKS:

1. Rajkamal, "Embedded System-Architecture, Programming, Design", Mc Graw Hill,3rded., 2014.
2. Peckol, "Embedded system Design", John Wiley & Sons, 2010.
3. Daniel W. Lewis, "Fundamentals of Embedded Software", Prentice Hall of India, 2004.

REFERENCES:

1. Shibu. K.V, "Introduction to Embedded Systems", Tata Mcgraw Hill, 2009.
2. Elicia White, " Making Embedded Systems", O' Reilly Series,SPD, 2011.

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

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

15EE611 - POWER ELECTRONICS LABORATORY

L	T	P	C
0	0	4	2

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: Understand 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

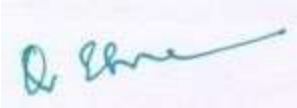
LIST OF EXPERIMENTS:

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 of Single Phase PWM Inverter
10. Simulation of AC to AC Converter

TOTAL: 60 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	X
3		X	X		X						X	X
4		X	X	X							X	X
5		X	X									X



15GE611 - COMPREHENSION

L	T	P	C
0	0	2	1

OBJECTIVE:

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

COURSE OUTCOMES:

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

CO1: Understand and comprehend any given problem related to 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)

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

15GY611 - SOFT SKILLS APTITUDE AND REASONING – II

L	T	P	C
0	0	2	0

OBJECTIVE:

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

COURSE OUTCOMES:

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

CO1: Write and speak fluently without any grammatical errors

CO2: Solve aptitude problems with ease

CO3: Solve reasoning problems with ease

UNIT I : SOFT SKILLS **(10)**

Grammar – Synonyms and Antonyms, Error Spotting, Statement Completion, Idioms & Phrases, One word Substitution, Confusable Words, Jumbled Words / Sentences, Reading Comprehension, Theme Detection, Punctuation – Job Application with Resume – Written Communication - Impromptu Speech – Group Discussion – Mock Interview

UNIT II : APTITUDE **(10)**

Simple Interest - Probability - Speed & Distance – Time & Work - Calendar – Clock

UNIT III : REASONING **(10)**

Analogy - Blood Relations - Directions - Data Interpretation - Data sufficiency

TOTAL: 30 PERIODS

TEXT BOOKS:

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

REFERENCES:

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

Mapping of course Outcome and Programme Outcome

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

15EE701- PROTECTION AND SWITCH GEAR

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand the concept of switchgear and provide reliable protection to power system

COURSE OUTCOMES:

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

CO 1: know the layout of a typical substation
CO 2: Select Fuses and Circuit breakers for a given situation
CO 3: Acquire knowledge to understand the principles of different types of protective relays
CO 4: Gain adequate knowledge in selection of different types of protective schemes
CO 5: Know the causes of abnormal operating conditions

UNIT I - INTRODUCTION (9)

Switchgear - essential features - Substations –Equipment - Layout of a typical substation- Current and voltage transformers for protection.

UNIT II – FUSES AND CIRCUIT BREAKER (9)

Fuses -Types - HRC Fuses – Characteristics and applications. Circuit Breakers - Arc phenomenon - restriking and recovery voltage – resistance switching. Types – Air, Oil, SF_6 and vacuum circuit breakers.

UNIT III – RELAYS (9)

Operating principles of relays - The Universal torque equation –Electromagnetic Relays-Over current, Directional, Distance, Differential and Negative sequence and under frequency relays.

UNIT IV – APPARATUS PROTECTION (9)

Protection of transformer, alternator, busbar and transmission line.

UNIT V – PROTECTION SCHEMES (9)

Principles and need for protective schemes – nature and causes of faults – types of faults-Protection against overvoltage due to lightning-Arcing grounds-Petersen coil.

TOTAL: (L: 45) = 45 PERIODS

TEXT BOOKS:

1. Badri Ram and D.N. Vishwakarma, “Power System Protection and Switch Gear”, Tata McGraw Hill 2nd edition - 2011.
2. Sunil S. Rao, “Protection and Switch Gear”, Khanna Publishers 13th edition, New Delhi, 2017.

REFERENCES:

1. Uppal, “Electrical Power” Khanna Publisher, 13th edition, 1992.
2. Y.G Paithankar and S.R Bhide, “Fundamentals of power system protection”, Prentice Hall of India, 2nd edition 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	X		X		X
2	X						X				X	
3	X		X			X		X		X		X
4	X			X					X	X		X
5			X	X			X	X			X	

15EE711-POWER SYSTEM AND SIMULATION LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVE:

- To provide better understanding of power system analysis through digital simulation

COURSE OUTCOMES:

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

CO 1: Develop programs for formation of bus admittance and impedance matrices.
CO 2: Develop programs for Power flow solution using Gauss-Seidel method.
CO 3: Know about Unit Commitment and Economic Dispatch.
CO 4: Develop programs for load flow solution using Newton –Raphson method.
CO 5: 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.

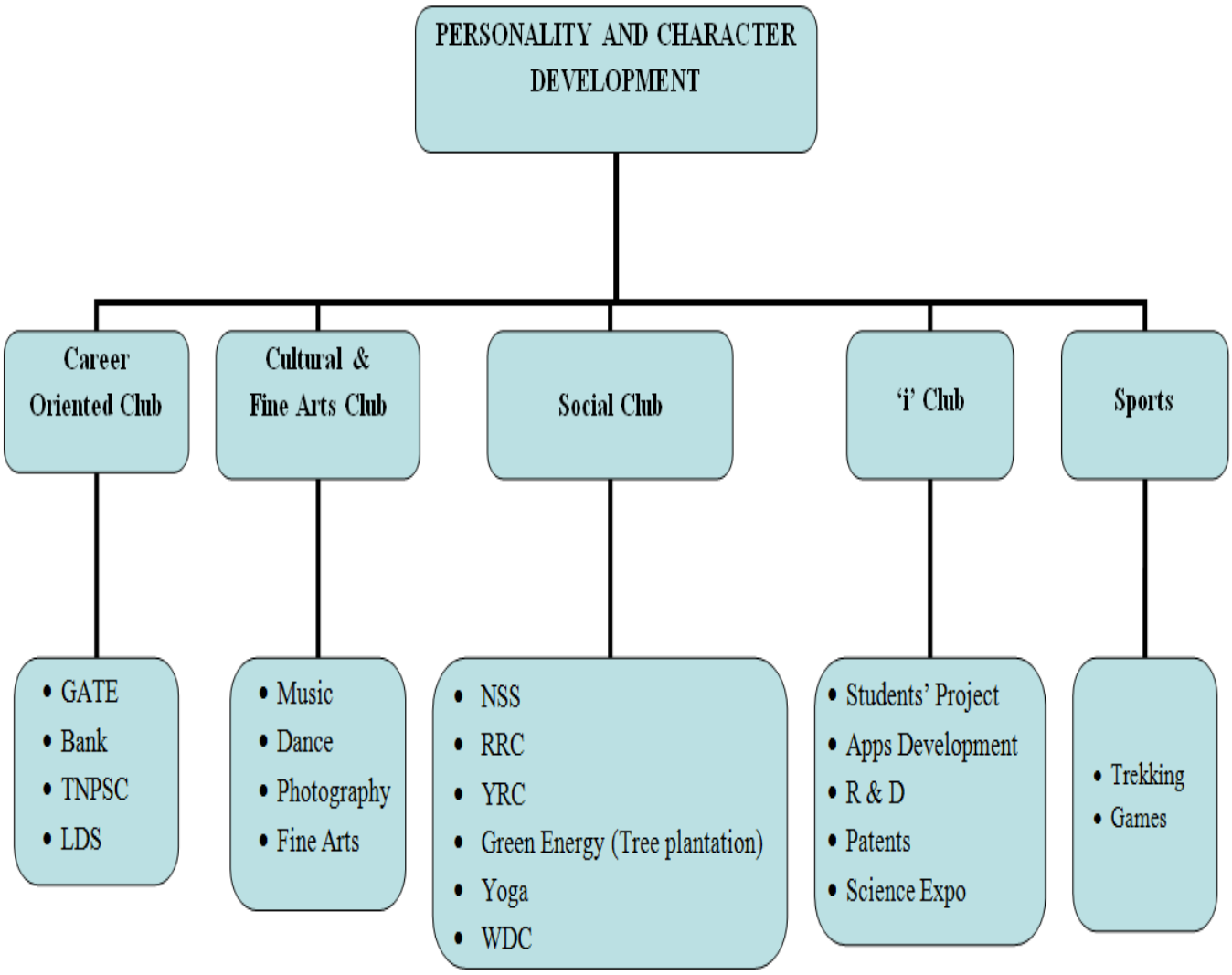
TOTAL :(P: 60)= 60 PERIODS

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							

15GE711 PERSONALITY AND CHARACTER DEVELOPMENT

L	T	P	C
0	0	1	0



***LDS - Leadership Development Skills**

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

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

TOTAL [4 x (P: 15)]: 60 PERIODS

(Cumulatively for Four Semesters)

15EE731 - PROJECT WORK-I

L	T	P	C
0	0	8	4

OBJECTIVE:

- To practice the fundamental of electrical and electronics engineering concepts and principles in addressing a real time situation autonomously or in a team.

COURSE OUTCOMES:

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

CO 1: Formulate a problem in the field of Electrical and Electronics Engineering through literature survey and its reviews.

CO 2: Identify the objectives of the project by understanding the source of a problem.

CO 3: Analyze the problem based on a methodology and tabulate the results.

CO 4: Develop methodology using appropriate tools for the problem.

CO 5: Conclude the results and prepares a report on the project.

The students in a group of 4 works on a topic approved by a team of faculty project coordinators and the head of the department under the guidance of a faculty member and prepares 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: 120 PERIODS

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

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

15EE831 - PROJECT WORK-II

L	T	P	C
0	0	16	8

OBJECTIVES:

- To practice the fundamental of electrical and electronics engineering concepts and principles in addressing a real time situation autonomously or in a team
- To develop an ability to solve problem by making a literature review and finding a solution for the same.
- To train the students for facing presentations, preparing reports and appears for the viva voce sessions.

COURSE OUTCOMES:

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

CO 1: Study problems in the field of Electrical and Electronics Engineering through literature survey and its reviews.
CO 2: Undertake problem identification, formulation and solution.
CO 3: Design engineering solutions to complex problems utilizing a systems approach and develop projects.
CO 4: Demonstrate the knowledge, skills and work as a team to achieve common goal.
CO 5: Conclude the results and prepares a report on the project.

The students in a group of 4 works on a topic approved by a team of faculty project coordinators and the head of the department under the guidance of a faculty member and prepares 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: 240 PERIODS

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

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

15EEX01 - COMMUNICATION ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVE:

- To introduce the concepts of communication systems and its applications using wired and wireless medium

COURSE OUTCOMES:

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

CO1: Learn the different methods of analog communication and their significance

CO2: Understand the digital Communication methods for high bit rate transmission

CO3: Realize the concepts of source and line coding techniques for enhancing the transmission rate

CO4: Know various MAC protocols used in communication systems for enhancing the number of users

CO5: Examine the various media for digital communication

UNIT I ANALOG COMMUNICATION **9**

Amplitude modulation: Frequency spectrum – vector representation – power relations – generation of AM – SB, SB/SC, SSB; AM transmitter: Low level and high level transmitter, AM receiver : Super heterodyne Receiver. Power relation between FM and PM, Generation (Armstrong method) and detection (Foster Seely Discriminator) of FM and PM.

UNIT II DIGITAL COMMUNICATION **9**

Concept of sampling and sampling theorems, Pulse modulation techniques: PAM, PWM, PCM, DM, Adaptive delta modulation, Keying techniques: ASK, FSK and PSK, Advantages and disadvantages of digital communication.

UNIT III SOURCE CODES, LINE CODES & ERROR CONTROL (Qualitative only) **9**

Source codes : Shaum codes , Huffman codes , Line Codes : NRZ and RZ, Error control codes : Linear block codes – Hamming codes, Convolutional codes – Trellis codes – Narrowband and Wideband CODECS using IoT.

UNIT IV SPREAD SPECTRUM AND MULTIPLE ACCESS TECHNIQUES **9**

Spread Spectrum techniques: DSSS & FHSS techniques. Multiple Access techniques: FDMA, TDMA, CDMA, SDMA.

UNIT V SATELLITE AND OPTICAL FIBER COMMUNICATION **9**

Satellite communication: Types of satellites, Satellite orbits, INTELSAT and INSAT - Optical fiber communication: Technology - Single mode and Multimode fibers - Advantages.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Taub & Schiling "Principles of Communication Systems" Tata McGraw Hill 2007.
2. Anoky Singh,"Principles of Communication Engineering", S.Chand&Co., 1999.
3. Simon Haykin, "Communication Systems", Wiley 2007.

REFERENCES:

1. Kennedy and Davis "Electronic Communication Systems" Tata McGraw hill, 4th Edition, 1993.
2. Sklar "Digital Communication Fundamentals and Applications"Pearson Education, 2001.
3. G.Kennedy,"Electronic Communication Systems", Mcgraw Hill, 4th Edition, 2002.
4. Miller, "Modern Electronic Communication", Prentice Hall of India, 2003.
5. Gerd Keiser, "Optical Fiber Communications**",** McGraw Hill Education (India) Private Limited, 2013.

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	X							
4	X	X	X	X								
5	X	X		X								

15EEX02 - COMPUTER NETWORKS AND PROTOCOLS

L	T	P	C
3	0	0	3

OBJECTIVE:

- Understanding the concepts of data communications, functions of different layers, IEEE standards employed in computer networking, and to make the students to get familiarized with different protocols and network components.

COURSE OUTCOMES:

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

CO1: Understand the basics of data communication through transmission medium.

CO2: Choose the required functionality at each layer for given application.

CO3: Apply solution for network related problems in real time.

CO4: Recognize process to process delivery concepts and protocols used in it.

CO5: Analyze and recognize the application layer protocols and its applications.

UNIT I FUNDAMENTALS & PHYSICAL LAYER 9

Networks – Components and Categories – Line Configuration – Topologies – Protocols and Standards –ISO /OSI Model – Transmission Media – Coaxial Cable – Fiber Optics – Interfaces(RS232 Standard) and Modems .

UNIT II DATA LINK LAYER 9

Error – Detection and Correction – Parity – LRC – CRC – Hamming code – Flow Control and Error control – Stop and wait – Go back-N ARQ – Selective repeat ARQ - Sliding window – HDLC. LAN-Ethernet IEEE 802.3 – Connecting devices – Repeaters – Hubs – Bridges.

UNIT III NETWORK LAYER 9

Internetworks – Circuit Switching – Packet Switching – IP addressing methods – Subnetting – Routers –Routing Algorithms – Distance Vector Routing – Link State Routing.

UNIT IV TRANSPORT LAYER 9

Duties of transport layer – Multiplexing – Demultiplexing – Sockets – User Datagram Protocol (UDP) –Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS) – Techniques.

UNIT V APPLICATION LAYER 9

Domain Name Space (DNS) – Email (SMTP) – File Transfer protocol (FTP) – HTTP – Simple Network Management Protocol (SNMP) – World Wide Web (WWW).

TOTAL: 45 PERIODS

TEXT BOOK:

1. Behrouz A. Forouzan, "Data communication and Networking Update", Tata McGraw-Hill, Third Edition,2006.

REFERENCES:

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.

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

15EEX03 - FUNDAMENTALS OF ELECTRIC POWER UTILIZATION

L	T	P	C
3	0	0	3

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)

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	X			X			
5		X		X		X		X		X		

15EEX04 - SEMICONDUCTING MATERIALS AND DEVICES

L	T	P	C
3	0	0	3

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

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

15EEX05 - DESIGN OF ELECTRICAL MACHINES

L	T	P	C
3	0	0	3

OBJECTIVE:

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

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 **9**

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 **9**

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 **9**

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

UNIT IV INDUCTION MOTORS **9**

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.

UNIT V SYNCHRONOUS MACHINES **9**

Output equations – choice of loadings – Design of salient pole machines – Short circuit ratio – shape of pole face – Armature design – Estimation of air gap length – Design of rotor –Design of damper winding – Design of field winding.

TOTAL: 45 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	
3	X		X	X	X		X				X	
4	X			X	X		X				X	
5	X			X	X		X				X	

15EEX06-DISCRETE TIME SYSTEMS AND SIGNAL PROCESSING

L	T	P	C
3	0	0	3

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: Understand the concepts of signals and systems

CO2: Compute DFT using FFT algorithm.

CO3: Design IIR filter.

CO4: Design FIR filter.

CO5: Understand and write program using DSP processors.

UNIT I INTRODUCTION **9**

Classification of systems: Continuous, discrete, linear, causal, stable, dynamic, recursive, time variance; classification of signals: continuous and discrete, energy and power; mathematical representation of signals; spectral density; sampling techniques, quantization, quantization error, Nyquist rate, aliasing effect.

UNIT II DISCRETE FOURIER TRANSFORM & COMPUTATION **9**

Discrete Fourier Transform- properties - Computation of DFT using FFT algorithm – DIT &DIF using radix 2 FFT – Butterfly structure.

UNIT III 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 IV 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 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, 4th Edition, TMH, 2010.
4. Lawrence R Rabiner and Bernard Gold, "Theory and Application of Digital Signal Processing", PHI 2010.
5. http://www.ti.com/lit/ds/symlink/tms320c6713.pdf

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

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

15EEX07 - VEHICULAR ELECTRIC POWER SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVE:

- This course introduces the fundamental concepts, principles and analysis of hybrid and electric vehicles.

COURSE OUTCOMES:

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

CO1: Understand the various aspects of hybrid and electric vehicles.
CO2: Plan the selection of electrical machines for hybrid and electric vehicles.
CO3: Select various energy storage technologies for hybrid and electric vehicles.
CO4: Implement energy management techniques for hybrid and electric vehicles.
CO5: Demonstrate the power system of various vehicular systems.

UNIT I HISTORY OF HYBRID AND ELECTRIC VEHICLES 9

Social and environmental importance of hybrid and electric vehicles - Impact of modern drive-trains on energy supplies - Basics of vehicle performance - vehicle power source characterization - transmission characteristics - Automation system computer facilities

UNIT II INTRODUCTION TO ELECTRIC COMPONENTS USED IN HYBRID AND ELECTRIC VEHICLES 9

Configuration and control of DC Motor drives - Induction Motor drives - Permanent Magnet Motor drives - Switched Reluctance Motor drives - Drive system efficiency.

UNIT III ENERGY STORAGE TECHNOLOGIES 9

Flywheel – Hydraulic - Fuel cell and hybrid fuel cell energy storage system - ultra capacitors - battery charging control.

UNIT IV INTRODUCTION TO ENERGY MANAGEMENT STRATEGIES 9

Energy management strategies used in hybrid and electric vehicle - Classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy strategies.

UNIT V ELECTRICAL POWER SYSTEM CONTROL STRATEGIES 9

Electric power system in air craft, sea and undersea vehicles, space vehicles - Hybrid vehicle control strategies.

TEXT BOOK:

1. Ali Emadi, Mehrdad Ehsani, John M. Miller, 'Vehicular Electric Power Systems: Land, Sea, Air, and Space Vehicles', CRC Press, 2003.

REFERENCES:

1. Ion Boldea and S.A Nasar, 'Electric drives', CRC Press, 2005.
2. Sandeep Dhameja, 'Electric Vehicle Battery Systems', Newnes, 2002.
3. Chris Mi, M. Abul Masrur, David Wenzhong Gao, 'Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives', Wiley, 2011.
4. Iqbal Husain, 'Electric and Hybrid Vehicles: Design Fundamentals', CRC Press, 2nd Edition, 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	

15EEX08 - RENEWABLE POWER GENERATION SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVE:

- To impart the knowledge on various forms of renewable energy sources and the process of electric energy conversion.

COURSE OUTCOMES:

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

CO1: Apprise the environmental impacts of conventional energy sources and the need of renewable energy.

CO2: Explain the process of PV generation and design stand-alone and grid connected system.

CO3: Explain the process of wind power generation and choose stand-alone and grid connected configuration.

CO4: Explain the process of fuel cell power generation and its applications.

CO5: Suggest and configure the various hybrid systems.

UNIT I ENVIRONMENTAL ASPECTS OF ELECTRIC POWER GENERATION FROM CONVENTIONAL SOURCES **9**

Limitation of fossil fuels - Atmospheric pollution – Effects of hydro-electric projects – Disposal of nuclear waste – GHG emission from various energy sources and its effects – Need for renewable energy sources.

UNIT II SOLAR PHOTO-VOLTAIC SYSTEM **9**

Solar radiation and its measurement – Angle of sun rays on solar collector – optimal angle for fixed collector – sun tracking, an introduction to solar cell, solar PV module, PV system design and applications – stand-alone and grid connected systems, environmental impacts.

UNIT III WIND POWER GENERATION **9**

Wind energy, classification of wind turbines – aerodynamic operation of wind turbine, extraction of wind turbine power, wind turbine power curve, horizontal axis wind turbine generator – modes of wind power generation – stand-alone and grid connected system, environmental impacts.

UNIT IV FUEL CELL SYSTEM **9**

Principle of operation of fuel cell, technical parameters of fuel cell, Type of fuel cell – Advantages of fuel cell power plants, energy output, efficiency and emf of fuel cell – Operating characteristics, applications and environmental impacts.

UNIT V HYBRID ENERGY SYSTEMS **9**

Need for hybrid systems, types, configuration and coordination, electrical interface – PV-Diesel, Wind-diesel, wind-PV, wind-PV- fuel cell.

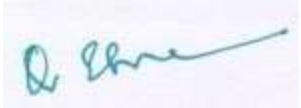
TOTAL = 45 PERIODS

REFERENCES:

1. G D Rai, 'Non-conventional Energy sources', Khanna Publishers, 5th Edition, 2014.
2. D P Kothari, K C Singal and Rakesh Ranjan, 'Renewable Energy Sources and Emerging Technologies' 2nd Edition, 2012.
3. C S Solanki, 'Solar Photo-voltaics – Fundamentals, Technologies and Applications', PHI Pvt., Ltd., 2nd Edition, 2011.
4. S N Bhadra, D Kastha and S Banerjee, 'Wind Electric Systems', Oxford Publications, 2nd Edition, 2007.

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

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



15EEX09 - FIBRE OPTICS AND LASER INSTRUMENTS

L	T	P	C
3	0	0	3

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 applications of laser.

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

UNIT III LASER FUNDAMENTALS **9**

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

UNIT IV INDUSTRIAL APPLICATION OF LASERS **9**

Laser for measurement of velocity 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 Outcomes (COs) and Programme Outcomes (POs)

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

15EEX10 - POWER SEMICONDUCTOR DEVICES AND APPLICATIONS

L	T	P	C
3	0	0	3

OBJECTIVE:

- To impart the knowledge of attributes of power semiconductor devices, current controlled devices and voltage controlled devices and provide the knowledge to apply these devices in converters

COURSE OUTCOMES:

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

CO1: Know about the construction, physics of operation, safe operating areas and protection circuits for various semiconductor devices
CO2: Know about the Construction, static characteristics, and switching characteristics of power diode and power BJT
CO3: Know about the Construction, static characteristics, and switching characteristics of SCRS and GTOs
CO4: Know about the Construction, static characteristics, and switching characteristics of IGBT and power FETS
CO5: Get the knowledge how to use these devices for various converters

UNIT I OVERVIEW OF POWER SEMICONDUCTOR SWITCHES 9

Introduction - Diodes, Thyristors, BJTs, JFETs, MOSFETs, GTOs IGBTs, Comparison of these as switching devices,Drive and Protection circuit for these devices – New Semiconductor materials for Power devices.

UNIT II POWER DIODE AND POWER BJT 9

Basic structure and I-V & Switching characteristics of Power diode, Schottky diode - Structure and Switching characteristics of Power BJT - Breakdown voltage considerations - Safe operating area - Drive circuits for BJT – Snubber design for Power diode.

UNIT III THYRISTORS AND GTOs 9

Basic structures - I-V characteristics - Physics of device operation - Switching characteristics of Thyristors and GTOs– Derive circuits - Snubber circuits for Thyristors and GTOs - Over current protection of GTO.

UNIT IV IGBT AND POWER JFET & MOSFETS 9

Basic structures - I-V characteristics, physics of device operation - Switching characteristics – Safe operating area ofIGBT and Power JFET & MOSFET - Derive circuits and Protection.

UNIT V APPLICATIONS **9**

Single phase rectifiers and Three phase rectifiers using Diodes and Thyristors, Choppers, Inverters using GTOs-IGBTsand power JFETs & MOSFETs.

TOTAL = 45 PERIODS

TEXT BOOKS:

1. B.W Williams, "Power Electronics Circuit Devices and Applications" .
2. Rashid M.H., "Power Electronics Circuits, Devices and Applications ", Prentice Hal India, New Delhi, 4th ed, 2013.

REFERENCES:

1. MD Singh and K.B Khanchandani, "Power Electronics", Tata McGraw Hill, 2010.
2. Mohan, Undcland and Robins, "Power Electronics – Concepts, applications and Design", John Wiley and Sons, Singapore, 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				
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	X			

15EEX11 - SPECIAL ELECTRICAL MACHINES

L	T	P	C
3	0	0	3

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:

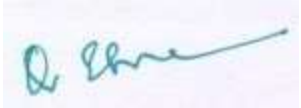
1. T.J.E. Miller, "Brushless Permanent Magnet and Reluctance Motor Drives", Clarendon Press, Oxford, 1989.
2. T. Kenjo, "Stepping Motors and their Microprocessor Controls", Clarendon Press London, 1984.

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				



15EEX12 - POWER QUALITY

L	T	P	C
3	0	0	3

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	

15EEX13 - ELECTRIC DRIVES AND CONTROL

L	T	P	C
3	0	0	3

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

CO1: Analyze the steady-state operation and transient in dynamics of machines.

CO2: Understand the operation of the converter, chopper fed dc drive and solve simple problems

CO3: Study and analyze the speed control of induction motor drive using VSI, CSI and AC voltage controller .

CO4: Understand the operation and speed control methods of synchronous motor drives.

CO5: 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)

3.

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	

15EEX14 - PLC AND AUTOMATION

L	T	P	C
3	0	0	3

OBJECTIVE:

- 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: Understand the concepts of protocols
CO2: Debug the errors in the programming field
CO3: Know the concepts of SCADA
CO4: Know about the case studies of PLC
CO5: Under the concepts of automation

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.

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

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

15EEX15 - ADVANCED CONTROL SYSTEMS

L	T	P	C
3	0	0	3

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

CO1: 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:

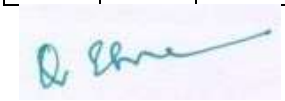
1. I .J. Nagrath and M.Gopal, "Control Systems Engineering", 5th ed., New Age International, New Delhi, 2013.
2. Roy Choudhury D, "Modern Control Engineering", Prentice Hall of India, New Delhi, 2009.

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



15EEX16 - FLEXIBLE AC TRANSMISSION SYSTEMS

L	T	P	C
3	0	0	3

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				

15EEX17 - HIGH VOLTAGE ENGINEERING

L	T	P	C
3	0	0	3

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 this course, the students 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 over voltages – 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 – PeakVoltmeter, Generating Voltmeters - Capacitance Voltage Transformers, Electrostatic Voltmeters – Sphere Gaps - High voltage measurement using CRO.

UNIT V HIGH VOLTAGE TESTING 9

High voltage testing of electrical power apparatus as per 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, 5 th ed., 2013.
2. Subir Ray, An Introduction to High Voltage Engineering " PHI Learning Private Limited, 2 nd 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, 3 rd 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	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	

15EEX18 - SOLAR ENERGY UTILIZATION

L	T	P	C
3	0	0	3

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)

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

15EEX19 - SOLID STATE RELAYS

L	T	P	C
3	0	0	3

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

CO1: Understand the static relay circuits used for different types of relays

CO2: Know about static relay circuits used for carrier current protection and testing

CO3: Know about static relays used for measurements of various electrical parameters based on microprocessor

CO4: Understand the concepts of protection and testing

CO5: Know about the microprocessor relays

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 - CTs and PTs in relaying schemes - Saturation effects.

UNIT II STATIC RELAY CIRCUITS I **9**

Static relay circuits (using Analog and Digital ICs) 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, 1974.
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
2		X	X	X	X	X		X	X	X		X
3		X						X		X		X
4		X	X	X					X	X		
5		X										

15EEX20 - ANALYSIS OF INVERTERS

L	T	P	C
3	0	0	3

OBJECTIVE:

- To study various inverters with various switching device and different conduction mode and also to learn various PWM techniques

COURSE OUTCOMES:

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

CO1: Know about the detailed operation of various inverters

CO2: Study different PWM techniques

CO3: Study different current source inverters

CO4: Design inverters for different applications

CO5: Study the working of advanced types of inverters such as multilevel inverters and resonant inverters

UNIT I SINGLE PHASE INVERTERS **9**

Introduction to self commutated switches: MOSFET and IGBT - Principle of operation of half and full bridge inverters – Performance parameters – Voltage control of single phase inverters using various PWM techniques – Various harmonic elimination techniques – Forced commutated Thyristor inverters.

UNIT II THREE PHASE VOLTAGE SOURCE INVERTERS **9**

180 degree and 120 degree conduction mode inverters with star and delta connected loads – Voltage control of three phase inverters: single, multi pulse, sinusoidal, space vector modulation techniques- Various harmonic elimination techniques.

UNIT III CURRENT SOURCE INVERTERS **9**

Operation of six-step thyristor inverter – inverter operation modes – Load – Commutated inverters – Auto sequential current source inverter (ASCI) – Current pulsations – Comparison of current source inverter and voltage source inverters.

UNIT IV MULTILEVEL INVERTERS **9**

Multilevel concept – Diode clamped – flying capacitor – Cascade type multilevel inverters -Hybrid multilevel inverter- FFT analysis- Comparison of multilevel inverters - Application of multilevel inverters.

UNIT V RESONANT INVERTERS **9**

Series and parallel resonant inverters - Voltage control of resonant inverters – Class E resonant inverter – resonant DC – Link inverters.

TOTAL = 45 PERIODS

TEXT BOOK:

1. Ned Mohan, Undeland and Robbin, "Power Electronics: converters, Application and design" John Wiley and sons. Inc, Newyork, 3rd ed., 2006.

REFERENCES:

1. Jai P.Agrawal, "Power Electronics Systems", Pearson Education, 2nd ed. 2002.
2. Bimal K.Bose "Modern Power Electronics and AC Drives", Pearson Education, 2nd ed. 2006.
3. P.C. Sen, "Modern Power Electronics", Wheeler Publishing Co, 2nd ed. New Delhi, 2005.
4. P.S.Bimbra, "Power Electronics", Khanna Publishers, 5th ed. 2012.

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

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

15EEX21 - POWER SYSTEM DYNAMICS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To explain the power system stability problem.
- To understand the behavior of synchronous and induction machines during disturbance.
- To employ mathematical tools for power system stability analysis.

COURSE OUTCOMES:

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

CO1: Understand the dynamic phenomena of the power system operation.

CO2: Employ modeling techniques for investigating the response of system during disturbance.

CO3: Interpret results coming from the simulation of differential - algebraic systems.

UNIT I STABILITY CONSIDERATIONS **9**

Dynamic modeling requirements- Angle stability - Equal area criterion- Critical fault clearing time and angle- numerical integration techniques.

UNIT II SYNCHRONOUS MACHINES **9**

Park's transformation – Flux linkage equations – Formulation of normalized equations – State space current model – Simplified models of the synchronous machine – Turbine, Generator – Steady state equations and phasor diagrams.

UNIT III DYNAMICS OF SYNCHRONOUS MACHINES **9**

Mechanical relationships – Electrical transient relationships –Adjustment of machine models – Park's equation in the operational form.

UNIT IV INDUCTION MOTOR EQUIVALENT CIRCUITS AND PARAMETERS **9**

Free acceleration characteristics – Dynamic performance – Effect of three phase short circuit and unbalanced faults.

UNIT V TRANSIENT AND DYNAMIC STABILITY DISTINCTION **9**

Linear model of unregulated synchronous machine and its oscillation modes – Distribution of power impacts – Effects of excitation on stability – Supplementary stabilization signals.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. P. M. Anderson, 'A A Fouad, 'Power System Control and Stability', John Wiley & Sons, 1st Edition, 2008.
2. Ramanujam R, 'Power System Dynamics', PHI Learning Pvt. Ltd., New Delhi, 2009.
3. T. Kenjo, 'Stepping Motors and Their Microprocessor Controls', Clarendon Press London, 1995.

REFERENCES:

1. Krause P.C., 'Analysis of Electric Machinery', McGraw-Hill, 3rd Revised Edition, 2013.

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					

Approved by Sixth Academic Council

15EEX22 - ENERGY MANAGEMENT AND AUDITING

L	T	P	C
3	0	0	3

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

15EEX23 - POWER SWITCHING CONVERTERS

L	T	P	C
3	0	0	3

OBJECTIVE:

- To provide knowledge about how to analyze different converters with different loads and to find the performance parameters of converters

COURSE OUTCOMES:

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

CO1: Analyze different converter with different loads

CO2: Determine the various performance parameters of single phase and three phase converter

CO3: Know about the application of semiconductor switches in various converters

CO4: Design choppers and an ac voltage controllers

CO5: Study cycloconverters , matrix converter and its types

UNIT I SINGLE PHASE AC-DC CONVERTER **9**

Static Characteristics of power diode, SCR and GTO, half controlled and fully controlled converters with R-L, R-L-E loads and freewheeling diodes – continuous and discontinuous modes of operation - inverter operation – Dual converter - Sequence control of converters – performance parameters: harmonics, ripple, distortion, power factor – effect of source impedance and overlap.

UNIT II THREE PHASE AC-DC CONVERTER **9**

Semi and fully controlled converter with R, R-L, R-L-E - loads and freewheeling diodes – inverter operation and its limit – dual converter– performance parameters – effect of source impedance and over lap – 12 pulse converter.

UNIT III DC-DC CONVERTERS **9**

Principles of step-down and step-up converters – Analysis of buck, boost, buck-boost,Cuk and LUO converters – time ratio and current limit control – Full bridge converter – Resonant and quasi – resonant converters.

UNIT IV AC VOLTAGE CONTROLLERS **9**

Static Characteristics of TRIAC- Principle of phase control: single phase and three phase controllers – various configurations – analysis with R and R-L loads.

UNIT V CYCLOCONVERTERS **9**

Principle of operation – Single phase and three phase Cycloconverter – power factor control-Forced commutated cycloconverters- Matrix Converter and its types.

TOTAL = 45 PERIODS

TEXT BOOKS:

1. Ned Mohan, Undeland and Robbin, “Power Electronics: converters, Application and design” John Wiley and sons.Inc, Newyork, 3rd ed., 2006.
2. Rashid M.H., “Power Electronics Circuits, Devices and Applications ", Prentice Hal India, New Delhi, 4th ed, 2013.

REFERENCES:

1. M.H. Rashid, Hand Book of “Power Electronics: Circuits, Devices and Application”, New Delhi, Prentice Hall of India, 3rded.,2011.
2. P.S.Bimbra, “Power Electronics”, Khanna Publishers, 5thed., 2012.

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

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

15EEX24 - SMART GRID

L	T	P	C
3	0	0	3

OBJECTIVE:

- To study about Smart Grid technologies, different smart meters and advanced metering infrastructure

COURSE OUTCOMES:

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

CO1: Know basics of smart grid
CO2: Study technologies involved in smart grid
CO3: Know about smart meters and advanced metering infrastructure
CO4: Study about power quality issues and power quality conditioners
CO5: Study about high performance computing for smart grid applications

UNIT I INTRODUCTION TO SMART GRID **9**

Evolution of Electric Grid: Concept, Definitions and Need for Smart Grid - Smart grid drivers: functions, opportunities, challenges and benefits - Difference between conventional & Smart Grid.

UNIT II SMART GRID TECHNOLOGIES **9**

Technology Drivers, Smart energy resources, Smart substations, Substation Automation, Feeder Automation, Transmission systems: EMS, FACTS and HVDC, Wide area monitoring, Distribution systems: DMS, Volt/VAR control, Fault Detection, Isolation and service restoration.

UNIT III SMART METERS AND ADVANCED METERING INFRASTRUCTURE **9**

Introduction to Smart Meters - Advanced Metering infrastructure (AMI) drivers and benefits - AMI protocols, standards and initiatives - AMI needs in the smart grid - Phasor Measurement Unit (PMU).

UNIT IV POWER QUALITY MANAGEMENT IN SMART GRID **9**

Power Quality & EMC in Smart Grid - Power Quality issues of Grid connected Renewable Energy Sources - Power Quality Conditioners for Smart Grid, -Web based Power Quality Monitoring.

UNIT V HIGH PERFORMANCE COMPUTING FOR SMART GRID APPLICATIONS **9**

Local Area Network (LAN) - House Area Network (HAN) - Wide Area Network (WAN) - Broadband over Power line (BPL) - Basics of Web Service and CLOUD computing to make Smart Grids smarter.

TOTAL = 45 PERIODS

TEXT BOOKS :

1. Vehbi C. Gungor, DilanSahin, TaskinKocak, Salih Ergut, Concettina Buccella, Carlo Cecati, and Gerhard P. Hancke, "Smart Grid Technologies: Communication Technologies and Standards IEEE Transactions On Industrial Informatics", Vol. 7, No. 4, November 2011.
2. Xi Fang, Satyajayant Misra, Guoliang Xue, and Dejun Yang "Smart Grid – The New and Improved Power Grid: A Survey" , IEEE Transaction on Smart Grids.

REFERENCES:

1. Stuart Borlase "Smart Grid :Infrastructure, Technology and Solutions", CRC Press 2012.
2. Janaka Ekanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama, "Smart Grid: Technology and Applications", Wiley.

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
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	X		

15EEX25 - MEDICAL INSTRUMENTATION

L	T	P	C
3	0	0	3

OBJECTIVE:

- The course is designed to make the student acquire an adequate knowledge of the physiological systems of the human body and relate them to the parameters that have clinical importance.

COURSE OUTCOMES:

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

CO1: Acquaintance of the physiology of the heart, lung, blood circulations, respirations, patient monitoring and electrical safety in clinical environment.

CO2: Obtain the in-depth knowledge in various electrical origins of recording methods of ECG, EEG, EMG and ERG.

CO3: Know how to use the latest medical equipments available for measurement of non-electrical parameters in the physiological systems of the human body and also the modern methods of imaging techniques used for diagnostic purpose in the health care centre.

CO4: Know the latest procedure adopted for providing Medical assistance through telemetry and the Therapeutic equipments used for diagnostic and surgery purposes.

CO5: Know the latest equipments and patient monitoring systems.

UNIT I HUMAN PHYSIOLOGICAL SYSTEM **9**

Cell and its Structure – Action potential – Resting potential – Propagation of Action potential and Sodium pump action – Nerve cell: Neuron – Axon – Synapse – Central Nervous System-Peripheral Nervous System – Respiratory System-Electro Physiology of Cardiopulmonary Circulation system.

UNIT II NON-ELECTRICAL PARAMETER MEASUREMENTS **9**

Measurement of Blood pressure – Cardiac Output measurement – Measurement of Heart Sounds – Phonocardiography – Measurement of Partial pressure of Carbon dioxide (PaCO2) and Partial pressures of Oxygen (PaO2) in the Arterial blood – Measurement of lung volumes: Spirometry.

UNIT III ELECTRO–PHYSIOLOGICAL PARAMETERS MEASUREMENTS **9**

Basic components of a Biomedical system – Bio-Electrodes : Micro, Needle and Surface Electrodes – Different Lead configurations and recording methods of Electrocardiograph(ECG) – Electroencephalograph(EEG) – Brain Waves: Alpha, Beta, Theta and Delta waves and their frequency spectrum – Electromyography (EMG)- Electroretinography (ERG).

UNIT IV PATIENT LIFE ASSISTING AND THERAPEUTIC EQUIPMENTS **9**

Pacemakers and its types –Defibrillators: D.C and AED – Ventilators: Pressure limited, Volume limited and Servo controlled ventilators – Nerve and Muscle stimulators-Surgical diathermy machines: Short wave, Microwave and Ultrasonic diathermy – Hemo and Peritoneal dialyzers.

UNIT V MEDICAL IMAGING EQUIPMENTS & PATIENT MONITORING SYSTEMS **9**

Block diagram, operations and applications of X-Ray machines– Computer Tomography – Magnetic Resonance Imaging (MRI) System – Ultrasonography – Medical Thermography – Bio-telemetry systems – Patient monitoring and Electrical safety in Clinical environment.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Khandpur R.S., "Handbook of Bio-Medical Instrumentation", McGraw Hill Publishing Co Ltd., 2013.
2. Leslie Cromwell, Fred J.Weibell, Erich A.Pfeiffer, "Bio-Medical Instrumentation and Measurements", Pearson Education, 2011 / PHI,2nd Edition.

REFERENCES:

1. John G. Webster, "Medical Instrumentation Application and Design", John Wiley and sons, India, 3rd Edition, 2013.
2. Geddes L.A. and Baker L.E., "Principles of Applied Bio-Medical Instrumentation", John Wiley & Sons, 3rd Edition, 2013.
3. Ed. Joseph D. Bronzino, "The Biomedical Engineering HandBook", Boca Raton, CRC Press LLC, 2nd Edition, 2000.
4. Barbara L. Christe, "Introduction to biomedical Instrumentation" Cambridge University Press, 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	
2	X	X					X				X	
3	X	X					X				X	
4	X	X					X				X	
5	X	X					X				X	

15EEX26 - COMPUTER ARCHITECTURE

L	T	P	C
3	0	0	3

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: Study Various interrupts used for system organization

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

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)

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

15IT504 - FUNDAMENTALS OF JAVA PROGRAMMING

L	T	P	C
3	0	0	3

OBJECTIVE :

- To learn the syntax of JAVA language.
- To learn the basic concepts of OOPs.
- To learn advanced concepts such as Packages, Exception Handling, Threads

COURSE OUTCOMES:

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

CO1: Able to understand the basic concepts of JAVA
CO2: Able to understand OOPs concepts with JAVA
CO3: Understanding the concepts of Interfaces, Packages and Threads.
CO4: Understanding the basics of Applet, AWT.
CO5: To work with Database using database connectivity.

UNIT I JAVA FUNDAMENTALS **9**

Introduction of Java: Java Environment - Features Of Java – Application of Java – Java Programming Structure – Data Types – Operators - Control statements - Simple Java Program – Execution of Java Program

UNIT II OOPS CONCEPT WITH JAVA **9**

Basics of Oops Concepts : Class – Objects – Methods – Nested Class – Constructor – finalizer –Access Control – Keywords : static –final - this - String – String Buffer – Arrays – Wrapper Class.

UNIT III INHERITANCE, EXCEPTION HANDLING and FILES **9**

Inheritance: Types Of Inheritance – Polymorphism – Method Overloading – Method Overriding- super – final with inheritance – Abstract Class - Exception Handling – File and I/O Streams

UNIT IV INTERFACES, PACKAGES AND THREADS **9**

Interfaces – Interface Design – Packages – Package Hierarchy – ThreadProgramming and Handling – Thread Synchronization - Multi-Thread Programming.

UNIT V GUI with JAVA **9**

Java GUI: Basic elements of AWT –Introduction to Applet – Applet life cycle - Basics of JDBC - Database Connectivity.

TOTAL : 45 PERIODS

TEXT BOOKS :

1. Ken Arnold, James Gosling, David Holmes, “The Java Programming Language 3e,” A-W, 4th ed,2005.
2. CS. Horstmann, G. Cornell, “Core Java Vol I – Fundamental,” Sun,9thed ,2012. 3. Ivor Horton, “Beginning Java 2/5,” Wrox,2002.

REFERENCES:

1. P. Naughton, H. Schildt, "Java The Complete Reference 4e," Tata McGraw-Hill,8th ed,2003.
2. http://java.sun.com/docs/books/tutorial .
3. Deitel&Deitel, "Java How to Program," PH-India,9th ed,2011.
4. Richarson, et al, Wrox, "Professional Java," 6th ed ,2007.

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

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

Approved by Sixth Academic Council

15ITC01 - INTERNET OF THINGS

L	T	P	C
3	0	0	3

OBJECTIVE:

- To learn the basic issues, policy and challenges in the Internet
- To understand the components and the protocols in Internet
- To build a small low cost embedded system with the internet
- To understand the various modes of communications with Internet.
- To learn to manage the resources in the Internet.

COURSE OUTCOMES:

A student who successfully completes the course will have the ability to

CO1	Identify the components of IOT
CO2	Design a portable IOT using appropriate boards
CO3	Program the sensors and controller as part of IOT
CO4	Develop schemes for the applications of IOT in real time scenarios
CO5	Establish the communication to the cloud through Wi-Fi / Bluetooth

UNIT I - : IOT Network Technology **(9)**

Introduction - Examples of IoT in Use Today - Basic Internet Concepts - Choice of Connectivity - ICANN and IP Addresses - Cellular Connectivity - Types of Cellular Technologies - Cellular Fall-Back - Determining Location

UNIT II - Sensor, Scheduling and Processing **(9)**

IOT Sensors - Typical IoT/M2M Sensors - Conversion to Digital Data - Calibration and Linearization - Data Transmission Schedules - UDP or TCP - Content Encoding - Gateways - Application Servers - Cloud Computing - Fog Computing.

UNIT III - Security and Scalability **(9)**

Privacy and Security - Security Objectives - Security Issues for IoT/M2M - Risk Management and Assessing Impact of Breaches - Encryption as an IoT Tool - Choice of Encryption Algorithm - Scalability - End-of-Life Management - Scalability and Connectivity.

UNIT IV Connectivity Management Platforms and Analytics **(9)**

Connectivity Management Platform - The Difficulties of Managing IoT Connectivity - Essential Connectivity Management Platform Features - IoT Data and Analytics - Types of Analytics - Analytics Tools and Languages

UNIT V - Implementing an IOT Solution and LifeCycle Management **(9)**

Supply Chain Management - Cellular Operator Selection - Operator Support Service Level Agreement - Device Certification - Normal Operation Considerations - Application Communications Call Flow - Customer Support Process - LifeCycle Management - Planning Checklist - Lifecycle Management Phases - Pitfalls to Avoid - Future of IOT

TOTAL :(T: 45) = 45 PERIODS

TEXT BOOKS :

1. Syed Zaeem Hosain , The Definitive guide "The Internet of Things for Business", 2nd Edition, Aeris, Auguest 2016.
2. Cuno Pfister, "Getting Started with the Internet of Things", O'Reilly, 1st Edition May 2011
3.

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
4					X							X
5					X							X

15GEC03 - PROFESSIONAL ETHICS AND HUMAN VALUES

L	T	P	C
3	0	0	3

OBJECTIVE:

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

COURSE OUTCOMES:

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

CO1: Understand the concepts of ethics and values.
CO2: Acquire the knowledge of interpersonal and organizational issues in ethics
CO3: Highlight the ethical issues related to engineering.
CO4: Learn the concepts of engineer's responsibilities and their rights.
CO5: Understand the role of global issues and professional bodies.

UNIT I - HUMAN VALUES (9)

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

UNIT II - ENGINEERING ETHICS (9)

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

UNIT III - ENGINEERING AS SOCIAL EXPERIMENTATION (9)

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law – The Challenger case study – Bhopal Gas Tragedy and Chernobyl case studies.

UNIT IV – SAFETY, RESPONSIBILITIES AND RIGHTS (9)

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

UNIT V - GLOBAL ISSUES (9)

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

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", 4th Edition , Tata Mc Graw Hill, New Delhi, 2014.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India Private Limited, New Delhi, 20012.

REFERENCES:

1. Charles D. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Cengage Learning, 2009
3. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2008
4. http://www.slideworld.org/slidestag.aspx/human-values-and- Professional-ethics
5. www.mne.psu.edu/lamancusa/ProdDiss/Misc/ethics.ppt.

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

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

Approved by Sixth Academic Council

15GEC04 - TOTAL QUALITY MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand total quality management concept s and principles and the various tools available to achieve total quality management, statistical approach for quality control, ISO & QS certification process and its needs for the industries.

COURSE OUTCOMES:

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

CO1: Acquire various concepts of quality management.
CO2: Implement various principles of quality management.
CO3: Impart quality using statistical process.
CO4: Use the various tools to maintain quality.
CO5: Implement the quality system for ISO certification.

UNIT I - INTRODUCTION (9)

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Quality statements- Quality planning- Quality councils - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Costs of quality.

UNIT II - TQM PRINCIPLES (9)

Leadership - Employee involvement - Motivation, Empowerment, Team and Teamwork, Quality circles Recognition and Reward, Performance appraisal – Continuous process improvement – PDSA cycle,5S,Kaizen – Supplier Partnership – Partnering, Supplier selection - Supplier Rating.

UNIT III - TQM TOOLS AND TECHNIQUES- I (9)

The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.

UNIT IV - TQM TOOLS AND TECHNIQUES- II (9)

Control Charts - Process Capability - Concepts of Six Sigma - Quality Function Deployment (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

UNIT V - QUALITY SYSTEMS (9)

Need for ISO 9000 - ISO 9001-2008 Quality System - Elements, Documentation, Quality Auditing - QS 9000 - ISO 14000 - Concepts, Requirements and Benefits - TQM Implementation in manufacturing and service sectors.

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOK:

1. Dale H. Besterfiled, et at., "Total quality Management", Pearson Education Asia, Third Edition, Indian Reprint, 2011.

REFERENCES:

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th ed., First Indian Edition, Cengage Learning, 2012.
2. Subburaj Ramasamy , “Total Quality Management”, Tata McGrawHill, First reprint 2009.
3. Suganthi. L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.
4. Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

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

Mapping of COs and POs												
COs	**POs**											
	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X	X			X						
2		X	X			X						
3		X	X		X							
4		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 [R15]

(This Curriculum and Syllabi are applicable to Students admitted from the academic year [2015-2016] to [2016-2017])

DECEMBER 2018

Approved by Seventh Academic Council

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

15CEZ01 ENERGY CONSERVATION IN BUILDINGS
(*Common to All branches except Civil Engineering)*

L	T	P	C
3	0	0	3

OBJECTIVE:

- To get idea on energy estimates considering about climate zones.
- To gain knowledge on energy conservation in buildings and monitoring systems

COURSE OUTCOMES:

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

CO1: Get idea on climate effects on building systems.
CO2: Perform energy estimation for buildings
CO3: Implement thermal insulation techniques in buildings.
CO4: Plan for the energy conservation methods in buildings.
CO5: Apply monitoring and control of energy systems in buildings.

UNIT I CLIMATE (6)

Climate and shelter – Historic buildings – Modern architecture – Examples from different climate zones.

UNIT II ENERGY ESTIMATION (9)

Thermal comfort – Solar geometry and shading – Heating and cooling loads – Energy estimates and site planning – Integrative Modeling methods and building simulation

UNIT III PRINCIPLES OF ENERGY (9)

Principles of Energy conscious building design – Energy conservation in buildings – Day lighting – Water heating and photovoltaic systems – Advances in thermal insulation – Heat gain / loss through building components – Solar architecture

UNIT IV ENERGY CONSERVATION (9)

Passive solar heating – Direct gain – Thermal storage wall – Sunspace – Convective air loop – Passive cooling – Ventilation – Radiation – Evaporation and Dehumidification – Mass effect – Design guidelines

UNIT V MONITORING AND CONTROL SYSTEMS (12)

Energy conservation in building – Air conditioning – HVAC equipment – Computer packages for thermal design of buildings and performance prediction – Monitoring and instrumentation of passive buildings – Control systems for energy efficient buildings – Illustrative passive buildings – Integration of emerging technologies – Intelligent building design principles.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. J.K. Nayak and J.A. PrajapatiHadbook on Energy Consious Buildings, Solar Energy Control MNES, 2006.
2. J.A. Clarke, Energy Simulation in Building Design (2e) Butterworth 2001.

REFERENCES:

1. J.R. Williams, Passive Solar Heating, Ann Arbar Science, 1983.
2. R.W. Jones, J.D. Balcomb, C.E. Kosiewiez, G.S. Lazarus, R.D. McFarland and W.O. Wray, Passive Solar Design Hanbook, Vol.3, Report of U.S. Department of Energy (DOE/CS-0127/3), 1982.
3. M.S. Sodha, N.K., Bansal, P.K. Bansal, A.Kumar and M.A.S. Malik. Solar Passive Building, Science and Design, Pergamon Press, 1986.
4. J.L. Threlkeld, Thermal Environmental Engineering, Prentice Hall, 1970.

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

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

15CEZ02 WASTE MANAGEMENT

(*Common to All branches except Civil Engineering)*

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand of the basic principles of waste and resource management will be supplemented, where appropriate, by practical problem-solving exercises.
- To provide detailed knowledge and skills in the management, treatment, disposal and recycling options for solid wastes.
- To provide details on resource efficiency plays in conserving resources and contributing to a low carbon economy.

COURSE OUTCOMES:

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

CO1: Understand and apply the basic for solving practical waste management challenges.
CO2: Understand the collection of waste and recycling.
CO3: Understand the fundamental principles of existing and emerging technologies for the treatment of waste.
CO4: Appreciate the role of decision-making tools in the critical assessment of major waste issues.
CO5: Understand the economy and financial aspects of waste management.

UNIT I INTRODUCTION & TYPES OF SOURCES (9)

Problems and need of solid and hazardous waste management - Waste management planning - Toxicology and risk assessment - Legislations on management and handling of different types of wastes.

UNIT II WASTE GENERATION RATES (9)

Composition - Hazardous Characteristics – TCLP tests – waste sampling- reduction of wastes at source – Recycling and reuse. Handling and segregation of wastes at source – storage and collection of municipal solid wastes – Analysis of Collection systems - Need for transfer and transport – Transfer stations -labeling and handling of hazardous wastes.

UNIT III WASTE PROCESSING (9)

Processing technologies – biological and chemical conversion technologies – Composting - thermal conversion technologies - energy recovery – incineration – solidification and stabilization of hazardous wastes - treatment of biomedical wastes.

UNIT IV DISPOSAL (9)

Site selection - design and operation of sanitary landfills - secure landfills and landfill bioreactors – leachate and landfill gas management – landfill closure and environmental monitoring – landfill remediation

UNIT V ECONOMY AND FINANCIAL ASPECTS (9)

Elements of integrated waste management - Economy and financial aspects of waste management. Other Waste Types: Nuclear and Radio Active Wastes.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. 1. Hilary Theisen and Samuel A, Vigil, George Tchobanoglous, Integrated Solid Waste Management, McGraw- Hill, New York, 1993.

REFERENCES:

1. CPHEEO, Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organization, Government of India, New Delhi, 2000
2. Michael D. LaGrega, Philip L Buckingham, Jeffrey C. E vans and Environmental Resources Management, Hazardous waste Management, Mc-Graw Hill International edition, New York, 2001.
3. Vesilind P.A., Worrell W and Reinhart, Solid waste Engineering, Thomson Learning Inc., Singapore, 2002.
4. Charles A. Wentz, Hazardous Waste Management, Second Edition, Pub: McGraw Hill International Edition, New York, 1995.

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

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

15CEZ03 AIR POLLUTION MANAGEMENT

(*Common to All branches except Civil Engineering)*

L	T	P	C
3	0	0	3

OBJECTIVE:

- To study about the characteristics and effects of air and noise pollution and the methods of controlling the same.
- To know about source inventory and control mechanism.

COURSE OUTCOMES:

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

CO1: Understand about nature and characteristics of air pollutants.
CO2: Identify the basic elements of atmosphere and its stability.
CO3: Design stacks and particulate air pollution control devices to meet applicable standards.
CO4: Understand the basic concepts of air quality management.
CO5: Identify, formulate and solve air and noise pollution problems.

UNIT I SOURCES AND EFFECTS OF AIR POLLUTANTS (9)

Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution – Source inventory – Effects of air pollution on human beings, materials, vegetation, animals – global warming-ozone layer depletion, Sampling and Analysis – Basic Principles of Sampling – Source and ambient sampling – Analysis of pollutants – Principles.

UNIT II DISPERSION OF POLLUTANTS (9)

Elements of atmosphere – Meteorological factors – Wind roses – Lapse rate - Atmospheric stability and turbulence – Plume rise – Dispersion of pollutants – Dispersion models – Applications.

UNIT III AIR POLLUTION CONTROL (12)

Concepts of control – Principles and design of control measures – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment - gaseous pollutant control by adsorption, absorption, condensation, combustion – Pollution control for specific major industries.

UNIT IV AIR QUALITY MANAGEMENT (8)

Air quality standards – Air quality monitoring – Preventive measures - Air pollution control efforts – Zoning – Town planning regulation of new industries – Legislation and enforcement – Environmental Impact Assessment and Air quality.

UNIT V NOISE POLLUTION (7)

Sources of noise pollution – Effects – Assessment - Standards – Control methods – Prevention.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Anjaneyulu, D., “Air Pollution and Control Technologies”, Allied Publishers, Mumbai, 2002.
2. Rao, C.S. Environmental Pollution Control Engineering, Wiley Eastern Ltd., New Delhi, 1996.
3. Rao M.N., and Rao H. V. N., Air Pollution Control, Tata McGraw Hill, New Delhi, 1996.

REFERENCES:

1. Heumann. W.L., "Industrial Air Pollution Control Systems", McGraw Hill, New Yark, 1997.
2. Mahajan S.P., "Pollution Control in Process Industries", Tata McGraw Hill Publishing Company, New Delhi, 1991.
3. Peavy S.W., Rowe D.R. and Tchobanoglous G. "Environmental Engineering", McGraw Hill, New Delhi, 1985.
4. Garg, S.K., “Environmental Engineering Vol. II”, Khanna Publishers, New Delhi, 1998
5. Mahajan, S.P., “Pollution Control in Process Industries”, Tata McGraw Hill, New Delhi, 1991.
6. Thod Godesh, "Air Quality, Lewis India Edition, 2013.

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

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

15CEZ04 BUILDING SERVICES

(*Common to All branches except Civil Engineering)*

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand about electrical systems in building and its specifications.
- To know about the concepts of refrigeration and other safety installations as per NBC
- Planning and scheduling the frequency of inspection and maintenance of building including drainage

COURSE OUTCOMES:

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

CO1: Know about the basic electrical systems in buildings
CO2: Gain knowledge about the modern lighting systems.
CO3: Study about the HVAC systems.
CO4: Be familiar with the concept of planning considerations and fire safety installation in buildings.
CO5: Study about the concepts of plumbing and drainage in building.

UNIT I ELECTRICAL SYSTEMS IN BUILDINGS (9)

Basics of electricity – Single / Three phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems and their choice – Planning electrical wiring for building – Main and distribution boards – Transformers and switch gears – Layout of substations

UNIT II PRINCIPLES OF ILLUMINATION & DESIGN (9)

Visual tasks – Factors affecting visual tasks – Modern theory of light and colour –Synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candela – Solid angle illumination – Utilisation factor – Depreciation factor – MSCP – MHCP – Lans of illumination – Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering. Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

UNIT III REFRIGERATION PRINCIPLES & APPLICATIONS (9)

Thermodynamics – Heat – Temperature, measurement transfer – Change of state – Sensible heat – Latent heat of fusion, evaporation, sublimation – saturation temperature – Super heated vapour – Sub cooled liquid – Pressure temperature relationship for liquids – Refrigerants – Vapour compression cycle – Compressors – Evaporators – Refrigerant control devices – Electric motors – Starters – Air handling units – Cooling towers – Window type and packaged air-conditioners – Chilled water plant – Fan coil systems – Water piping – Cooling load – Air conditioning systems for different types of buildings – Protection against fire to be caused by A.C. Systems

UNIT IV FIRE SAFETY INSTALLATION (9)

Causes of fire in buildings – Safety regulations – NBC – Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies, fire escapes and A.C. systems. Special features required for physically handicapped and elderly in building types – Heat and smoke detectors – Fire alarm system, snorkel ladder – Fire lighting pump and water storage – Dry and wet risers – Automatic sprinklers.

UNIT V PLUMBING AND DRAINAGE (9)

Plumbing fixtures and fixture fittings – Water conserving fittings – Over flows – Strainers and connectors – Prohibited fixtures – Special fixtures – Installation of water closet – Urinals - Flushing devices – Floor drains – Shower stall – Bath tub – Bidets – Minimum plumbing facilities – Rain water harvesting systems – Necessity – Construction – Different types .

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Udayakumar, “A Text Book on Building Services”, Eswar Press, 2007.
2. Handbook for Building Engineers in Metric systems, NBC, New Delhi, 1968.

REFERENCES:

1. E.R.Ambrose, “Heat Pumps and Electric Heating”, John and Wiley and Sons, Inc., New York, 1968.
2. Handbook for Building Engineers in Metric systems, NBC, New Delhi, 1968.
3. R.G.Hopkinson and J.D.Kay, “The Lighting of buildings”, Faber and Faber, London, 1969.
4. William H.Severns and Julian R.Fellows, “Air-conditioning and Refrigeration”,John Wiley and Sons, London, 1988.
5. A.F.C. Sherratt, “Air-conditioning and Energy Conservation”, the Architectural Press, London, 1980.

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

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

15CSZ01 SOFTWARE ENGINEERING METHODOLOGIES

(Common to All branches except CSE Branch)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To Understand the life cycle models of software process
- To Understand fundamental concepts of requirements engineering .
- To learn the systematic procedure for software design
- To Implement the strategies for software testing
- To explore the significance of project planning and management.

COURSE OUTCOMES:

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

CO1: Identify the key activities in managing a software project.
CO2: Compare different process models.
CO3: Implement the Concepts of requirements engineering.
CO4: Apply systematic procedure for software design and deployment.
CO5: Compare and contrast the various testing and maintenance.

UNIT I: SOFTWARE PROCESS (9)

Introduction –Software Engineering Paradigm – life cycle models (water fall, incremental, spiral, WINWIN spiral, evolutionary, prototyping, object oriented) - system engineering – computer based system – verification – validation.

UNIT II: SOFTWARE REQUIREMENTS (9)

Functional and non-functional - user – system –requirement engineering process – feasibility studies – requirements – elicitation – validation and management – software prototyping – prototyping in the software process – rapid prototyping techniques – user interface prototyping -Software document. Analysis and modeling – data, functional and behavioral models – structured analysis and data dictionary.

UNIT III: SOFTWARE DESIGN (9)

Design process – Design Concepts-Design Model– Design Heuristic – Architectural Design – Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components.

UNIT IV: SOFTWARE TESTING (9)

Taxonomy of software testing – levels – test activities – types of software test – black box testing – testing boundary conditions – structural testing – test coverage criteria based on data flow mechanisms – regression testing – testing in the large - software testing strategies - testing using extreme programming.

UNIT V: SOFTWARE PROJECT MANAGEMENT (9)

Estimation – FP Based, LOC Based, Make/Buy Decision, COCOMO II - Planning – Project Plan, Planning Process, RFP Risk Management – Identification, Projection, RMMM - Scheduling and Tracking –Relationship between people and effort, Task Set & Network, Scheduling, EVA – Process and Project Metrics

. **TOTAL (L:45) = 45 PERIODS**

TEXT BOOK:

1. Roger S. Pressman, “Software Engineering – A Practitioner’s Approach”, 7th ed., Mc Graw-Hill International Edition, 2010.

REFERENCES :

1. Ian Sommerville, “Software Engineering”, 9th ed., Pearson Education Asia, 2011.
2. Rajib Mall, “Fundamentals of Software Engineering”, Third Edition, PHI COURSE Private Limited, 2009.
3. Pankaj Jalote, “Software Engineering - A Precise Approach”, Wiley India, 2010.
4. Kelkar S.A., “Software Engineering”, Prentice Hall of India Pvt Ltd, 2007.
5. Stephen R.Schach, “Software Engineering”, Tata McGraw-Hill Publishing Company.

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

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

Approved by Seventh Academic Council

15CSZ02 DESIGN THINKING

(Common to All branches except CSE Branch)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To acquire Design Thinking skills.
- To learn by doing projects.
- To solve so called "wicked problems" (problems for which neither question nor answer is well defined).

COURSE OUTCOMES:

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

CO1: Have a sense of self-efficacy & creative confidence

CO2: Interpret and visualize the scenario..

CO3: Know how to manage a Design Thinking workshop Layout, roles, times and process.

CO4: Apply Design thinking tools to increase research output.

CO5: Do experiments by creating prototype and by obtaining feedback.

UNIT I INTRODUCTION TO DESIGN THINKING (9)

Overview - Use of Design Thinking – Design Process. Getting Started: Define Challenges – Create a Project Plan. Design Thinking Tools.

UNIT II DISCOVERY (9)

Understand the Challenge: Review the Challenge - Build your Team - Refine your Plan. Prepare Research: Identify Sources of Inspiration - Select Research Participants - Prepare For Fieldwork. Gather Inspiration: Immerse Yourself in Context - Seek Inspiration In Analogous Settings - Learn From Experts - Learn From Users.

UNIT III INTERPRETATION (9)

Tell Stories: Capture Your COURSEs- Share Inspiring Stories. Search for meaning: Find Themes - Make Sense of Findings - Define Insights. Frame Opportunities: Create a Visual Reminder - Make Insights Actionable.

UNIT IV IDEATION (9)

Generate Ideas: Prepare for Brainstorming - Facilitate Brainstorming - Select Promising Ideas - Sketch to Think. Refine Ideas - Do a Reality Check - Describe Your Idea.

UNIT V EXPERIMENTATION AND EVOLUTION (9)

Make Prototypes: Create a Prototype. Get Feedback: Identify Sources for Feedback - Select Feedback Participants - Facilitate Feedback Conversations - Capture Feedback COURSEs - Integrate Feedback. Track COURSEs: Define Success - Document Progress. Move Forward: Plan Next.

TOTAL :(L: 45) = 45 PERIODS

REFERENCES:

1. http://www.designthinkingforeducators.com/toolkit
2. https://hbr.org/2008/06/design-thinking
3. http://asimetrica.org/wp-content/uploads/2014/06/design-thinking.pdf

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

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

13CSZ03 OPEN SOURCE SOFTWARE
(*Common to All branches except CSE Branch)*

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand the basics of open source operating systems.
- To gain the knowledge of working with Linux platform and open source database.
- To be familiar with programming languages PHP, Perl, Python.

COURSE OUTCOMES:

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

CO1: Install and run open-source operating systems.
CO2: Gather information about Free and Open Source Software projects from software releases and from sites on the internet.
CO3: Develop programs using PHP.
CO4: Solve problems using Python programming.
CO5: Develop programs using Perl.

UNIT I: INTRODUCTION **(9)**

Introduction to Open sources – Need of Open Sources – Advantages of Open Sources –Application of pen Sources. Open source operating systems: LINUX: Introduction – General Overview – Kernel Mode and user mode – Process – Advanced Concepts – Scheduling – Personalities – Cloning – Signals –Development with Linux.

UNIT II: OPEN SOURCE DATABASE **(9)**

MySQL: Introduction – Setting up account –Starting, terminating and writing your own SQL programs – Record selection Technology – Working with strings –Date and Time – Sorting Query Results – Generating Summary – Working with metadata – Using sequences –MySQL and Web.

UNIT III: OPEN SOURCE PROGRAMMING LANGUAGES **(9)**

PHP: Introduction – Programming in web environment – variables – constants – data types – operators – Statements – Functions – Arrays – OOP –String Manipulation and regular expression – File handling and data storage – PHP and SQL database – PHP and LDAP – PHP Connectivity – Sending and receiving E-mails –Debugging and error handling – Security –Templates.

UNIT IV: PYTHON **(9)**

Syntax and Style – Python Objects – Numbers – Sequences – Strings –Lists and Tuples – Dictionaries – Conditionals and Loops – Files – Input and Output –Errors and Exceptions – Functions – Modules – Classes and OOP –Execution Environment.

UNIT V: PERL **(9)**

Perl backgrounder – Perl overview – Perl parsing rules – Variables and Data – Statements and Control structures – Subroutines, Packages, and Modules- Working with Files –Data Manipulation.

TOTAL (L:45) = 45 PERIODS

TEXT BOOKS:

1. Remy Card, Eric Dumas and Frank Mevel, “The Linux Kernel Book”, Wiley Publications, 2003.
2. Steve Suchring, “MySQL Bible”, John Wiley, 2002.

REFERENCES:

1. Rasmus Lerdorf and Levin Tatroe, "Programming PHP", O'Reilly, 2002
2. Wesley J. Chun, "Core Phython Programming", Prentice Hall, 2001
3. Martin C. Brown, "Perl: The Complete Reference", 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.
4. Steven Holzner, "PHP: The Complete Reference", 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.

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

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

Approved by Seventh Academic Council

15CSZ04 INFORMATION SECURITY

(*Common to All branches except CSE branch)*

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand the basics of Information Security
- To know the legal, ethical and professional issues in Information Security
- To know the aspects of risk management
- To become aware of various standards in this area
- To know the technological aspects of Information Security

COURSE OUTCOMES:

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

CO1: Understand the basics of Information Security

CO2: Know the legal, ethical and professional issues in Information Security

CO3: Know the aspects of risk management

CO4: Become aware of various standards in this area

CO5: Know the technological aspects of Information Security

UNIT I: INTRODUCTION **(9)**

History, What is Information Security?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.

UNIT II: SECURITY INVESTIGATION **(9)**

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues.

UNIT III: SECURITY ANALYSIS **(9)**

Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk

UNIT IV: LOGICAL DESIGN **(9)**

Blueprint for Security, Information Security Poicy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity

UNIT V: PHYSICAL DESIGN **(9)**

Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel

TOTAL (L:45) = 45 PERIODS

TEXT BOOK:

1. Michael E Whitman and Herbert J Mattord, “Principles of Information Security”, Vikas Publishing House, New Delhi, 2017.

REFERENCES:

1. Micki Krause, Harold F. Tipton, “ Handbook of Information Security Management”, Vol 1-3 CRC Press LLC, 2004.
2. Stuart Mc Clure, Joel Scrambray, George Kurtz, “Hacking Exposed”, Tata McGraw Hill, 2003
3. Matt Bishop, “ Computer Security Art and Science”, Pearson/PHI, 2002.

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

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

15ECZ01 - AVIONICS

(Common to All Branches except ECE branch)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand the needs for avionics for both Civil and military aircraft.
- To introduce various digital electronic principles and working operations of digital circuit.
- To integrate the digital electronics with cockpit equipments.
- To understand the various principles in flight disk and cockpit panels.

COURSE OUTCOMES:

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

CO1 : Describe the hardware required for aircraft.
CO2 : Interfacing with analog and digital systems.
CO3 : Design avionics system architecture.
CO4 : Describe Civil and Military Cockpits.
CO5 : Design of flight control systems and Radar systems.

UNIT- I INTRODUCTION TO AVIONICS (9)

Need for Avionics in civil and military aircraft and space systems – Integrated Avionics system – Typical avionics sub systems – Design approaches and recent advances - Application Technologies.

UNIT- II PRINCIPLES OF DIGITAL SYSTEMS (9)

Digital Computers – Digital number system- number systems and codes-Fundamentals of logic and combinational logic circuits –Digital arithmetic – interfacing with analogue systems - Microprocessors – Memories.

UNIT- III DIGITAL AVIONICS ARCHITECTURE (9)

Avionics system architecture– salient features and applications of Data buses MIL–STD 1553 B–ARINC 429–ARINC 629.

UNIT- IV FLIGHT DECK AND COCKPITS (9)

Control and display technologies CRT, LED, LCD, EL and plasma panel - Touch screen - Direct voice input (DVI) - Civil cockpit and military cockpit : MFDS, HUD, MFK, HOTAS 63.

UNIT- V AVIONICS SYSTEMS (9)

Communication Systems - Navigation systems - Flight control systems - Radar electronic warfare - Utility systems Reliability and maintainability - Certification .

TOTAL :(L: 45) =45 PERIODS

TEXT BOOKS:

1. Middleton, D.H. “Avionics Systems”, Longman Scientific and Technical, Longman Group UK.Ltd, England, 1989.
2. Spitzer, C.R. “Digital Avionics Systems”, Prentice Hall, Englewood Cliffs, N.J., U.S.A., 1987.

REFERENCES:

1. Malcrno A.P. and Leach, D.P., “Digital Principles and Application”, Tata McGraw-Hill, 1990.
2. Gaonkar, R.S., “Microprocessors Architecture – Programming and Application”, Wiley and Sons Ltd., New Delhi, 1990.
3. Cary R .Spitzer, “The Avionics Handbook”, CRC Press, 2000.
4. Brain Kendal, “Manual of Avionics”, The English Book House, 3rd Edition, New Delhi, 1993.

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

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

15ECZ02 - CONSUMER ELECTRONICS
(Common to All Branches except ECE branch)

L	T	P	C
3	0	0	3

OBJECTIVE:

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

COURSE OUTCOMES:

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

CO1 : Know the concepts of audio system.
CO2 : Know the concepts of video system.
CO3 : Analysis different techniques involved in audio and video processing.
CO4 : Identification of new developments in office equipment and domestic appliances.
CO5 : Know the working concepts of consumer applications.

UNIT - I AUDIO SYSTEM COMPONENTS (9)

Introduction to wave motion – Interference and superposition of waves – Beats, Resonance, Echos – characteristics of microphones – types of microphone – wireless microphones – Types of headphones – Loudspeakers

UNIT-II AUDIO PROCESSING (9)

Audio Filters, Types of AGC – Loudspeaker Impedance matching – Pre-emphasis and De-emphasis noise reduction – Optical recording and reproduction – stereophony, Quadraphony – Stereo controls –Equalizers –Mixer.

UNIT - III VIDEO STANDARDS AND SYSTEMS (9)

Elements of a TV system, scanning process – resolution, interlacing, composite signal The Kell factor. LED, LCD, Types of TV camera-Color TV systems- The NTSC system-The PAL systems- The SECAM system. Broadcasting of TV programs-Digital Video Recorder and CCTV Surveillance system

UNIT - IV COMMUNICATION AND CONSUMER GADGETS (9)

Radio system – VHF and UHF – Cellular communication - Types of mobile phones – Establishing cell- Smart card– Facsimile machine – electronic calculators – Digital clocks– Xerography - TV Remote.

UNIT - V CONSUMER APPLICATIONS (9)

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

TOTAL :(L: 45)= 45 PERIODS

TEXT BOOK:

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

REFERENCES:

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

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

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

15ECZ03 - MODERN WIRELESS COMMUNICATION SYSTEMS

(Common to All Branches except ECE branch)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To learn the comprehensive background concepts of wireless and mobile communication.
- To know the flavor of personal communication systems.
- To study the highlights of the latest communication networks and out the next generation networks.

COURSE OUTCOMES:

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

CO1 : Know the fundamentals of basic mobile communication wireless networks.

CO2 : Have a detailed overview of different networking topologies and multiple access methods.

CO3 : Have the information about the several generation of personal communication technologies

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

CO5 : Identify the different data services and short range networks used in mobile networks.

UNIT- I TRANSMISSION FUNDAMENTALS (9)

Cellphone Generations: 1G, 2G, 2.5G, 3G & 4G Transmission Fundamentals: Time domain & Frequency domain concep Carrier-based signalling, spread- spectrum signalling.

UNIT –II NETWORK CONCEPTS (9)

Communication Networks: LANs, MANs, WANs, circuit switching, packet switching, ATM Cellular Networks: Cells, duplex FDMA, TDMA, SDMA, CDMA, spectral efficiency.

UNIT- III PERSONAL COMMUNICATION SERVICES (9)

GSM, HSCSD, GPRS, D-AMPS, CDMA One, CDMA Two, Packet Data Systems.

UNIT- IV 3G & BEYOND (9)

IMT-2000, W-CDMA, CDMA 2000, EDGE, Wi-Fi, WiMAX, OFDM.

UNIT- V MOBILE DATA SERVICES & SHORT-RANGE NETWORKS (9)

Mobile Data Services: Messaging, wireless web, WAP, site design Short-Range Wireless Networks:Unlicensed spectrum phones, mobile OSs, smart phone applications.

TOTAL :(L: 45)= 45 PERIODS

TEXT BOOKS:

1. Andy Dornan, “The essential guide to wireless communications applications: from cellular systems to Wi-Fi”, 2nd Edition, Prentice Hall, 2002.
2. Misra, “Wireless Communications and Networks: 3G & Beyond”, Tata McGraw-Hill, 2013.

REFERENCES:

1. Theodore S. Rappaport, “Wireless Communications: Principles and Practice”, 2nd Edition,
2. Pearson Education, 2009.
3. William Stallings, “Wireless communications and networking”, Prentice Hall, 2005

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

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

15ECZ04 - ELECTRONIC TESTING

(Common to All Branches except ECE branch)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand the basics of testing and the testing equipments.
- To understand the different testing methods.
- To learn about testable system design.

COURSE OUTCOMES:

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

CO1 : Have knowledge of different types of faults and fault modeling.

CO2 : Design the different testing schemes for Digital circuits.

CO3 : Know the testing schemes for memories and mixed signal systems.

CO4 : Have knowledge of various testability design schemes.

CO5 : Diagnosis the Faults at module level.

UNIT I - INTRODUCTION **(9)**

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

UNIT II - DIGITAL TESTING **(9)**

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

UNIT III - ANALOG TESTING **(9)**

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

UNIT IV - DESIGN FOR TESTABILITY **(9)**

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

UNIT V - LOADED BOARD TESTING **(9)**

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

TOTAL :(L: 45) =45 PERIODS

TEXT BOOKS:

1. Michael L. Bushnell and Vishwani D. Augural, “Essentials of Electronic Testing for Digital, Memory & Mixed-Signal VLSI Circuits”, Springer, 2006.
2. Mehdi Dehbashi, Görschwin Fey “Debug Automation from Pre-Silicon to Post-Silicon” Springer, 25-Sep-2014.

REFERENCE:

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

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

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

15EEZ01 RENEWABLE ENERGY TECHNOLOGY

L	T	P	C
3	0	0	3

(Common to All Branches except EEE branch)

OBJECTIVE:

- To emphasis the current energy status and role of renewable energy
- To know about the various concept of solar and wind energy
- To know about the various concept of biomass and other renewable energy sources

COURSE OUTCOMES:

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

CO1: Plan appropriate kind of energy for the future development.
CO2: Know about solar energy concepts, techniques and its applications.
CO3: Identify the concepts, various wind turbines, storage and environmental aspects of wind energy.
CO4: Understand the concepts of biomass energy conversion technologies and plant design considerations.
CO5: Know some other renewable energy sources.

UNIT I : INTRODUCTION (9)

World energy status, Current energy scenario in India, Environmental aspects of energy utilization, Environment-Economy - Energy and Sustainable Development, Energy planning. Reserves of Energy resources - Renewable energy resources - Potentials - Achievements - applications - Technical and social implications, issues in grid integration of power from renewable energy sources.

UNIT II : SOLAR ENERGY (9)

Basic concepts, Solar radiation – Measurement, Solar thermal systems – Flat plate and concentrating collectors, Solar passive space – Solar heating and cooling techniques – Solar desalination – Solar Pond – Solar cooker – Solar dryers – Solar furnaces – Solar pumping – Solar green house- Solar thermal electric power plant – Solar photo voltaic conversion – Solar cells – PV applications – Hybrid systems.

UNIT III : WIND ENERGY (9)

Introduction – Availability- Wind power plants, Power from the wind, Wind energy conversion systems, site characteristics – Wind turbines types – Horizontal and vertical axis – Design principles of wind turbine – Blade element theory - Magnus effect – Performance – Wind energy Applications – Hybrid systems – Wind energy storage – Safety and environmental aspects.

UNIT IV : BIOMASS ENERGY (9)

Biomass – Usable forms- composition – Fuel properties – Applications – Biomass resource – Biomass conversion technologies – Direction combustion – Pyrolysis – Gasification – Anaerobic digestion –Bioethanol and Biodiesel Production – Economics – Recent developments – Energy farming – Biogas technology – Family biogas plants – Community and institutional biogas plants – design consideration – Applications

UNIT V : OTHER RENEWABLE ENERGY SOURCES (9)

Tidal energy – Wave energy – Open and closed OTEC Cycles – Small hydro – Geothermal energy – Social and environmental aspects – Fuel cell technology: Types, principle of operation, applications –Hydrogen energy production – Storage – Transportation – Utilization.

TOTAL: 45 PERIODS

TEXTBOOKS:

1. Godfrey Boyle, “Renewable Energy”, Power for a Sustainable Future, Oxford University Press, U.K, 1996.
2. Twidell.J.W & Weir.A, “Renewable Energy Sources”, EFN Spon Ltd., UK, 1986.
3. Tiwari.G.N, “Solar Energy - Fundamentals Design”, Modelling and applications, Narosa PublishingHouse, NewDelhi, 2002.

REFERENCES:

1. Kothari P, K C Singal and Rakesh Ranjan, “Renewable Energy Sources and Emerging Technologies”, PHI Pvt. Ltd.,New Delhi, 2008.
2. G.D. Rai, “Non Conventional Energy Sources”, Khanna Publishers, New Delhi, 1999.
3. S.P. Sukhatme, “Solar Energy”, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1997.

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

15EEZ02 ENERGY CONSERVATION AND AUDITING | **L T P C**
(Common to All Branches except EEE branch) | **3 0 0 3**

OBJECTIVE:

- To enable the students to acquire the knowledge of energy conservation measures in thermal and electrical energy systems.

COURSE OUTCOMES:

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

CO1: Understand the concepts of energy status and conservation principle.
CO2: Measure the energy conservation in steam systems
CO3: Know about the energy conservation concepts of various fluid machineries
CO4: Identify electrical energy conservation in various industries
CO5: Know the energy management techniques and policies

UNIT I ENERGY CONSERVATION PRINCIPLES **(9)**

Energy scenario - Principles of energy conservation - Resource availability - Energy savings - Current energy consumption in India - Roles and responsibilities of energy managers in industries.

UNIT II ENERGY CONSERVATION IN STEAM SYSTEMS **(9)**

Power plant components - Conservation measures in steam systems, losses in boiler - Methodology of upgrading boiler performance - Blow down control, excess air control - Pressure reducing stations - Condensate recovery - Condensate pumping - Thermo compressor - Recovery of flash steam - Air removal and venting - Steam traps -Cooling towers.

UNIT III ENERGY CONSERVATION IN FLUID MACHINERY **(9)**

Centrifugal pumps - Energy consumption and energy saving potentials - Design consideration - Minimizing over design - Fans and blowers : specification, safety margin, choice of fans, controls and design considerations - Air compressor and compressed air systems: selection of compressed air layout, energy conservation aspects to be considered at design stage.

UNIT IV ELECTRICAL ENERGY CONSERVATION **(9)**

Potential areas for electrical energy conservation in various industries: conservation methods, energy management opportunities in electrical heating, lighting system, cable selection - Energy efficient motors - Factors involved in determination of motor efficiency - Adjustable AC drives - Variable speed drives - Energy efficiency in electrical system.

UNIT V ENERGY AUDITING **(9)**

Energy audit : need, preliminary audit, detailed audit, methodology and approach - Instruments for audit, monitoring energy and energy savings.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Reay.D.A, "Industrial energy conservation", Pergamon Press, 1st ed., 2003.
2. Albert Thumann, "Handbook of energy audits", 6th ed., The Fairmount Press, 2003.

REFERENCES:

1. Smith.C.B, “Energy Management Principles”, Pergamon Press, 2006.
2. Hamies, “Energy Auditing and Conservation; Methods, Measurements, Management and Case study”, Hemisphere, 2003.
3. Trivedi. P.R and Jolka .K.R, “ Energy Management”, Common Wealth Publication, 2002.

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

15EEZ03 ELECTRICAL MACHINES

(Common to All Branches except EEE branch)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To disseminate an overview of various electric machines used in industries, power generation and home appliances with a technical know-how on the control techniques

COURSE OUTCOMES:

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

CO1: Understand the constructional details and principle of operation of DC motors,induction machines, alternators, transformers and fractional horse-power motors

CO2: Evaluate the performance of starting and operating characteristics of various electrical machines used in industrial and domestic applications

CO3: Choose an appropriate method of speed control and braking for the drive motors

CO4: Understand the concepts of synchronous motors

CO5: Understand the manufacturing concepts in machines

UNIT I : DC MOTORS **(9)**

Construction and working principle, emf equation, torque equation, starting and running characteristics, speed control, braking, duty of operation, choice of motors.

UNIT II : TRANSFORMERS **(9)**

Construction and working principle, equivalent circuit, regulation and efficiency, autotransformers, industrial applications – welding transformer and furnace transformer.

UNIT III : THREE PHASE INDUCTION MACHINES **(9)**

Construction and working principle. Induction motors - torqueequation, torque–slip characteristics, starting and running characteristics, speed control, braking, choice of motor for industrial applications and traction.

UNIT IV : SYNCHRONOUS MACHINES **(9)**

Construction, principle of operation and types, various types of excitation systems, stand alone and grid connected modes of operation, voltage and frequency control.

UNIT V : FRACTIONAL HORSE POWER MACHINES **(9)**

Factory Automation: Flexible Manufacturing Systems concept – Automatic feeding lines, ASRS, transfer lines, automatic inspection – Computer Integrated Manufacture – CNC - Intelligent automation - Industrial networking, - Bus standards - HMI Systems - DCS and SCADA - Wireless controls.

TOTAL: 45 PERIODS

TEXTBOOKS:

1. D.P.Kothari and I.J.Nagrath, 'Electric Machines', McGraw Hill Education Private Limited, 4th ed, 2010.
2. Ashfaq Husain, 'Electric machines', Dhanpat Rai & Company, 2nd ed, 2002.

REFERENCES:

1. Gopal K. Dubey, 'Fundamentals of Electrical Drives', Narosa publishing house, 2nd ed, 2011.
2. A Fitzgerald , Charles Kingsley , Stephen Umans, 'Electric Machinery', McGraw Hill Education Private Limited, 6th ed, 2002.
3. K. Murugesh Kumar, 'Induction & Synchronous Machines', Vikas Publishing House Pvt Ltd., 2009.
4. Edward Hughes, 'Electrical and Electronic Technology', Dorling Kindersley (India) Pvt. Ltd., 10th ed, 2011.

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

Approved by Seventh Academic Council

15EEZ04 WIND AND SOLAR ELECTRICAL SYSTEMS

L	T	P	C
3	0	0	3

(Common to All Branches except EEE branch)

OBJECTIVE:

- To familiarize the students with basics of solar and wind energy systems and various techniques for the conversion of solar and wind energy into electrical energy.

COURSE OUTCOMES:

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

CO1: Describe the solar radiation, measurements and characteristics of solar PV cell.
CO2: Develop the model of a PV system and its applications.
CO3: Describe the basic types and mechanical characteristics and model of wind turbine.
CO4: Analyze the electrical characteristics and operation of various wind-driven electrical generators.
CO5: Understand various power electronic converters used for hybrid system.

UNIT I INTRODUCTION TO SOLAR (9)

Basic characteristics of sunlight – solar spectrum – insolation specifics– irradiance and irradiation pyranometer – solar energy statics- Solar PV cell – I-V characteristics –P-V characteristics– fill factor- Modeling of solar cell– maximum power point tracking.

UNIT II PHOTO VOLATIC (9)

PV module – blocking diode and bypass diodes– composite characteristics of PV module – PV array– PV system –PV-powered fan–PV fan with battery backup – PV-powered pumping system – PV powered lighting systems–grid- connected PV systems.

UNIT III WIND ENERGY (9)

Wind source–wind statistics-energy in the wind –turbine power characteristics - aerodynamics – rotor types – parts of wind turbines– braking systems–tower- control and monitoring system.

UNIT IV GENERAL CHARACTERISTICS OF INDUCTION GENERATORS (9)

Grid-connected and self-excited systems – Steady state equivalent circuit - Performance predetermination – Permanent magnet alternators: steady-state performance.

UNIT V HYBRID SYSTEMS (9)

Power electronic converters for interfacing wind electric generators – Power quality issues - Wind-diesel systems – Wind-solar systems.

TOTAL = 45 PERIODS

TEXT BOOKS:

1. S N Bhadra, S Banerjee and D Kastha, 'Wind Electrical Systems', Oxford University Press, 1st Edition, 2005.
2. Chetan Singh Solanki, 'Solar Photovoltaics: Fundamentals, Technologies and Applications' PHI Learning Publications, 2nd Edition, 2011.

REFERENCES:

1. Roger A. Messenger and Jerry Ventre, “Photovoltaic Systems Engineering”, Taylor and Francis Group Publications, 2nd Edition, 2003.
2. M. Godoy Simoes and Felix A. Farret, “Alternative Energy Systems: Design and Analysis with Induction Generators”, CRC Press, 2nd Edition, 2008.
3. Ion Boldea, ‘The Electric Generators Handbook- Variable Speed Generators’, CRC Press, 2010.
4. Bin Wu, Yongqiang Lang, Navid Zargari, Samir Kouro, “Power Conversion and Control of Wind Energy Systems”, IEEE Press Series on Power Engineering, John Wiley & Sons, 2011.
5. S. Sumathi,L. Ashok Kumar,P. Surekha ,‘Solar PV and Wind Energy Conversion Systems’, Springer 2015.

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

15EIZ01 AUTOTRONIX

(Common to ALL Branches Except EIE)

L	T	P	C
3	0	0	3

OBJECTIVE:

This course focuses on the extent and nature of electronic circuitry in automotive systems including monitoring and control circuits for engines, emission control system, ignition systems and fuel systems. The course imparts applications of sensors on automotive systems .

COURSE OUTCOMES:

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

CO1: Understand the application of electronics in automotive industry.
CO2: Identify different control systems in automotives and their control.
CO3: Design and implement various control algorithms in automotives.
CO4: Demonstrate different instrumentation systems in automotives.
CO5: Identify, formulate and solve real time engineering problems.

UNIT I FUNDAMENTALS OF AUTOMOTIVE ELECTRONICS (9)

Electronic Engine Management System – Components – Open and Closed Loop Control Strategies – PID Control – Look Up Tables – Introduction – Modern Control Strategies Like Fuzzy Logic and Adaptive Control – Controlled Parameters – SI and CI Engines.

UNIT II SENSORS AND ACTUATORS (9)

Introduction – Basic Sensor Arrangement – Types Of Sensors – Hall Effect Sensor – Hot Wire Anemometer – Thermistor – Piezo-Electric Sensor – Piezo-Resistive Sensors – Oxygen Concentration Sensor – Lambda Sensor – Crankshaft Angular Position Sensor – Cam Position Sensor – Mass Air Flow (MAF) Rate – Manifold Absolute Pressure (MAP) – Throttle Plate Angular Position – Engine Oil Pressure Sensor – Vehicle Speed Sensor – Stepper Motors – Relays – Detonation Sensor – Emission Sensors.

UNIT III SPARK IGNITION ENGINE MANAGEMENT (9)

Feedback Carburetor System – Throttle Body Injection – Multi Point Fuel Injection System – Injection System Controls –Advantage of Electronic Ignition Systems – Three Way Catalytic Converter – Conversion Efficiency Versus Lambda – Group and Sequential Injection Techniques – Fuel System Components – Advantages of Electronic Ignition Systems – Solid State Ignition Systems – Principle Of Operation – Types – Contact Less Electronic Ignition System – Electronic Spark Timing Control.

UNIT IV COMPRESSION IGNITION ENGINE MANAGEMENT (9)

Fuel Injection System – Parameters Affecting Combustion – Noise and Emissions in CI Engines – Pilot, Main, Advanced – Post Injection and Retarded Post Injection – Electronically Controlled Unit Injection System – Layout of the Common Rail Fuel Injection System – Fuel Injector – Fuel Pump – Rail Pressure Limiter – Flow Limiter – Working Principle – EGR Valve Control in Electronically Controlled Systems.

UNIT V DIGITAL ENGINE CONTROL SYSTEM (9)

Open Loop and Closed Loop Control System – Engine Cooling and Warm Up Control – Idle Speed Control – Acceleration and Full Load Enrichment – Deceleration Fuel Cut-off – Fuel Control Maps – Open Loop Control of Fuel Injection – Closed Loop Lambda Control – Exhaust Emission Control – On Board Diagnostics: Diagnostics – Future Automotive Electronic Systems.

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. Arthur Primrose Young, Leonard Griffiths, “Automobile Electrical and Electronic Equipment: Theory and Practice for Students, Designers, Automobile Electricians and Motorists”, London Butterworths, Ninth Edition, 1986.
2. William Ribbens, “Understanding Automotive Electronics: An Engineering Perspective”, Butterworth-Heinemann, Seventh Edition, 2013.

REFERENCES:

1. Allan Bonnick, “Automotive Computer Controlled Systems” Taylor & Francis, Fifth Edition, 2001.
2. Tom Denton, “Automobile Electrical and Electronics Systems”, Butterworth- Heinemann, Fourth Edition, 2004.
3. Robert Bosch GmbH and Horst Bauer, “Gasoline-Engine Management”, Bentley Publishers, Second Edition, 2006.

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

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

15EIZ02 FIBER OPTIC SENSORS

(Common to ALL Branches Except EIE)

L	T	P	C
3	0	0	3

OBJECTIVE:

- This course introduces fundamental physical principles of both classical and modern optics as well as principles of optical design used in the engineering of optical systems.
- The course also provides exposure to practical aspects of optical materials and devices.
- The intention of the course is to provide foundation of basic principles, design methodology, and practical considerations needed to design or use optical and laser instruments in engineering practice.

COURSE OUTCOMES:

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

CO1: Understand the basic concepts of optical fibres and their properties.
CO2: Have adequate knowledge about the Industrial applications of optical fibres.
CO3: Relate and identify different types of lasers and their applications.
CO4: Demonstrate industrial applications of lasers.
CO5: Understand holography and medical applications of laser.

UNIT I OPTICAL FIBRES AND THEIR PROPERTIES (9)

Principles of light propagation through a fibre - Different types of fibres and their properties, fibre characteristics – Absorption losses – Scattering losses – Dispersion – Connectors & splicers – Fibre termination – Optical sources – Optical detectors.

UNIT II INDUSTRIAL APPLICATION OF OPTICAL FIBRES (9)

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

UNIT III LASER FUNDAMENTALS (9)

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

UNIT IV INDUSTRIAL APPLICATION OF LASERS (9)

Laser for measurement of distance, length, velocity, acceleration, current, voltage and atmospheric effect – Material processing – Laser heating, welding, melting and trimming of material – Removal and vaporization.

UNIT V HOLOGRAM AND MEDICAL APPLICATIONS (9)

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

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. J.M. Senior, 'Optical Fibre Communication – Principles and Practice', Prentice Hall of India, 2009.
2. J. Wilson and J.F.B. Hawkes, 'Introduction to Opto Electronics', Prentice Hall of India, 2001.

REFERENCES:

1. Donald J.Sterling Jr, 'Technicians Guide to Fibre Optics', 3rd Edition, Vikas Publishing House, 2000.
2. M. Arumugam, 'Optical Fibre Communication and Sensors', Anuradha Agencies, 2002.
3. John F. Read, 'Industrial Applications of Lasers', Academic Press, 2004.
4. Monte Ross, 'Laser Applications', McGraw Hill, 2008
5. G. Keiser, 'Optical Fibre Communication', McGraw Hill, 2003.
6. Mr. Gupta, 'Fiber Optics Communication', Prentice Hall of India, 2004.

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

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

Approved by Seventh Academic Council

15EIZ03 INDUSTRIAL AUTOMATION
(Common to ALL Branches Except EIE)

L	T	P	C
3	0	0	3

OBJECTIVE:

- This course produces students who can use their multidisciplinary skills to meet growing demand from an industry that is pushing the limits of technology by exploiting the growing convergence of these fields.
- The course aims to provide knowledge on fundamentals of robots, robot programming, and its vision system and apply to demonstrate their knowledge in real time application.

COURSE OUTCOMES:

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

CO1: Demonstrate the concepts of robotic principles and various robot configurations.
CO2: Develop solutions for the robot position and orientation for given application.
CO3: Identify the appropriate configuration for the application.
CO4: Design intelligence systems incorporating real time data capturing using vision systems.
CO5: Understand robotic programming and develop simple robotic systems.

UNIT I BASIC CONCEPTS (9)

Definition and origin of robotics –different types of robotics–various generations of robots –degrees of freedom – Asimov's laws of robotics – dynamic stabilization of robots.

UNIT II POWER SOURCES AND SENSORS (9)

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

UNIT III MANIPULATORS, ACTUATORS AND GRIPPERS (9)

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

UNIT IV KINEMATICS AND PATH PLANNING (9)

Solution of inverse kinematics problem–multiple solution jacobian work envelop–hill climbing Techniques – robot programming languages

UNIT V CASE STUDIES (9)

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

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. Industrial Robotics (SIE): Technology, Programming and Applications Nicholas Odrey, Mitchell Weiss, Mikell Groover, Roger Nagel, Ashish Dutta , Mcgrawhill, 2012.
2. Ghosh, Control in Robotics and Automation: Sensor Based Integration, Allied Publishers, Chennai, 1999.

REFERENCES:

1. S.R. Deb, Robotics technology and flexible Automation, John Wiley, USA 1992.
2. C.R. Asfahl., Robots and manufacturing Automation, John Wiley, USA 1992.
3. R.D. Klafter, T.A. Chimielewski, M. Negin, Robotic Engineering –An integrated approach, Prentice Hall of India, New Delhi, 1994.
4. P.J. Mc Kerrow, Introduction to Robotics, Addison Wesley, USA, 1991.
5. Issac Asimov I Robot, Ballantine Books, New York, 1986.

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

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

15EIZ04 ULTRASONIC INSTRUMENTATION
(Common to ALL Branches Except EIE)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To know the generation and detection of ultrasonic waves and to provide knowledge on the concepts of Ultrasonic Instrumentation.

COURSE OUTCOMES:

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

CO1: Understand the applications of ultrasonic instrumentation
CO2: Characterize the ultrasonic waves
CO3: Analyze the sensors used in ultrasonic application
CO4: Apply the concepts to make simple applications
CO5: Model and analyze ultrasonic systems.

UNIT I ULTRASONIC WAVE CHARACTERISTICS (9)

Principles and propagation of various waves, Characterization of ultrasonic transmission, Reflection and Transmission coefficients, Intensity and attenuation of sound beam.

UNIT II GENERATION/DETECTION OF ULTRASONIC WAVES (9)

Magnetostrictive and piezoelectric effects, Detection of Ultrasonic Waves: Mechanical, Optical and Electrical Method, Precise Measurement: Pulse– echo Overlap, Cross correlation

UNIT III ULTRASONIC TEST METHODS (9)

Ultrasonic test methods: pulse echo, transit time, resonance, direct contact and immersion type and ultrasonic methods of flaw detection.

UNIT IV ULTRASONIC MEASUREMENTS (9)

Ultrasonic measurements: ultrasonic methods of measuring thickness, depth and flow, variables affecting ultrasonic testing in various applications.

UNIT V ULTRASONIC APPLICATIONS (9)

Ultrasonic methods of flaw detection, Flow meters, Density measurement, Viscosity measurement, Level measurement, Sensor for Temperature and Pressure measurements, Measuring thickness, Depth, Rail Inspection, SONAR, Inspection of Welds and defect detection in welds

TOTAL :(L: 45) = 45 PERIODS

TEXTBOOKS:

1. Baldev Raj, V.Rajendran, P.Palanichamy, “Science and Technology of Ultrasonics”,Alpha Science International, UK, 2004.
2. LawrenceE.Kinsler, Austin R.Frey, Alan B.Coppens, James V. Sanders, “Fundamentals of Acoustics,” John Wiley and Sons Inc,USA, 2000.

REFERENCES:

1. J.David N.Cheeke,”Fundamentals and Applications of Ultrasonic Waves,” CRC Press, Florida, 2002
2. L.A. Bulavin, YU.F.Zabashta, “Ultrasonic Diagnostics in Medicine,” VSP, Koninklijke, Brill,Boston, 2007.
3. Emmanuel P. Papadakis, “Ultrasonic Instruments and Devices”Academic Press,1999.

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

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

15ITZ01 - PC HARDWARE AND TROUBLE SHOOTING

(Common to All branches except IT Branchs)

L	T	P	C
3	0	0	3

OBJECTIVE:

- This course will provide participant a much needed knowledge of computer hardware and networking, enabling them to identify and rectify the onboard computer hardware, software and network related problems.
- Upgrading of existing hardware / software as and when required. The main aspect of this program is to eliminate cost for the computer engineer boarding the vessel for troubleshoot, install / configure the application program and network related problems and there by charging exorbitant fees to ship owners / managers.

COURSE OUTCOMES:

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

CO1: Disassemble and reassemble a working computer Handle and repair

CO2 : Establish a local computer network & Load and configure a working Windows Operating System

CO3 : Make minor repairs and upgrades to a laptop computer& evaluate a computer system for individual customers, making suggestions to optimize the system for the individual

CO4 : Implement the design using Objective C and Ios

CO5 : Configure the power management features on a computer system, Troubleshoot, configure and repair printers.

UNIT I INTRODUCTION (9)

Introduction - Computer Organization – Number Systems and Codes – Memory – ALU – CU – Instruction prefetch – Interrupts – I/O Techniques – Device Controllers - Error Detection Techniques – Microprocessor – Personal Computer Concepts – Advanced System Concepts – Microcomputer Concepts – OS – Multitasking and Multiprogramming – Virtual Memory – Cache Memory – Modern PC and User.

UNIT II PERIPHERAL DEVICES (9)

Introduction – Keyboard – CRT Display Monitor – Printer – Magnetic Storage Devices – FDD – HDD – Special Types of Disk Drives – Mouse and Trackball – Modem – Fax Modem – CD ROM Drive – Scanner – Digital Camera – DVD – Special Peripherals.

UNIT III PC HARDWARE OVERVIEW (9)

Introduction – Hardware BIOS DOS Interaction – The PC family – PC hardware – Inside the System Box – Motherboard Logic – Memory Space – Peripheral Interfaces and Controllers – Keyboard Interface – CRT Display interface – FDC – HDC.

UNIT IV INSTALLATION AND PREVENTIVE MAINTENANCE (9)

Introduction – system configuration – pre installation planning – Installation practice – routine checks – PC Assembling and integration – BIOS setup – Engineering versions and compatibility – preventive maintenance – DOS – Virus – Data Recovery.

UNIT V TROUBLESHOOTING (9)

Introduction – computer faults – Nature of faults – Types of faults – Diagnostic programs and tools – Microprocessor and Firmware – Programmable LSI's – Bus Faults – Faults Elimination process – Systematic Troubleshooting – Symptoms observation and analysis – fault diagnosis – fault rectification – Troubleshooting levels – FDD, HDD, CD ROM Problems.

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOK:

1. B. Govindarajalu, "IBM PC Clones Hardware, Troubleshooting and Maintenance", 2/E, TMH, 2002.

REFERENCES:

1. Peter Abel, Niyaz Nizamuddin, “IMB PC Assembly Language and Programming”, Pearson Education, 2007.
2. Scott Mueller, “Repairing PC's”, PHI,1992

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

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

15ITZ02 - CYBERCRIME INVESTIGATIONS AND DIGITAL FORENSICS

(Common to All branches except IT Branch)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To give knowledge of constitutional and case law to search and capture digital evidence, determine the most effective and appropriate forensic response strategies to digital evidence, and provide effective proof in a case involving digital evidence.

COURSE OUTCOMES:

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

CO1: To have various ideas about cybercrime.

CO2: To have knowledge of the various issues of cybercrime.

CO3 : To investigate and find the cybercrime.

CO4: To identify the cybercrime.

CO5: To have clear idea of the various laws and acts.

UNIT I INTRODUCTION (9)

Introduction and Overview of Cyber Crime - Nature and Scope of Cyber Crime - Types of Cyber Crime: Social Engineering - Categories of Cyber Crime - Property Cyber Crime.

UNIT II CYBER CRIME ISSUE (9)

Unauthorized Access to Computers - Computer Intrusions - White collar Crimes - Viruses and Malicious Code - Internet Hacking and Cracking - Virus Attacks – Software Piracy - Intellectual Property - Mail Bombs - Exploitation - Stalking and Obscenity in Internet - Digital laws and legislation - Law Enforcement Roles and Responses.

UNIT III INVESTIGATION (9)

Introduction to Cyber Crime Investigation - Investigation Tools – Discovery - Digital Evidence Collection - Evidence Preservation - E-Mail Investigation – Tracking - IP Tracking - E-Mail Recovery - Hands on Case Studies - Encryption and Decryption Methods - Search and Seizure of Computers - Recovering Deleted Evidences - Password Cracking.

UNIT IV DIGITAL FORENSICS (9)

Introduction to Digital Forensics - Forensic Software and Hardware - Analysis and Advanced Tools - Forensic Technology and Practices - Forensic Ballistics and Photography - Face, Iris and Fingerprint Recognition - Audio Video Analysis - Windows System Forensics - Linux System Forensics - Network Forensics.

UNIT V LAWS AND ACTS (9)

Laws and Ethics - Digital Evidence Controls - Evidence Handling Procedures - Basics of Indian Evidence ACT IPC and CrPC - Electronic Communication Privacy ACT - Legal Policies.

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. Nelson Phillips and Enfinger Steuart, —Computer Forensics and Investigationsll, Cengage Learning, New Delhi, 2009.
2. Kevin Mandia, Chris Prosise, Matt Pepe, —Incident Response and Computer Forensics —Tata McGraw - Hill, New Delhi, 2006.

REFERENCES:

1. Robert M Slade, Software Forensics , Tata McGraw Hill, New Delhi, 2005.
2. Bernadette H Schell, Clemens Martin, —Cybercrime, ABC – CLIO Inc, California, 2004.
3.Understanding Forensics in IT — NIIT Ltd, 2005.

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

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

15ITZ03 - DEVELOPING MOBILE APPS

(Common to All branches except IT Branch)

L	T	P	C
3	0	0	3

OBJECTIVE:

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

.

COURSE OUTCOMES:

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

CO1: Describe the requirements for mobile applications

CO2: Explain the challenges in mobile application design and development

CO3: Implement the design using Android SDK

CO4: Implement the design using Objective C and iOS

CO5: Deploy mobile applications in Android and iPone marketplace for distribution

UNIT I INTRODUCTION **(9)**

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

UNIT II BASIC DESIGN **(9)**

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

UNIT III ADVANCED DESIGN **(9)**

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

UNIT IV TECHNOLOGY I - ANDROID **(9)**

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

UNIT V TECHNOLOGY II - IOS **(9)**

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

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. http://developer.android.com/develop/index.html.

2. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012

REFERENCES:

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

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

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

15ITZ04 - SOFTWARE PROJECT MANAGEMENT

(Common to All branches except IT Branch)

L	T	P	C
3	0	0	3

OBJECTIVE:

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

.

COURSE OUTCOMES:

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

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

CO2: Apply appropriate approaches to plan a new project.

CO3: Apply appropriate methodologies to develop a project schedule.

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

UNIT I INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT (9)

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

UNIT II PROJECT EVALUATION (9)

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

UNIT III ACTIVITY PLANNING (9)

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

UNIT IV MONITORING AND CONTROL (9)

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

UNIT V MANAGING PEOPLE AND ORGANIZING TEAMS (9)

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

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOK:

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

REFERENCES:

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

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

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

Approved by Seventh Academic Council

15MEZ01 SIX SIGMA

(Common to All Branches except Mechanical Engineering)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To introduce the techniques and phases of six sigma
- To acquire knowledge on design for six sigma during product development stage
- To introduce the lean concepts in service sectors

COURSE OUTCOMES:

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

CO1: Formulate the six sigma project definition for process improvement in an industry
CO2: Summarize the stages in preparation of technical requirements and team formation
CO3: Create a project definition document and/or assess the process condition through collected data
CO4: Apply the six sigma tools the analyze the process parameters and/or identify the scope for process improvement
CO5: Recommend a system to sustain the results and/or list the tools in design for six sigma and lean servicing

UNIT I : INTRODUCTION **(9)**

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

UNIT II : PREPARATION PHASE **(9)**

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

UNIT III : DEFINE AND MEASURE PHASE **(9)**

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

UNIT IV: ANALYZE AND IMPROVE PHASE **(9)**

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

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

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

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. Michael L George, David T Rowlands, and Bill Kastle, “What is Lean Six Sigma”, McGraw Hill, New York, 2004
2. Betsi Harris Ehrlich, “Transactional Six Sigma and Lean Servicing”, St. Lucie Press, 2002.

REFERENCES:

1. Kai Yang and Basem El Haik, “Design for Six Sigma”, McGraw Hill, New York, 2004
2. Thomas Pyzdek, “Six Sigma Handbook: Complete Guide for Green belts, Black belts and Managers at All Levels”, Tata McGraw Hill Companies Inc, 2003
3. Donald W Benbow and Kubiak T M, “Certified Six Sigma Black Belt Handbook”, Pearson Education, 2007
4. Urdhwarashe, “Six Sigma for Business Excellence”, 1st ed., Pearson Education India, 2010
5. Gopalakrishnan. N, “Simplified Six Sigma: Methodology, Tools and Implementation, Prentice Hall India, 2012.

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

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

15MEZ02 PROJECT MANAGEMENT

(Common to All Branches except Mechanical Engineering)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To gain knowledge about project, project management and its basics
- To know stages of project management in an organization
- To understand the roles and responsibilities of a project manager

COURSE OUTCOMES:

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

CO1: Demonstrate the skill set of a project manager
CO2: Develop skills in managing project works by effective team building
CO3: Strategize proper plan and premeditate the risks related to projects
CO4: Phase the project work as various stages and develop skills to control the project
CO5: Apply project management concepts by identifying and carrying out a real time project

UNIT I : PROJECTS, PROJECT MANAGEMENT AND PROJECT MANAGER (9)

Project Management - process context - interpersonal and behavioral context - organizational context - defining project success - responsibilities of project manager - common challenges expected to face - skill requirements and functional competencies - unofficial job duties - value of introspection and self-awareness to the soft side

UNIT II : PROJECT DEFINITION, EFFECTIVE TEAM BUILDING (9)

Evolution of projects - understanding the problem - identification of optimum solution - development of solution and preliminary plan - formal launching of project - evaluation of political environment - mechanics of building a team - team leadership - fostering teamwork and synergism - getting the most from team members

UNIT III : PROJECT PLANNING, RISK AND UNCERTAINTY (9)

Project Planning - estimating - scope management - time management - cost management - project management software - understanding risk and uncertainty - managing risk - identifying what can hurt you - quantifying how badly you can get hurt - analyzing the biggest threats - responding to high-threat problems - accommodating uncertainty

UNIT IV: PROJECT CONTROL AND INTERFACES (9)

Project Control - Establishing a Baseline of Measurement - Information Needs - Information Gathering - ensuring Good Information - Analyzing the Information - Reacting to the Information - Project Interfaces - Roles of Internal Stakeholders and External Stakeholders - Other Interfaces - Considerations in Interface Management

UNIT V : PROJECT COMMUNICATION, DOCUMENTATION AND CONCLUSION (9)

Configuration plan - documentation and communication road map - methods of communicating - guidelines for effective communication - conducting high quality meetings - communication skills - key project documentation - early termination - key elements in project closure - punch list approach - project completion checklist

TOTAL (L:45) : 45 PERIODS

TEXTBOOKS:

1. Gary R. Heerkens, "Project Management", 2nd ed., McGraw-Hill Book Company, 2013

REFERENCES:

1. Harold Kerzner, "Project Management", 12th ed., John Wiley & Sons, 2017
2. John M Nicholas, Herman Steyn, "Project Management for Engineering, Business and Technology", 5th ed., Taylor&Francis, 2016
3. Prasanna Chandra, "Projects : Planning, Analysis, Selecting, Financing, Implementation and Review", 8th ed., McGraw Hill Education, 2017
4. Eric W Larson and Clifford F Gray, Gautam V Desai, "Project Management: The Managerial Process", 6thed., McGraw Hill Education, 2017

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

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

15MEZ03 ELECTRIC VEHICLE TECHNOLOGY

(Common to All Branches except Mechanical Engineering)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To introduce the working principles of batteries and their types
- To acquire knowledge on applications of alternative energy sources in vehicles
- To introduce the electrical drives, mathematical modeling and design considerations

COURSE OUTCOMES:

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

CO1: Differentiate the types of batteries which are used in electrical vehicles
CO2: List the types of alternative energy sources and/or working principles of fuel cells
CO3: Assess the potential of hydrogen energy in vehicles and energy storage techniques
CO4: Recommend an electrical drive and its controller in vehicular applications
CO5: Explain the concepts of electric vehicle modeling and design aspects

UNIT I : INTRODUCTION AND BATTERIES (9)

Types of electric vehicle - battery parameters - lead acid batteries - nickel based batteries - battery charging - designer‟s choice of battery - use of batteries in hybrid vehicles - battery modelling.

UNIT II : ALTERNATIVE ENERGY SOURCES AND FUEL CELLS (9)

Solar photovoltaics - wind power - flywheels - super capacitors - supply rails - hydrogen fuel cells - fuel cell thermodynamics - connecting cells in series - water and thermal management in PEM fuel cell.

UNIT III : HYDROGEN SUPPLY AND STORAGE (9)

Introduction - fuel reforming - fuel cell requirements, steam reforming, partial oxidation and autothermal reforming, further fuel processing, mobile applications - storage as hydrogen - chemical methods.

UNIT IV: ELECTRIC MACHINES AND CONTROLLERS (9)

Brushed DC electric motor - DC regulation and voltage conversion - brushless electric motors - motor cooling, efficiency, size and mass - electrical machines for hybrid vehicles.

UNIT V : ELECTRIC VEHICLE MODELLING AND DESIGN CONSIDERATIONS (9)

Introduction - tractive effort - modelling vehicle acceleration and electric vehicle range - simulations - aerodynamic considerations - rolling resistance - transmission efficiency - vehicle mass - general issues

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. James Larminie, John Lowry, “Electric Vehicle Technology Explained”, John Wiley & Sons Ltd., 2015
2. Iqbal Husain, “Electric and Hybrid Vehicles”, 2nd ed., CRC Press, 2010.

REFERENCES:

1. Mehrdad Ehsani, Yimin Gao, Ali Emadi, “Modern Electric, Hybrid Electric, and Fuel Cell Vehicles”, 2nd ed., CRC Press 2009
2. Chau.K.T, “Electric vehicle machines and drives”, Wiley-IEEE Press, 2015
3. James D Halderman, “Hybrid and Alternative Fuel Vehicles”, 3rd Revised edition, Pearson Education, 2012
4. Jingyu Yan , Huihuan Qian , Yangsheng Xu, “Hybrid Electric Vehicle Design and Control”, McGraw-Hill Professional Publishing, 2013
5. Chris Mi; M. Abul Masrur and David Wenzhong Gao, “Hybrid Electric Vehicles”, John Wiley & Sons, 2011

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

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

15MEZ04 VALUE ENGINEERING

(Common to All Branches except Mechanical Engineering)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To introduce the concept of value engineering for eliminating the unnecessary costs of a product
- To acquire knowledge on various value engineering techniques, team dynamics and job plan
- To introduce the financial aspects and human factors of value engineering

COURSE OUTCOMES:

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

CO1: Estimate the value of a product and/or identify the primary and secondary functions of a product
CO2: Determine the cost, worth of a product and their elements
CO3: Demonstrate the value engineering techniques for industrial applications
CO4: Summarize the stages in team dynamics and value engineering job plan
CO5: Illustrate the financial aspects and human factors of value engineering

UNIT I : VALUE AND FUNCTION (9)

Seven types values - economic value - cost, use, esteem and exchange values - mathematical model of value - types and levels of functions - function identification - method of finding functions of a product - case study - vocabulary of verbs and nouns.

UNIT II : COST AND WORTH (9)

Cost and price - elements of cost - direct material, direct labour, direct expenses, overheads - calculation of cost - case study - method of determining function cost - evaluation of worth - guidelines to find out worth - value gap and value index.

UNIT III : VALUE ENGINEERING TECHNIQUES (9)

Brainstorming and Gordon techniques - feasibility ranking - morphological analysis technique - ABC analysis - probabilistic approach - make or buy - function-cost-worth analysis - FAST - weighted evaluation method - evaluation matrix - life cycle cost.

UNIT IV: TEAM DYNAMICS AND JOB PLAN (9)

Team structure - team building - physical, intellectual, spiritual transformations - job plan - orientation phase - information phase - function phase - creative phase - evaluation phase - recommendation phase - implementation phase - audit phase.

UNIT V : FINANCIAL ASPECTS AND HUMAN RELATION (9)

Break-even point - payback period - return on investment - discounted cash flows - balance sheet and profit and loss account - human aspects in value engineering - individual ego states - techniques of transactions - human interactions - Managerial grid

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. Mukhophadhyaya A K, "Value Engineering", Sage Publications Pvt. Ltd., New Delhi, 2003
2. Mukhophadhyaya A K, "Value Engineering Mastermind", Sage Publications Pvt. Ltd., New Delhi, 2009

REFERENCES:

1. Richard J Park, "Value Engineering - A plan for inventions", St.Lucie Press, London, 1998.
2. Iyer. S. S, "Value Engineering: A How to Manual", 3rd ed., New age publishers, 2009
3. Larry W Zimmesman. P E , "VE - A Practical approach for owners designers and contractors", 1st ed., CBS Publishers, Delhi, 1992
4. Theodore C. Fowler, "Value Analysis in Design", John Wiley & Sons, 1997
5. Arthus E Mudge, "Value Engineering", McGraw Hill book company, 1971

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

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

Approved by Seventh Academic Council

15MYZ01- MATHEMATICAL STRUCTURES

(Common to All Branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand the basic concepts of logic and their applications.
- To give you a familiarity with rigour and a grounding in the art of formal reasoning.
- To understand the concepts of sets and relations.
- To understand basic concepts of functions.
- To understand the characteristic of a group and the coset

.

COURSE OUTCOMES:

At the end of this course, the students would know

CO1 : To extend the logical and mathematical ability to deal with abstraction.
CO2 : Be aware of counting principle
CO3 : Exposed to concepts and properties of set theory
CO4 : Identify and analyze the basic proofs involving functions.:
CO5 : Be exposed to concepts and properties of algebraic structures such as Semi groups

UNIT I - PROPOSITIONAL CALCULUS **(9)**

Propositions - Logical connectives-Compound propositions - Conditional and biconditional propositions - Truth tables - Tautologies and Contradictions - Logical and Equivalences and implications - DeMorgan's Laws - Normal forms

UNIT II – PREDICATE CALCULUS **(9)**

Predicates - Statement Function – Variables - free and bound variables – Quantifiers - Universe of discourse -Logical equivalences and implications for quantified statements

.

UNIT III – SET THEORY **(9)**

Cartesian product of sets- Relations of sets-Types of relations and their properties – Relational matrix and the graph of a relation- Equivalence relations – Partial ordering – Poset – Hasse diagram.

UNIT IV – FUNCTIONS **(9)**

Definition – Classification of functions – Composition of functions – Inverse functions – Binary and n-ary operations – Characteristic function of a set..

.

UNIT V – ALGEBRAIC STRUCTURES **(9)**

Algebraic systems - Semi groups and monoids - Groups – Subgroups - Homomorphisms – Normal subgroup and coset – Lagrange's theorem..

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. **Tremblay J.P and Manohar R**, "Discrete Mathematical Structures with Applications to Computer Science" ,Tata McGraw-HILL, New Delhi, ,30th Reprint 2011.
2. **Veerarajan.T,** "Discrete Mathematics with Graph Theory and Combinatorics", Fourth Edition, Tata McGraw Hill , New Delhi, Reprint 2013.

REFERENCES:

1. **Kenneth H.Rosen**, "Discrete Mathematics and its Applications", Fifth Edition, Tata McGraw- Hill publications, New Delhi 2012.
2. **Venkatraman M.K.,** "Discrete Mathematics", The National Publishing Company, Chennai,2007.

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

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

Approved by Seventh Academic Council

15MYZ02- OPTIMIZATION TECHNIQUES

(Common to All Branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To provide the concept and an understanding of basic concepts in Operations Research.
- To understand, develop and solve mathematical model of Transport and assignment problems.
- To understand, develop and solve mathematical model of linear programming problems.
- To provide Techniques for Analysis and Modeling in Computer Applications.
- To understand network modeling for planning and scheduling the project activities

COURSE OUTCOMES:

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

CO1 : Construct and solve linear programming models to answer business optimization
CO2 : Apply transportation and assignment models to find optimal solution in warehousing and Travelling.
CO3 : Prepare project scheduling using PERT and CPM.
CO4 : Appraise theoretical predictions obtained from Game Theory analyses against real world conflicts.
CO5 : Identify and analyze appropriate queuing model to reduce the waiting time in queue

.

UNIT I - LINEAR PROGRAMMING MODELS **(9)**

Mathematical Formulation - Graphical Solution of Linear Programming Models - Simplex Method - Big-M Method

UNIT II – TRANSPORTATION AND ASSIGNMENT MODELS **(9)**

Mathematical Formulation of Transportation Problem - Methods for Finding Initial Basic Feasible Solution: North West Corner Rule, Least Cost Method, VAM - Optimum solution – Mathematical Formulation of Assignment Models.

UNIT III – PERT AND CPM **(9)**

Network Construction – Critical Path Method – Project Evaluation and Review Technique

UNIT IV– GAME THEORY **(9)**

Definition - Pay-off - Two Person Zero - Sum Games -The Maximin - Minimax Principle - Games without Saddle Points (Mixed Strategies) - 2x2 Games without Saddle Points - Graphical Method for 2xn or mx2 Games.

UNIT V – QUEUING MODELS **(9)**

Characteristics of Queuing Models – Poisson Queues – (M/M/1): (FIFO/∞/∞), (M/M/1): (FIFO/N/∞), (M/M/C): (FIFO/∞/∞), (M/M/C) : (FIFO/N/∞) Models.

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. Taha, H.A. “Operations Research: An Introduction”, 8th Edition, Pearson Education, 2008.
2. V.Sundaresan, K.S.Ganapathy Subramanian, K.Ganesan, ”Resource Management Techniques”, A.R.Publication, 2002.

REFERENCES:

1. A .M. Natarajan, P. Balasubramani, A.Tamilarasi, “Operations Research” , Pearson Education, Asia, 2005.
2. Prem Kumar Gupta , D.S. Hira “Operations Research”, S. Chand & Company Ltd., New Delhi, Third Edition, 2003.
3. Manmohan .,Kandi swarp.,Gupta., “Operations Research”,Sultan Chand & Sons(first edition),New delhi.”.

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

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

Approved by Seventh Academic Council

15MYZ03- STATICS FOR ENGINEERS
(Common to All Branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To Aware knowledge of parallel forces
- To know the concept of equilibrium of forces.
- To acquire the knowledge of moments and couples.
- To know resultant of co-planar forces acting on a rigid body.
- To learn the necessary and sufficient conditions of equilibrium.
-

COURSE OUTCOMES:

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

CO1 : Knowledge about different types of forces and their resultant
CO2 : To bring the polygon of forces to be in equilibrium.
CO3 : Moments and couples of parallel forces.
CO4 : To know about co-planar forces.
CO5 : Necessary and sufficient conditions to bring the equilibrium of forces.

UNIT I - TYPES OF FORCES **(9)**

Forces acting at a point – Parallelogram law – triangle law

UNIT II – EQUILIBRIUM OF FORCES **(9)**

(λ, μ) theorem – Polygon of forces – conditions of equilibrium.

UNIT III – MOMENTS AND COUPLES **(9)**

Parallel forces – Moments and couples composition of parallel forces (like and unlike).

UNIT IV – CO-PLANAR FORCES **(9)**

Moment of a force about a point – Varignons theorem – Co-planar forces acting on a rigid body – Theorem on three co-planar forces in equilibrium

UNIT V – REDUCTION OF A SYSTEM OF CO-PLANAR FORCES **(9)**

Reduction of a system of co-planar forces to a single force and a couple – necessary and sufficient conditions of equilibrium only – Equation to the line of action of the resultant.

TOTAL (L:45) : 45 PERIODS

TEXT BOOK:

1. M.K.Venkataraman, Statics, Agasthiar Publications, Trichy, 1999

REFERENCES :

1. A.V.Dharmapadam, Statics, S.Viswanathan Printers and Publishing Pvt., Ltd, 1993.

2 P.Duraipandian and Laxmi Duraipandian, Mechanics, S.Chand and Company Ltd, Ram Nagar, New Delhi-55,

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

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

15MYZ04- STATISTICS FOR ENGINEERS
(Common to All Branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To assess the validity of statistical conclusions.
- To determine the outcomes and probabilities for experiments.
- To Understand how to develop Null and Alternative Hypotheses
- To understand difference between Parametric and Nonparametric Statistical Procedures.
- To estimate the relationships among variables

COURSE OUTCOMES:

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

CO1 : The fundamental knowledge of basic statistics and probability distribution concepts.
CO2 : Empirical distribution of sample means is closer to bell shaped when the size of the sample increases.
CO3 : The knowledge of test of Hypothesis as well as to calculate confidence limits for a given population parameter for single sample and two sample cases.
CO4 : Various methods of non parametric tests and concepts related to the testing of hypothesis.
CO5 : The application of correlation, regression and time series analysis in various aspects.

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

Statistics – Definition, Types. Types of variables – Organizing data – Descriptive Measures: Mean, Median, Mode, Standard Deviation, Mean Deviation.

UNIT II INTRODUCTION TO PROBABILITY **(9)**

Basic definitions and rules for probability - conditional probability - independence of events - Probability distributions: Binomial, Poisson and Normal distributions.

UNIT III TESTING OF HYPOTHESIS **(9)**

Hypothesis testing: one sample and two sample tests for means and proportions of large samples(z-test), one sample and two sample tests for means of small samples (t-test), F-test for two sample standard deviations. ANOVA one way and two ways.

UNIT IV NON-PARAMETRIC METHODS **(9)**

Chi-square test for single sample standard deviation. Chi-square tests for independence of attributes and goodness of fit. Rank sum test. Kolmogorov – Smirnov – test for goodness of fit, comparing two populations. Mann – Whitney U test and Kruskal Wallis test.

UNIT V CORRELATION, REGRESSION AND TIME SERIES ANALYSIS **(9)**

Correlation analysis, estimation of regression line. Time series analysis: variations in time series, Trend analysis, Cyclical variations, seasonal variations and irregular variations (Self-study).

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. Richard I.Levin, David S.Rubin, Statistics for Management, 7th Ed, 2011.
2. Aczel A.D. and Sounderpandian J., Complete Business Statistics 6th edition, Tata McGraw – Hill, Publishing company Ltd, New Delhi, 2012.

REFERENCES:

1. Srivatsava TN and Shailaja rego, Statistics for Management Tata McGraw Hill, 2008.
2. Ken Black, Business Statistics, 6th Ed., Wiley India Edition, 2009.
3. Anderson D.R. Sweeney D.J. and Williams T.A., Statistics for business and economics, 9th edition, Thomson (South- Western) Asia, Singapore, 2012.
4. N.D.Vohra, Business Statistics, Tata McGraw Hill, 2012.

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

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

15PYZ01- NANOMATERIALS
(Common to All Branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To provide basic knowledge about nanomaterials
- To understand the properties of nanomaterials and the mechanisms used in characterization
- To provide in-depth knowledge in characterization of nanomaterials in engineering and biology.
- To provide knowledge various testing mechanisms adopted for nanomaterials
- To understand the ways of full utilization of nanomaterials in various fields

COURSE OUTCOMES:

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

CO1 : Acquire knowledge of basics of nanomaterials
CO2 : Understand the peculiar properties of nanomaterials
CO3 : Know the various microscopy techniques involved in analysis of nanomaterials
CO4 : Understand the synthesis of different types of nanomaterials
CO5 : Appreciate the application of nanomaterials in engineering and biology

UNIT I - FUNDAMENTAL PRINCIPLES OF NANOMATERIALS **(9)**

Size & scale, units, scaling Laws, atoms, molecules & clusters, super molecules, nanoscale phenomena; Tunneling, Chemical Bonds (types and strength); Intermolecular forces, molecular and crystalline structures; Hierarchical structures and functionality; Surfaces and interfaces, bulk to surface transition, self-assembly and surface reconstruction.

UNIT II – PROPERTIES OF NANO MATERIALS **(9)**

Size dependence of properties, phenomena and properties at nanoscale; Mechanical/frictional, optical, electrical transport; Magnetic properties.

UNIT III – SYNTHESIS OF NANOMATERIALS **(9)**

Fabrication techniques: Self-assembly, self-replication, sol-gels; Langmuir-Blodgett thin films, nanolithograph, bio-inspired syntheses, microfluidic processes; Chemical vapor deposition; Semiconductors, cadmium sulfide, silicon, fullerenes carbon nanotubes; Nano-composites, nanoporous materials, biological materials.

UNIT IV –NANOMATERIAL CHARACTERIZATION **(9)**

Electron microscopy, scanning probe microscopies, near field microscopy, micro- and near field Raman spectroscopy, surface-enhanced Raman, spectroscopy, X-ray photoelectron spectroscopy.

UNIT V –APPLICATIONS OF NANOMATERIALS **(9)**

Nanoelectronics, Nanosensors, environmental, biological, energy storage and fuel cells.

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1 Edelstein A. A. and Cammarata R .C., "Nanomaterials- Synthesis, Properties and Applications", Institute of Physics Publishing, 1998.
2 Nalwa H.S., "Handbook of Nanostructured Materials and Nanotechnology", Vols. 1- 5, Academic Press 2000.

REFERENCES:

1. Benedek et al G., "Nanostructured Carbon for Advanced Applications", Kluwer Academic Publishers 2001.

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

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

15PYZ02- NUCLEAR PHYSICS AND REACTORS
(Common to All Branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To provide knowledge of building block of nature –Nuclei –and its interaction with light
- To provide knowledge about the various reactors and power generation
- To empower knowledge in core science of reactor designing.
- To provide the understanding of different types of reactors
- To provide understanding of effective methods to utilize the nuclear energy

COURSE OUTCOMES:

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

CO1 : Acquire knowledge regarding fundamentals of nuclear reactions
CO2 : Understand the interaction of light with matter
CO3 : Acquire the knowledge about power generation form nuclear reactions
CO4 : Understand the mechanisms involved in reactor designing
CO5 : Enhance knowledge of thermal energy generation and reactor safety

UNIT I - STRUCTURE OF NUCLEI AND REACTIONS **(9)**

Fundamental particles, structure of nuclei; Binding Energy – nuclear stability – radioactive decay-nuclear reactions

UNIT II – INTERACTION OF RADIATION WITH MATTER **(9)**

Neutron interactions- energy loss in scattering collisions. Nuclear fission reaction- gamma ray interaction with matter-charged particles.

UNIT III – NUCLEAR REACTOR AND NUCLEAR POWER **(9)**

Fission chain reaction – reactor fuels. Nuclear power resources- power plants –nuclear reactors

UNIT IV–NUCLEAR REACTOR THEROY **(9)**

One group reactor equation –slab reactor –thermal reactor –reflected reactor

UNIT V –HEAT REMOVAL FROM NUCLEAR REACTORS **(9)**

Heat generations in reactors – heat flow in reactors, heat transfer mechanism. Radiation shielding: Gamma ray shielding, nuclear reactor shielding.

TOTAL (L:45) : 45 PERIODS

TEXT BOOK:

1. Leroy Murray Raymond, :Nuclear Reactor Physics", Prentice Hall

REFERENCE:

1. R. Lamarsh John, J. Baratta Anthony, "Introduction to Nuclear Engineering".

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

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

Approved by Seventh Academic Council

15PYZ03- SPACE SCIENCE AND TECHNOLOGY
(Common to All Branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To provide basics of space technology
- To give a knowledge of Space transportation systems
- To provide the understanding of transportation and satellite communication
- To understand the various space programs undertaken by international organizations
- To provide knowledge of application of space technology and manned missions

COURSE OUTCOMES:

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

CO1 : Acquire knowledge about classical theory of satellite orbits.
CO2 : Understand the rocket transportation to space.
CO3 : Acquire the applications of satellite communication and navigation.
CO4 : Appreciate the applications of space technology changed human life.
CO5 : Understand the importance of manned mission.

UNIT I - EARTH AND ORBITING SATELLITES **(9)**

Basic principles -Keplerian orbits and Kepler equations. Orbital elements, from velocity and position information. Perturbation theory and applications, Data receiving and handling

UNIT II – ROCKETS AND ROCKET PROPULSION **(9)**

Rockets and rocket propulsion, liquid fuels, solid fuels, Electromagnetic propulsion, Ion propulsion, Important satellite launching stations –Facilities at !SRO, NASA and ESRO Russian and Chinese facilities.

UNIT III – SATELLITE COMMUNICATION AND GPS **(9)**

Earth to satellite communication, Laser communication, Satellite to satellite communication Global navigation satellite systems, Application of GPS systems.

UNIT IV – APPLICATIONS OF SPACE TECHNOLOGY **(9)**

Physics of the earth's space, Solar observations in infrared, visible and X-rays, Communication satellite and applications, Earth resource monitoring, Remote sensing and others, Hubble space telescope. Military, applications, Weather satellite and applications.

UNIT V – MANNED FLIGHTS **(9)**

Manned flights to moon, Manned orbiting space crafts, NASA Space shuttles, Immunology and infection in space, The ISS and application, Russian space crafts, Skylab.

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

2. Space Science and Technology by Hans Mark, John Wiley and Sons.
3. The Cambridge encyclopedia of Space, missions, applications and exploration by Verger et at, Cambridge University Press 2003

REFERENCE BOOKS :

1. Space environment and it's interaction with spacecraft by C. Uberoi and S.C. Chakravorty, IISc — ISRO Educational Program
2. Introduction to GPS the global positioning system by El-Rabbany, Ahmed, London: Artech house

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

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

15CYZ01-CHEMISTRY FOR ENGINEERS
(Common to all branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

- Basic information and applications of chemistry in daily life.
- Imparting knowledge on basic concepts and applications of thermodynamics
- To know about the chemistry of building materials.
- To understand the concepts of phase rule and alloys
- To understand the principles and applications of photochemistry and nuclear chemistry.

COURSE OUTCOMES:

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

CO6 : Identify the role and importance of chemistry in daily life.
CO7 : Understand the thermodynamic and predict the feasibility of chemical reactions.
CO8 : Use the modern engineering tools for building materials and their industrial applications
CO9 : Acquire the knowledge of industrial importance of phase rule and alloys.
CO10 : Outline the principles and applications of photochemistry and nuclear chemistry.

UNIT I : CHEMISTRY IN DAILY LIFE **(9)**

Introduction – role and importance of chemistry in day to day life - Food additives - Fruits - vegetables - milk and egg - constituents and benefits - chemistry of soft drinks – adulterants - simple tests for the identification of adulterants in food stuffs – Fats and Oils – difference – analysis of fats and oils – saponification number – iodine number – principle and applications of green chemistry – safer solvents and auxiliaries

UNIT II : THERMODYNAMICS **(9)**

Thermodynamic process (isothermic, isobaric, isochoric and adiabatic process) – Internal energy – First law of thermodynamics (Mathematical derivation and limitation) – Enthalpy – Second law of thermodynamics - Entropy – Entropy change of an ideal gas and problems - Free energy - work function – Gibbs Helmoltz equation (derivation - applications –Third law and zeroeth law (only statements) – Van't Hoff isotherm (derivation only)

UNIT III : CHEMISTRY OF BUILDING MATERIALS **(9)**

Lime – classification – manufacture - properties of lime – Cement – classification – Portland cement – chemical composition – manufacture – setting and hardening – analysis of cement – concretes – weathering of concrete - special cements - gypsum – plaster of Paris – Glass – manufacture - types - properties and uses .

UNIT IV : PHASE RULE AND ALLOYS **(9)**

Statement and explanation of terms involved – one component system – water system – condensed phase rule – construction of phase diagram by thermal analysis – simple eutectic systems (lead – silver system only).

Alloys: Introduction- Definition- Properties of alloys- significance of alloying, Functions and effect of alloying elements - ferrous alloys – nichrome and stainless steel – heat treatment of steel, non-ferrous alloys – brass and bronze.

UNIT V : PHOTOCHEMISTRY & NUCLEAR CHEMISTRY **(9)**

Photochemistry: Laws of photochemistry–Einstein law and Lambert- Beer Law. Quantum efficiency – determination - Photo processes – Fluorescence - Phosphorescence, Chemiluminescence and Photo-sensitization. Nuclear chemistry**:** Nuclear decay – Half life period – Nuclear fission and fusion – Nuclear reactors – light water nuclear power plant – Applications of radioactivity.

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co.,New Delhi , 2012.
2. Ravikrishnan A., "Engineering Chemistry", Sri Krishna Hi-tech Publishing Company Pvt. Ltd.,Chennai, 2015.

REFERENCES:

1. Dara S.S.Umare S.S, “Engineering Chemistry”, S. Chand& Company Ltd., New Delhi 2014.
2. Puri B.R., Sharma L.R. and Pathania M.S., Principles of physical chemistry, ShobanLal Nagin Chand & Co., New Delhi
3. K. Karunakaran et al., “Engineering Chemistry”, Sonaversity, Sona College of Technology,Salem, 2014.

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

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

15CYZ02- SOIL CHEMISTRY
(Common to all branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To build fundamental knowledge and skills of the students within the different areas of soil chemistry.
- To familiarize the students with the origin of soil, properties of soil and soil forming processes.
- To identify and describe physical, chemical and biological properties of soil that affect agricultural and non-agricultural land.
- To impart basic knowledge on pesticides and fertilizers
- To understand the basic concepts of biomass energy production from wastes.

COURSE OUTCOMES:

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

CO1 : Gain the fundamental knowledge about soil chemistry
CO2 : Understand the properties of soil.
CO3 : Understand the impact of soil fertility in agricultural processes.
CO4 : Gain the knowledge about pesticides and fertilizers.
CO5 : Apply the knowledge to develop energy recovering technology from bio wastes.

UNIT I : SOIL INTRODUCTION **(9)**

Soil – definition – Composition of soil - classification of soils – Soil forming rocks and minerals – Soil forming factors and processes –Chemical weathering–hydration–oxidation–reduction–hydrolysis–solution method.

UNIT II : SOIL PROPERTIES **(9)**

Important physical properties of soil – Soil texture – bulk density – particle density and soil porosity– their importance – Ion exchange in soil – anion exchange capacity – cation exchange capacity – Soil colloids – definition – types – soil inorganic colloids –layer silicate clays – amorphous minerals

UNIT III : SOIL FERTILITY AND BIO FERTILIZERS **(9)**

Soil organic matter – its composition and decomposition – effect of soil organic matter on soil fertility – Humus – formation of humus – maintenance of humus – Bio fertilizers – Introduction – types – importance – Nitrogen fixer – rhizobium – algal bio fertilizers – cyanobacteria.

UNIT IV : PESTICIDES AND FERTILIZER CHEMISTRY **(9)**

Pesticides – classification – Chloro pesticides (Methoxychlor) – organophosphorus pesticides (Parathion) – carbamate pesticides (corbaryl) – Fertilizers – nitrogen fertilizers (urea, ammonium nitrate) – phosphorus fertilizers (single super phosphate, triple super phosphate) – potassium fertilizers (potassium sulphate) – NPK fertilizers (diammonium phosphate)

UNIT V : AGRICULTURAL WASTE AS A BIOMASS **(9)**

Bioenergy from wastes – Introduction – agricultural wastes – sources – utilization as a fuel – Bio chemical conversion of organic wastes – anaerobic digestion – methane production – thermal liquefaction –liquid fuel production – sludge treatment – activated sludge process

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. Brady, N.C and Weil, R.R 2012. The Nature and properties of Soils (13th Ed.). Pearson Education.
2. Clair N Sawyer, Perry I. Mc Carty, Gene F Parkin, Chemistry for Environmental engineering and science, Tata Mc graw – Hill Edition, 2014.

REFERENCES:

1. A text book of Bio technology by S.C.Bhatia, Atlantic publishers – 2015.
2. Samuel L. Disdale, Werner L. Nelson, James D. Beaton, Soil fertility and fertilizers, 8th Edition, Pearson Publishers, 2013.
3. Biofuels from agricultural wastes and Byproducts by Hans Blascheck, Thaddeus Ezeji, Jurgen Scheffran John Wiley & Sons, 2010.

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

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

15CYZ03 - ORGANIC CHEMISTRY
(Common to all branches)

L	T	P	C
3	0	0	3

OBJECTIVES

- To understand the basic concepts of organic chemistry.
- To study the type of components in which organic reaction take place.
- To know the preparation ofthe essential organic compounds.
- To impart knowledge on synthetic routes to many types of industrially important organic compounds and their characterization.
- To gain knowledge on carbohydrates, amino acids and proteins

COURSE OUTCOMES

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

CO1 : Apply knowledge of fundamental concepts of organic chemistry.
CO2 : Gain basic principles involved in different chemical synthesis and apply them in chemical industries.
CO3 : Outline the importance of pharmaceutical chemistry.
CO4 : Discuss carbohydrates, amino acids and proteins.
CO5 : Knowledge on various reaction mechanisms, preparation of organic compounds and their properties.

UNIT I : REACTIONS AND REAGENTS **(9)**

Organometallic compounds – Grignard reagent- synthesis of different types of compounds like - alchohol - aldehyde – acid- amine - Acetoacetic ester – tautomerism – base hydrolysis – acid hydrolysis- malonic ester - cyano acetic ester – synthesis of dicarboxylic acids – oxalic acid – succinic acid.

UNIT II : CARBOHYDRATES **(9)**

Monosaccharide - definition – classification - glucose – synthesis and chemical properties of glucose - Disaccharides - definition – classification - sucrose - synthesis and chemical properties of sucrose - Polysaccharides - definition – classification - cellulose - synthesis and chemical properties of cellulose - derivatives of cellulose.

UNIT III : AMINO ACIDS AND PROTEINS **(9)**

Proteins – definition – classification of amino acid - synthesis of alpha amino acid– chemical properties of alpha amino acid – Proteins – classification of proteins - chemical properties of proteins - structure of proteins - denaturation of proteins – colour test of proteins.

UNIT IV : HETEROCYCLIC COMPOUNDS **(9)**

Preparation, physical and chemical properties and uses of pyrrole –furan – thiophene- indole- pyridine – quinoline.

UNIT V : PHARMACEUTICAL CHEMISTRY **(9)**

Synthesis of malonylurea – phenacetin – isoniazid - p-amino benzoic acid (PABA)- chloroquine – sulphaniliamide.

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. Morrison.R.T, & Boyd R, “Organic Chemistry” Edn., Prentice Hall India Pvt. Ltd. New Delhi, 2014
2. I.L. Finar “Organic Chemistry” Volume. 1, Sixth Edition, 2012.

REFERENCES:

1. Tewari. K.S, Vishnoi.N.k, Malhotra S.N., A Text Book of Organic Chemistry, Vikas publishing House Pvt. Ltd., New Delhi, 1986
2. Lakshmi. S, Pharmaceutical Chemistry First Edition (1995), Sultan Chand and Sons,New Delhi
3. P.L.Soni, A Text Book of organic Chemistry, Sultan Chand and Sons publishing Pvt. Ltd., 18th edition(1985).

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

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