NANDHA ENGINEERING COLLEGE

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

Curriculum and Syllabi
for
B.E – Electronics and Communication Engineering [R15]
(5th to 8th Semesters)

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

JUNE 2018

Approved by Sixth Academic Council

ECE Department PEOs and POs

PROGRAMME EDUCATIONAL OBJECTIVEs:

PEO1: To inculcate the ethical values for professional development of the students to solve complex problems and attain solutions leading to societal benefits.

PEO2: To empower the technical ability and contemporary knowledge of the students to achieve professional skills and ensure the leadership qualities through soft skill training.

PEO3: To enable the students to adapt to emerging technologies through self learning and analysis in the area of Electronics and Communication.

PEO4: T o continue their education in leading graduate programs in engineering and interdisciplinary areas to emerge as researchers, experts and educators.

PEO5: To excel their careers by being a part of success and growth of an organization with which they are associated.

PROGRAM OUTCOMES:

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

GRADUATE ATTRIBUTEs	PO No.	PROGRAMME OUTCOMEs
Engineering Knowledge	PO1	An ability to apply knowledge of mathematics, sciences, semiconductor theory to solve problems in the area of Signal processing, Embedded systems, VLSI & Communication systems
Problem Analysis	PO2	An ability to identify, formulate and analyze complex Electronics & Communication problems in the real world.
Design and Development of Solutions	PO3	An ability to design system components or process to meet desired needs within realistic constraints such as economic, environmental, social, ethical and sustainability.
Investigation of Complex Problems	PO4	An ability to conduct experiments, analyze and interpret experimental results to provide valid conclusion.
Modern Tool Usage	PO5	An ability to apply techniques, skills and modern engineering tools required for ECE applications.
The Engineer and Society	PO6	An ability to perform in multidisciplinary areas.
Environment and Sustainability	PO7	An ability to understand the impact of ECE solutions in a global, economic, environmental and societal context.
Ethics	PO8	An ability to apply professional and ethical principles with responsibility.
Individual and T eam Work.	PO9	An ability to function in multidisciplinary teams exhibiting innate abilities towards team building.
Communication	PO10	An ability to communicate effectively.
Lifelong Learning	PO11	An ability to engage in independent and lifelong learning in the broadest context of technological change.
Project Management and Finance	PO12	An ability to apply, design and implement application oriented projects.

PROGRAMME SPECIFIC OUTCOMES:

PSO1: Apply a systematic approach to the solution of problems in the field of Electronics and Communication Engineering.

PSO2: Engage in lifelong learning, commitment to quality and continuous improvement.

PSO3: Ability to work in multidisciplinary groups

PSO4: Design applications related to Signal Processing, Computer Networks and Communication

NANDHA ENGINEERING COLLEGE (AUTONOMOUS), ERODE – 638 052

REGULATIONS – 2015 CHOICE BASED CREDIT SYSTEM

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULAM: I - VIII SEMESTERS SYLLABUS: V to 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 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.	15CSC01	Problem solving and C programming	ES	3	3	0	0	3
6.	15EC101	Electronic Devices	PC	3	3	0	0	3
PRACTICALS								
7.	15GY111	Physics and Chemistry Laboratory I	BS	4	0	0	4	2
8.	15GY112	Soft Skills - I	EEC	2	0	0	2	1
9.	15CSC11	Computer Programming Laboratory	ES	2	0	0	2	1
10.	15GYC11	Engineering Practices Laboratory	ES	4	0	0	4	2
			TOTAL	32	16	2	14	24

SEMESTER: II								
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15EY201	Professional English	HS	3	1	0	2	2
2.	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.	15MEC01	Engineering Graphics	ES	4	2	0	2	3
6.	15EC201	Circuit T heory	PC	3	3	0	0	3
PRACTICALS								
7.	15GY211	Physics and Chemistry Laboratory II	BS	4	0	0	4	2
8.	15GY212	Soft Skills - II	EEC	2	0	0	2	1
9.	15EC211	Circuits and Devices Laboratory	PC	4	0	0	4	2
			TOTAL	31	15	2	14	23

SEMESTER: III								
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15MY303	T ransform Techniques and Partial Differential Equations	BS	5	3	2	0	4
2.	15EE305	Electrical Engineering	ES	3	3	0	0	3
3.	15IT 306	Data Structures and Algorithms	ES	3	3	0	0	3
4.	15EC301	Digital Logic Design	PC	3	3	0	0	3
5.	15EC302	Signals and Systems	PC	5	3	2	0	4
6.	15EC303	Electronic Circuits-I	PC	3	3	0	0	3
PRACTICALS								
7.	15IT 314	Data Structures and Algorithms Laboratory	ES	4	0	0	4	2
8.	15EC311	Digital Logic Design Laboratory	PC	4	0	0	4	2
9.	15EC312	Electronic circuits-I Laboratory	PC	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.	15MY403	Probability, Random Processes and Numerical Methods	BS	5	3	2	0	4
2.	15EC401	Measurements and Instrumentation	PC	3	3	0	0	3
3.	15EC402	Analog Circuit Design	PC	3	3	0	0	3
4.	15EC403	Electromagnetic Fields	PC	5	3	2	0	4
5.	15EC404	Microprocessors and its applications	PC	3	3	0	0	3
6.	15EC405	Electronic Circuits - II	PC	3	3	0	0	3
PRACTICALS								
7.	15EC411	Analog Circuit Design Laboratory	PC	4	0	0	4	2
8.	15EC412	Electronic circuits - II and Simulation Laboratory	PC	4	0	0	4	2
9.	15GYC12	Soft Skills – Listening and Speaking	EEC	2	0	0	2	0
			TOTAL	32	18	4	10	24

SEMESTER: V								
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15EC501	Analog Communication	PC	3	3	0	0	3
2.	15EC502	Microcontroller and Interfacing	PC	3	3	0	0	3
3.	15ECC01	Digital Signal Processing	PC	3	3	0	0	3
4.	15EC503	Transmission Lines and Waveguides	PC	3	3	0	0	3
5.	EI	Elective I (PE)	PE	3	3	0	2	4
6.	EII	Elective II (PE)	PE	3	3	0	0	3
PRACTICALS								
7.	15EC511	Microprocessors and Microcontrollers Interfacing Laboratory	PC	4	0	0	4	2
8.	15EC512	Digital Signal Processing Laboratory	PC	4	0	0	4	2
9.	15GY511	Soft Skills Aptitude and Reasoning-I	EEC	2	0	0	2	0
			TOTAL	28	18	0	10	22

SEMESTER: VI								
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15EC601	Digital Communication	PC	3	3	0	0	3
2.	15ECC02	VLSI Design	PC	3	3	0	0	3
3.	15EC602	Antenna and Wave Propagation	PC	5	3	2	0	4
4.	15GEC01	Principles of Management	PC	3	3	0	0	3
5.	EIII	Elective III (PE)	PE	3	3	0	0	3
6.	EIV	Elective IV (PE)	PE	3	3	0	0	3
PRACTICALS								
7.	15EC611	Communication System and Networks Laboratory	PC	4	0	0	4	2
8.	15EC612	VLSI Design Laboratory	PC	4	0	0	4	2
9.	15GY611	Soft Skills Aptitude and Reasoning-II	EEC	2	0	0	2	0
10.	15GE611	Comprehension	ES	2	0	0	2	1
			TOTAL	32	18	2	12	24

SEMESTER: VII								
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	15EC701	Microwave Engineering	PC	3	3	0	0	3
2.	15EC702	Embedded and Real Time Systems	PC	3	3	0	0	3
3.	E V	Elective V (PE)	PE	3	3	0	0	3
4.	E VI	Elective VI (PE/OE)	PE/OE	3	3	0	0	3
5.	E VII	Elective VII (OE)	OE	3	3	0	0	3
PRACTICALS								
6.	15EC711	Microwave and Optical Laboratory	PC	4	0	0	4	2
7.	15EC712	Embedded Systems Laboratory	PC	4	0	0	4	2
8.	15GE711	Personality and Character Development	EEC	2	0	0	1	0
			TOTAL	25	15	0	9	19

SEMESTER: VIII								
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1.	E 6	Elective VI (PE)	PE	3	3	0	0	3
2.	E 7	Elective VII (OE)	OE	3	3	0	0	3
PRACTICALS								
3.	15EC831	Project work	EEC	24	0	0	24	12
			TOTAL	30	6	0	24	18

TOTAL NO. OF CREDITS: 180

PROFESSIONAL ELECTIVES (PE)								
SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	15ECX01	Medical Electronics	PE	3	3	0	0	3
2.	15ECX02	Digital Image Processing	PE	3	3	0	0	3
3.	15ECX03	Radar and Navigational Aids	PE	3	3	0	0	3
4.	15ECX04	Sensor and its Applications	PE	3	3	0	0	3
5.	15ECX05	Computer Hardware Interfacing	PE	3	3	0	0	3
6.	15ECX06	Control Systems Engineering	PE	3	3	0	0	3
7.	15ECX07	Nano Electronics	PE	3	3	0	0	3
8.	15ECX08	MEMS and its Application	PE	3	3	0	0	3
9.	15ECX09	High Speed Networks	PE	3	3	0	0	3
10.	15ECX10	Advanced Microprocessors and Microcontrollers	PE	3	3	0	0	3
11.	15ECX11	Wireless Sensor Networks	PE	3	3	0	0	3
12.	15ECX12	Telecommunication Switching and Networks	PE	3	3	0	0	3
13.	15ECX13	Multimedia Compression T echniques	PE	3	3	0	0	3
14.	15ECX14	Satellite Communication	PE	3	3	0	0	3
15.	15ECX15	Data Communication and Network	PE	3	3	0	0	3
16.	15ECX16	Wireless Communication	PE	3	3	0	0	3
17.	15ECX17	Optical Communication	PE	3	3	0	0	3
18.	15IT 503	Object Oriented Programming Concepts	PE	3	3	0	0	3
19.	15IT 504	Fundamentals of Java Programming	PE	3	3	0	0	3
20.	15IT C01	Internet of T hings	PE	3	3	0	0	3
21.	15GEC03	Professional Ethics and Human Values	PE	3	3	0	0	3
22.	15GEC04	Total Quality Management	PE	3	3	0	0	3
23.	15MAX01	Basic Statistics and Numerical Analysis	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 T hinking	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 Structure	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 COURSES

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	0	0	0	3	0	0	10
2.	BS	12	9	4	4	0	0	0	0	29
3.	ES	6	3	8	0	0	0	0	0	17
4.	PC	3	5	14	20	16	14	10	0	82
5.	PE	0	0	0	0	6	6	6	3	21
6.	OE	0	0	0	0	0	0	3	3	6
7.	EEC	1	1	0	0	0	1	0	12	15
CREDITS TOTAL		24	23	26	24	22	24	19	18	180

Approved by Sixth Academic Council

15EY101 COMMUNICATIVE ENGLISH
(COMMON TO B.E/B.TECH)

L	T	P	C
1	0	2	2

OBJECTIVES:

To enable students

- 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 OUTCOME:

On completion of this course the students will be able to

CO1. Achieve proficiency in English.
CO2. Develop their professional communication skills.
CO3. Reproduce sentences in written and spoken form.
CO4. Express themselves and their relationships with others and their world.

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

15MY103 LINEAR ALGEBRA AND MULTIVARIABLE CALCULUS

(Common to EEE,ECE and EIE 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 student 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.
3. Bali.N.P., Manish Goyal," Engineering Mathematics", University Science Press, New Delhi, First Edition,2012.
4. Venkatasubramanian. N.K.,"Engineering Mathematics",Vikas Publishing House Private Ltd,(2000).
5. ManicavachagomPillai T.K., Natarajan T., Ganapathy K.S., "Algebra", Viswananthan Publishers.

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	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	

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

15CY101 - ENGINEERING CHEMISTRY
(Common to 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 student 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 – conducto metric 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, eflon 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 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
2	x		x			x	x					x
3	x		x			x	x					x
4	x					x	x	x				x
5	x		x	x				x			x	

15CSC01- PROBLEM SOLVING AND C PROGRAMMING

(Common to All Branches except CSE & IT)

L	T	P	C
3	0	0	3

OBJECTIVES :

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

COURSE OUTCOMES:

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

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

UNIT-1: INTRODUCTION TO COMPUTERS **(9)**

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

UNIT-2: 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-3: CONTROL STRUCTURES AND ARRAYS **(9)**

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

UNIT-4: 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-5: 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 PERIODS

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Yashavant Kanetkar, "Let us C", BPB publications, New Delhi, 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	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

15EC101 – ELECTRONIC DEVICES

L	T	P	C
3	0	0	3

OBJECTIVE:

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

COURSE OUTCOMES:

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

CO1 : Understand the operation and characteristics of PN junction diodes.
CO2 : Acquire the knowledge in bipolar junction transistor.
CO3 : To study and analyze the performance of FETs on the basis of their operation and working.
CO4 : Gain knowledge of special semiconductor devices.
CO5 : Apply gained knowledge to extend the real time applications.

UNIT I - SEMICONDUCTOR DIODE **(9)**

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

UNIT II - BIPOLAR JUNCTION TRANSISTIOR **(9)**

NPN and PNP – Junctions - Early effect - Current equations – Input and Output characteristics of CE, CB, CC Configurations - Hybrid -π model - Ebers Moll Model - Transistor as an amplifier.

UNIT III -FIELD EFFECT TRANSISTORS **(9)**

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

UNIT IV - SPECIAL SEMICONDUCTOR DEVICES **(9)**

Metal-Semiconductor Junction – MESFET – Schottky barrier diode - Zener diode - Varactor diode – Tunnel diode – PIN diode - LASER diode - LDR.

UNIT V - POWER DEVICES AND DISPLAY DEVICES **(9)**

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

TOTAL (L: 45) = 45 PERIODS

TEXT BOOK:

1. S. Salivahanan, N. Suresh kumar and A. Vallavanraj, “Electronic Devices and Circuits”, Tata McGraw Hill

1. David A. Bell, “Electronic Devices and Circuits”, Oxford University Press, Fifth Edition, (2008).
2. Jacob Millman & Christos C. Halkias, “Electronic Devices and Circuits”, McGraw Hill, 2nd Edition, 2007.
3. R.L. Boylestad & L. Nashelsky, “Electronic Devices and Circuit Theory”, PHI Learning Private Limited, Ninth Edition, 2008.

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

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

15GY111 - PHYSICS AND CHEMISTRY LABORATORY- 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 student will be able to

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

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

CO3 : Analyze the properties of matter with sound waves.

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

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

LIST OF EXPERIMENTS:

PHYSICS LABORATORY- I

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

CHEMISTRY LABORATORY- I

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

TOTAL (P:60) = 60 PERIODS

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

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

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 would be able to

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

CO2 : Understand various manufacturing processes

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

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

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

GROUP-A (MECHANICAL AND CIVIL ENGINEERING)

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

Buildings:

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

Plumbing Works:

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

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

Carpentry using Power Tools only:

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

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

Welding:

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

Basic Machining:

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

Sheet Metal Work:

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

GROUP - B (ELECTRICAL AND ELECTRONICS)

ELECTRICAL ENGINEERING PRACTICE **(15)**

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

ELECTRONICS ENGINEERING PRACTICE **(15)**

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

TOTAL (P:60) : 60 PERIODS

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

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

Approved by third Academic council

15EY201 PROFESSIONAL ENGLISH
(COMMON TO B.E/B.TECH)

L	T	P	C
1	0	2	2

OBJECTIVES:

To enable students

- 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 OUTCOME:

On completion of this course the students will be able to

CO1. Analysis and reproduce the grammar exercises
CO2. Listen and articulate effectively.
CO3. Use language to shape and make meaning according to purpose, audience and context.
CO4. Think in ways that is imaginative, creative, interpretive and critical.

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=45 PERIODS

TEXT/ REFERENCES BOOKS

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

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

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

On completion of this course the students will be able to

CO1 : Acquire knowledge about conductors, semiconductors and super conductors.
CO2 : Distinguish between conductors, semiconductors and super conductors.
CO3 : Classify the intrinsic and extrinsic semiconductors.
CO4 : Understand the dielectrics and its applications.
CO5 : To get the knowledge about fabrication of integrated circuits
CO6 : 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 – Weidman-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 electron.

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 super conductors – 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 Mlloys (SMA): Characteristics, properties of NiTi alloy, application, 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 application.

TOTAL = 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 Outcome and Programme Outcomes

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

Approved by third Academic council

15CY201 - ENVIRONMENTAL SCIENCE AND ENGINEERING

(Common to All Branches)

L	T	P	C
3	0	0	3

OBJECTIVES:

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

COURSE OUTCOMES:

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

CO 1: Design a system, component, or process to meet desired needs.
CO 2 :Identify, formulate, and solve environmental engineering problems
CO3: Understand the professional and ethical responsibility as related to the practice of environmental engineering and the impact of engineering solutions in a global context.
CO 4: 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												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x			x					x	x
2	x		x			x	x					x
3	x		x			x	x					x
4	x					x	x	x				x
5	x		x	x				x			x	

15MEC01 - ENGINEERING GRAPHICS

(Common to All Branches except MECH.)

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	12
1	x	x	x		x	x	x				x	
2					x	x						
3	x	x				x				x	x	
4	x	x			x					x	x	
5		x				x				x		x

15EC201 - CIRCUIT THEORY

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce the concepts and investigate the behavior of electric circuits by analytical techniques.
- To identify the transient and steady state response of the circuits subjected to step and sinusoidal Excitations.
- To identify the methods of circuit analysis using Network theorems. .

COURSE OUTCOMES:

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

CO1 : the Network Reduction of DC Electric circuits.
CO2 : the Network Reduction of AC Electric circuits.
CO3 : Design Series and Parallel resonance.
CO4 : Understand Transient response of RL, RC and RLC Circuits.
CO5 : Design of Two port networks with Z.Y and Z parameters.

UNIT I - BASIC CIRCUITS ANALYSIS (9)

Ohm"s Law – Kirchhoff"s laws – DC and AC Circuits – Resistors in series and parallel circuits – Mesh Current and node voltage method of analysis for D.C and A.C. circuits.

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

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

UNIT III- NETWORK THEOREMS FOR AC CIRCUITS (9)

Thevenins and Norton Theorem – Superposition Theorem – Maximum power transfer theorem –Reciprocity Theorem.

UNIT IV - RESONANCE AND COUPLED CIRCUITS (9)

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

UNIT V- TRANSIENT RESPONSE FOR DC CIRCUITS (9)

Transient response of RL, RC and RLC Circuits using Laplace transform method – Characterization of two port networks in terms of Z, Y and h parameters

TOTAL (L: 45) = 45 PERIODS

TEXT BOOK:

1. William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis," 8th edition., Tata McGraw Hill publishers, New Delhi, 2013.

REFERENCES:

1. Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis," Tata McGraw Hill, 2007.
2. Chakrabati A, "Circuits Theory (Analysis and synthesis), Dhanpath Rai & Sons, New Delhi, 1999.
3. Nageswara Rao.T, "Circuit Theory", A.R. Publications, Chennai, 2014.

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

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

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

Approved by third Academic council

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, students shall 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												
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
5						x						

15EC211 - CIRCUITS AND DEVICES LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVE:

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

COURSE OUTCOMES:

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

CO1 : Analyze the characteristics of diodes and transistors.
CO2 : Evaluate the characteristics of electronic devices such as FET, UJT and SCR etc based on their operations.
CO3 : Analyze the characteristics of Clipper, Clamper & rectifiers etc
CO4 : An ability to verify the different theorems such as The venin"s theorem, Norton theorem etc
CO5 : Measure the voltage and frequency using resonance circuits.

LIST OF EXPERIMENTS:

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

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											
4		x		x								x
5			x				x					

15MY303 - TRANSFORM TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS
(Common to B.E-ECE, EEE and 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 transforms techniques.

COURSE OUTCOMES:

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

CO1: Solve the engineering problems in terms of Fourier analysis.
CO2: Know the formation of partial differential equations.
CO3: Apply the partial differential equations to solve the various electrical and electronics application oriented problems.
CO4: Solve the problems using Fourier integral theorem and convolution theorem technique.
CO5: 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: (L45 + 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

1. Goyal. Manish and Bali, N.P, "A Textbook of Engineering mathematics", 6th ed., Laxmi Publication (P) Ltd.
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					

15EE305 - ELECTRICAL ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVE:

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

COURSE OUTCOMES:

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

CO1 : Narrate Constructional details, principle of operation, performance and starters of D.C.Machines.
CO2 : Explicate the Constructional details, principle of operation and testing of Transformer.
CO3 : Describe the Constructional details, principle of operation, starting and speed control of induction Motors.
CO4 : Understand the Constructional details and principle of operation of alternators and special machines.
CO5 : Identify the concepts of Power System transmission and distribution.

UNIT I - D.C. MACHINES (9)

Constructional details – emf equation – Methods of excitation – Self and separately excited generators – Characteristics of series, shunt and compound generators –Principle of operation of D.C. motor – Back emf and torque equation – Characteristics of series, shunt and compound motors - Starting of D.C. motors – Types of starters.

UNIT II - TRANSFORMERS (9)

Constructional details – Principle of operation – emf equation – Transformation ratio –Transformer on no load – Equivalent circuit –Transformer on load – Regulation - Testing – open circuit and short circuit tests.

UNIT III - INDUCTION MOTORS (9)

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

UNIT IV – SYNCHRONOUS AND SPECIAL MACHINES (9)

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

UNIT V – TRANSMISSION AND DISTRIBUTION (9)

Structure of electric power systems – EHVAC and EHVDC transmission systems – Substation layout 66/11KV– Types of Insulators – Types of cables.

TOTAL :(L: 45)= 45 PERIODS

TEXT BOOKS:

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

REFERENCES:

S.K.Bhattacharya, “Electrical Machines,” Third ed., Tata McGraw Hill publishing company Ltd, 2009.
2. V.K.Mehta and Rohit Mehta, “Principles of Power System,” S.Chand and Company, Fourth (Multicolor) 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								
2				x	x							
3				x	x							
4				x	x						x	x
5			x					x				

15IT306-DATA STRUCTURES AND ALGORITHMS
(Common to ECE, EEE and EIE Branches)

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

UNIT I -INTRODUCTION **(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 HOURS

TEXT BOOKS:

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

REFERENCE BOOKS:

4. Robert Kruse, C. L.Tondo, Bruce Lung, Shashi Magalla"Data Structures and Program Design in C" Pearson Education.
5. A.A.Putnambekar "Data Structures" Technical Publications.

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

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

15EC301 - DIGITAL LOGIC DESIGN

L	T	P	C
3	0	0	3

OBJECTIVES:

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

COURSE OUTCOMES:

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

CO1 : Understand the basic number systems used in digital design.
CO2 : Understand the basic principles of Boolean algebra.
CO3 : Understand the concept of Memories and PLD"s.
CO4 : Design and analyze combinational logic and sequential logic digital circuits
CO5 : Design and Modeling of Combinational and Sequential circuit"s using Verilog.

UNIT I - BOOLEAN ALGEBRA AND GATE-LEVEL MINIMIZATION (9)

Brief review of Digital systems, Binary numbers, Number base conversions, Representation of Negative Numbers, Complements, Binary arithmetic, Axiomatic Definition of Boolean Algebra, Basic Theorems of Boolean Algebra, Boolean Functions-Digital Logic Gates. SOP and POS- Simplification of Boolean Expressions using K-map Method and Quine-McClusky Method. Don"t Care Conditions. NAND and NOR Implementations.

UNIT II - MEMORY AND PROGRAMMABLE LOGIC FAMILIES (9)

Introduction to Memory Devices-ROM, PROM, EPROM, EEPROM- Random Access Memory-Static RAM and Dynamic RAM- Review of RTL, DTL, TTL, ECL, CMOS Logic families - Programmable Logic Array PLA, Programmable Array Logic PAL.

UNIT III - DESIGN AND MODELING OF COMBINATIONAL LOGIC CIRCUITS (9)

Analysis Procedure, Design Procedure, Binary Adder and Subtractor, Binary Multiplier, Code Converters, Magnitude Comparator, Decoders, Encoders, Multiplexers, De-multiplexers, Parity generator and Checker. Hardware Description Language (HDL) - Modeling of above Combinational circuits using Verilog.

UNIT IV – SYNCHRONOUS SEQUENTIAL LOGIC CIRCUITS (9)

Introduction-Storage Elements: Latches, Flip-Flops-SR, D, JK & T, Realization of FFs. Mealy and Moore Models-Design of counters-Ripple counters, Modulo-n counters, Johnson & Ring Counters. Shift Registers-SISO, SIPO, PISO, PIPO.

UNIT V – ASYNCHRONOUS SEQUENTIAL LOGIC CIRCUITS (9)

Introduction- Analysis and Design Procedure - State table and State diagrams, State Reduction Techniques. Design of asynchronous sequential circuits. Races and Cycles- Hazards, Design of Hazard free Circuits. Modeling of Sequential Circuits using Verilog.

TOTAL :(L: 45)= 45 PERIODS

TEXT BOOK:

5. M. Morris Mano & Michael D.Ciletti, "Digital Design with an Introduction to the Verilog HDL," 5th ed., Prentice Hall of India Pvt.Ltd. 2015.

REFERENCES:

4. Stephan D.Brown & Zvonko G.Vranesic, "Fundamentals of Digital Logic with VHDL Design, 2"nd ed, Tata Mc Graw – Hill,2003.
5. Samir Palnitkar, "Verilog HDL: A Guide to Digital Design and Synthesis," Second ed., Prentice Hall, 2009.
6. Thomas L. Floyd & R P Jain, "Digital Fundamentals," 10th ed., PHI, 2011.
7. Ronald J Tocci & Neal S. Widmer, "Digital Systems, Principles and Applications," 10th ed., Pearson education, 2011.
8. Frank Vahid, "Digital Design with RTL Design, Verilog and VHDL," 10th ed., John Wiley and Sons, 2010.

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

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

15EC302 – SIGNALS AND SYSTEMS

L	T	P	C
3	2	0	4

OBJECTIVES:

- To understand the basic properties of signal & systems and its various methods of classification
- To learn Laplace Transform &Fourier transform and their properties
- To know Z transform & DTFT and their properties
- To characterize LTI systems in the Time domain and various Transform domains

COURSE OUTCOMES:

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

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

UNIT I - CLASSIFICATION OF SIGNALS AND SYSTEMS (9)

Continuous time signals (CT signals) - Discrete time signals (DT signals):Step, Ramp, Pulse, Impulse, Sinusoidal, Exponential, Classification of CT and DT signals : Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals, Operation on CT & DT signals,CT systems and DT systems: Classification of systems – Static & Dynamic, Linear & Nonlinear, Time-variant & Time-invariant, Causal & Noncausal, Stable & Unstable.

UNIT II - ANALYSIS OF CONTINUOUS TIME SIGNALS (9)

Fourier series analysis-spectrum of Continuous Time (CT) signals- Fourier and Laplace Transforms in CT Signal Analysis – Properties of Fourier transform and Laplace.

UNIT III - LINEAR TIME INVARIANT- CONTINUOUS TIME SYSTEMS (9)

Differential Equation-Block diagram representation-impulse response, convolution integrals-Fourier and Laplace transforms in Analysis of CT systems.

UNIT IV - ANALYSIS OF DISCRETE TIME SIGNALS (9)

Baseband Sampling - DTFT – Properties of DTFT - Z Transform - Poles and zeros in Z-plane - Properties of Z Transform: Linearity, time shifting, change of scale, Z-domain differentiation, differencing, accumulation, convolution in discrete time, initial and final value theorems – Inverse Z transform – Long division – partial fraction.

UNIT V - LINEAR TIME INVARIANT-DISCRETE TIME SYSTEMS (9)

Difference Equations-Block diagram representation-Impulse response - Convolution sum- Discrete Fourier and Z Transform Analysis of LTI systems.

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

TEXT BOOK:

4. A.Nagoorkani, "Signals and Systems," Published by Tata McGraw-Hill Education Pvt. Ltd., 2010.

REFERENCES:

3. Alan V.Oppenheim, Alan S.Wilsky and S.Hamid Nawab, "Signals and Systems,"2nd Edition. Prentice-Hall of India.2010.
4. B. P. Lathi, “Principles of Linear Systems and Signals”, Second Edition, Oxford, 2009.
5. R.E.Zeimer, W.H.Tranter and R.D.Fannin, “Signals & Systems - Continuous and Discrete”, Pearson, 2007.
6. John Alan Stuller, “An Introduction to Signals and Systems”, Thomson, 2007.
7. Signals and Systems with MATLAB Applications, Second Edition, Steven T. Karris, Orchard Publications,2006

Mapping of Course Outcomes (COs) and Program 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		x
5		x				x				x	x	

15EC303 ELECTRONIC CIRCUITS - I

L	T	P	C
3	0	0	3

OBJECTIVES:

5. To understand the different biasing techniques of amplifier.
6. To study about small signal analysis of amplifiers.
7. To study about high frequency response of amplifiers.
8. To obtain knowledge about power amplifiers and power supplies.

COURSE OUTCOMES:

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

CO1 : Understand the biasing techniques of amplifier.
CO2 : Analyze the small - signal equivalent circuits of transistors.
CO3 : Analyze the frequency response of amplifiers.
CO4 : Understand the different types of large signal amplifiers.
CO5 : Design the Power Supplies and regulators.

UNIT I - TRANSISTOR BIAS STABILITY (9)

BJT – Need for biasing – Stability factor - Load line and quiescent point. - Different types of biasing circuits - Method of stabilizing the Q point - Bias compensation – Diode, Thermister and Sensistor compensations – Biasing of FET and MOSFET.

UNIT II - MIDBAND ANALYSIS OF SMALL SIGNAL AMPLIFIERS (9)

Method of drawing small-signal equivalent circuit - Midband analysis of single stage amplifiers to obtain gain, input impedance and output Miller"s theorem - Darlington connection and bootstrapping - Multistage amplifiers - Differential amplifiers - CMRR - Use of constant current circuit to improve CMRR.

UNIT III - FREQUENCY RESPONSE OF AMPLIFIERS (9)

Frequency response of amplifiers: cutoff frequencies and bandwidth – Hybrid-π equivalent circuit of BJTs - Gain Bandwidth Product - Frequency response of multistage amplifiers – overall upper and lower cutoff frequencies of multi stage amplifiers - Amplifier rise time and sag and their relation to cutoff frequencies.

UNIT IV - LARGE SIGNAL AMPLIFIERS (9)

Classification of amplifiers; Class A large signal amplifiers - second harmonic distortion; higher order harmonic distortion – transformer coupled class A audio power amplifier - Class B amplifier - push-pull amplifier – distortion in amplifiers – complementary - symmetry (Class B) push-pull amplifier - Class C – Class D – Class S amplifiers.

UNIT V - RECTIFIERS AND POWER SUPPLIES (9)

Classification of power supplies - Rectifiers - Half-wave, full-wave and bridge rectifiers with resistive load - V_{dc} and ripple voltage with C, L, and CLC filters - Voltage multipliers- Voltage regulators - Zener diode regulator- Switched mode power supply (SMPS).

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOK:

1. S. Salivahanan and N. Suresh Kumar, Electronic Devices and Circuits, McGraw Hill Private limited, Fifth Reprint 2014.

REFERENCES:

1. Millman J and Halkias .C, Integrated Electronics, TMH, 2007.
2. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 9th Edition, Pearson Education / PHI, 2007.
2. David A. Bell, Electronic Devices & Circuits, Oxford Higher Education Press, 5th Edition, 2010.
3. B.P. Singh and Rekha Singh, Electronic Devices and Integrated Circuits, Pearson Education, 2006.
4. Rashid M, Microelectronics Circuits, Thomson Learning, 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								
3	x	x		x								
4	x	x	x	x						x		
5	x	x	x	x		x	x			x		

15IT314 - DATA STRUCTURES AND ALGORITHMS LABORATORY

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

LIST OF EXPERIMENTS:

4. a) Singly Linked List b) Doubly Linked List
5. Application of Stack – Conversion of Infix to Postfix
6. Binary Search Tree
7. Tree Traversals
8. Priority Queue Using Heap
9. Dijkstra"s Algorithm
10. Quick Sort
11. a) Linear Search b)Binary Search
12. a) Depth First Search b) Breadth First Search
13. 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												
5												

15EC311 -DIGITAL LOGIC DESIGN LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVE:

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

COURSE OUTCOMES:

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

CO1 : Understand the design concept of Combinational logic circuits.
CO2 : Understand the design concept of Sequential logic circuits.
CO3 : Construct and Implement Adder, Subtractor, Code Converters, Magnitude comparators, Multiplexers and Demultiplexers, Parity generator and checker, Encoder and Decoders
CO4 : Construct and Implement Counters and Shift Registers.
CO5 : Modeling of Combinational and Sequential circuits using Verilog.

LIST OF EXPERIMENTS:

Hardware Experiments:

7. Verification of Basic Logic Gates AND, OR, NOT, NAND, NOR, X-OR and X-NOR.
8. Construct a Half Adder, Full Adder, Half Subtractor, and Full Subtractor using logic gates.
9. Construct a Code Converter circuit.(Binary to gray and BCD to XS-3)
10. Implementation of Magnitude Comparator circuit using logic gates.
11. Construct an Encoder and Decoder circuit using logic gates.
12. Construct a Multiplexer and De-Multiplexer circuit using logic gates.
13. Construct a Parity Generator and Checker circuit using logic gates.
14. Verification of SR, JK, D and T Flip Flops.
15. Design of Synchronous Counter using flip-flops.
16. Design of Shift Registers using flip-flops.

Software Experiments(Using Model Sim)

7. Modeling and Simulation of Combinational circuits using Verilog.
8. Modeling and Simulation of Sequential circuits using Verilog.

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
4		x	x			x				x		
5	x				x						x	x

15EC312-ELECTRONIC CIRCUITS – I LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

- To design and construct amplifiers biasing circuits.
- To verify frequency response and Bandwidth of amplifiers.
- To measure the gain and bandwidth of amplifiers.
- To design power supplies.

COURSE OUTCOMES:

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

CO1 : Design the transistor biasing circuits.
CO2 : Determine the Gain and Bandwidth.
CO3 : Design the power amplifier and determine the Bandwidth.
CO4 : Analyze the performance of various power amplifiers.
CO5 : Design the power supplies.

LIST OF EXPERIMENTS:

2. Design Fixed Bias amplifier circuit using BJT.
3. Design and Construct BJT CE amplifier using Voltage Divider Bias.
4. Design and Construct BJT CC amplifier using Voltage Divider Bias.
5. Construct Darlington Amplifier using BJT and measure its bandwidth.
6. Construct Source Follower with Bootstrapped Gate Resistance.
7. Construct Differential Amplifier using BJT and Calculate CMRR.
8. Construct Cascade Amplifier Circuit and plot the frequency response.
9. Construct Cascode Amplifier Circuit and plot the frequency response.
10. Construct Class - A Amplifier.
10. Class B Complementary Symmetry Power Amplifier.
11. Power Supply Circuit – HWR and FWR with simple filter.

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

15GYC13 - SOFT SKILLS – READING AND WRITING

L	T	P	C
0	0	2	0

OBJECTIVES:

To enable students

- 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, students shall be able to

CO1 : Apply the knowledge to identify the parts of speech and construct the sentences
CO2 : Develop the reading skills through cloze texts, matching and multiple choice modes
CO3 : Interpret effectively through writing for a variety of purposes.

UNIT- I: Grammar **(10)**

Articles – Adjectives – Conjunctions – Prepositions – Idioms & Phrases

UNIT -II: Reading **(10)**

Part I: Matching 7 sentences to four short texts
Part II: Text with sentences missing
Part III: Text with multiple choice questions
Part IV: Text with multiple choice gaps
Part V: Identification of additional unnecessary words in text

UNIT- III: Writing **(10)**

Part I: E-mail writing, Writing short notes, Memo, Agenda & Minutes
Part II: Report Writing, Complaint Letter, Writing Proposals

TOTAL :(P: 30)= 30 PERIODS

REFERENCE:

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

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

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

15MY403 - PROBABILITY, RANDOM PROCESSES AND NUMERICAL METHODS (Use of Normal Distribution table is permitted) **(Common to ECE, EEE and EIE Branches)**

L	T	P	C
3	2	0	4

OBJECTIVE:

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

COURSE OUTCOMES:

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

CO1: Have a well-founded knowledge of standard distributions which can describe real life phenomena
CO2: Acquire skills in handling situations involving more than one random variable and functions of random variables.
CO3: Understand and characterize phenomena which evolve with respect to time in probabilistic manner.
CO4: Apply concept and properties of spectral density function and cross correlation functions.
CO5: Acquire the basic concepts in numerical methods and their applications.

UNIT- I PROBABILITY AND RANDOM VARIABLES (9)

Probability–definition-simple problems-Axioms of probability-Discrete and continuous random variables-Mathematical expectation-Moments-Moment generating functions-Properties-Discrete distributions: Binomial, Poisson distributions – Continuous distributions: Uniform, Normal distributions-Function of one dimensional random variable.

UNIT- II TWO DIMENSIONAL RANDOM VARIABLES (9)

Joint probability distributions-Marginal and conditional distributions -Covariance-Correlation and Regression-Transformation of random variables-Central limit theorem (for independent identically distributed random variables)

UNIT - III RANDOM PROCESSES (9)

Classification-Stationary process:-first order; second order, strictly stationary, wide-sense stationary and ergodic process- Markov process- Transition probabilities - Binomial, Poisson processes-sine wave process-Random telegraph process.

UNIT-IV CORRELATION AND SPECTRAL DENSITIES (9)

Auto correlation-Cross correlation-properties-Power spectral density-Cross spectral density-properties-Wiener-Khintchine relation-Relationship between cross power spectrum and cross correlation function.

UNIT- V NUMERICAL SOLUTION OF ALGEBRAIC AND LINEAR SYSTEM OF EQUATIONS (9)

Newton Raphson method-Direct methods:Gauss elimination method- Gauss jordan method- Iterative method:Gauss seidal method- Eigen value of a symmetric matrix by power method (upto 3×3 matrix)

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

TEXT BOOKS:

6. Veerarajan. T, "Probability, Statistics and Random Processes," 3rd ed., New Delhi, Tata McGraw-Hill, 2015.
7. P Kandasamy .K Thilagavathy and K Gunavathy ., —Numerical Methods – Vol: IV", S.Chand & Co. Ltd. New Delhi, 2015.

REFERENCES:

10. Miller. L, Scott and Childers, G. Donald, "Probability and Random Processes with applications to Signal Processing and communications," Elsevier, 2013.
11. Stark, Henry and Woods, W. John, "Probability and Random Processes with Applications to Signal Processing," 3rd ed., Pearson Education, 2002.
12. Gubner,A.John,"Probability and Random Processes for Electrical and Computer Engineers," Cambridge University press,Newyork,2006.
13. K. Sankar Rao, "Numerical Methods for Scientists and Engineers", 3rd ed., 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										
2		x										
3	x		x									
4	x	x		x								
5	x		x									

15EC401 - MEASUREMENTS AND INSTRUMENTATION

L	T	P	C
3	0	0	3

OBJECTIVES:

- Basic measurement concepts
- Electronic Measuring instruments
- Importance of signal generators and signal analyzers in measurements.

COURSE OUTCOMES:

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

CO1 : Understand the different types of bridges.
CO2 : Known about the working principles of digital instruments.
CO3 : Understand the various signal generators and analyzers.
CO4 : Understand the various types of transducers.
CO5 : Acquire knowledge about elements of data acquisition system.

UNIT- I BASIC MEASUREMENT CONCEPTS (9)

Measurement systems – Static and dynamic characteristics – units and standards of measurements –Errors- types of error- moving coil meters, moving iron meters – Bridge measurements: – Maxwell, Hay, Schering, Anderson and Wien bridge.

UNIT- II ELECTRONIC INSTRUMENTS (9)

Cathode ray oscilloscopes – block schematic – applications –special oscilloscopes: – analog and digital storage oscilloscope, sampling oscilloscope – Q meters – digital voltmeter- frequency counters-Digital multimeter-Digital LCR meter.

UNIT - III SIGNAL GENERATORS AND ANALYZERS (9)

Function generators – pulse and square wave generators, AF signal generators –Sweep generators – Frequency synthesizer – wave analyzer – Harmonic distortion analyzer – spectrum analyzer :- Real time spectrum analyzer, Fourier Analyzer.

UNIT-IV TRANSDUCERS (9)

Classification of Transducers-Variable Resistive transducers-Strain gauges, Thermistor, RTD-Variable Inductive transducers-LVDT-Variable Capacitive Transducers -Capacitor Tachometer-Photo electric transducers - Piezoelectric transducers.

UNIT- V DATA ACQUISITION SYSTEMS (9)

Elements of digital Data acquisition system – Analog and automated data acquisition system, single channel data acquisition system -multi channel data acquisition system –ADC& its types – DAC & its types–Multiplexers- General Telemetring system.

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

14. A.K. Sawhney, „A Course in Electrical & Electronic Measurements & Instrumentation", Dhanpat Rai and Co, 2004.
15. R.K.Rajput-Electronic Measurements and Instrumentation, S.Chand & company LTD, 2009.

REFERENCES:

e. Albert D.Helfrick and William D.Cooper – Modern Electronic Instrumentation and Measurement Techniques, Pearson / Prentice Hall of India, 2007.
f. Ernest O. Doebelin, Measurement Systems- Application and Design, TMH, 2007.
g. B.C. Nakra and K.K. Choudhry, Instrumentation, Measurement and Analysis, 2nd Edition, TMH, 2004.
. 4. Alan. S. Morris, Principles of Measurements and Instrumentation, 2nd Edition, Prentice Hall of India, 2003.

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

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

15EC402 - ANALOG CIRCUIT DESIGN

L	T	P	C
3	0	0	3

OBJECTIVES:

- Describe the Characteristics of the op-amp, Current mirror and current sources.
- Analyze and design operational amplifier applications.
- Describe the operations of analog multiplier, PLLs and their applications.
- Exhibit the characteristics of DAC and ADC circuits.
- Describe the function of special function IC"s

COURSE OUTCOMES:

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

CO1 : Understand the mathematical concepts to characterize and model the circuits using IC 741.
CO2 : Design and troubleshoot simple analog circuits using Op amp, Timer ICs and PLLs.
CO3 : Design the different types of filters.
CO4 : Construct A/D and D/A converters and study their characteristics.
CO5 : Design different types of waveform generators and advanced special function IC"s.

UNIT I - CIRCUIT CONFIGURATION FOR LINEAR ICS (9)

Introduction-Current mirror and current sources, Current sources as active loads, Voltage sources, Voltage References, BJT Differential amplifier with active loads, Ideal operational amplifier, General operational amplifier stages ,IC 741 Op-Amp, Inverting and Non inverting amplifier, slew rate, CMRR, Open and closed loop configurations.

UNIT II - APPLICATIONS OF OPERATIONAL AMPLIFIERS (9)

Sign Changer, Scale Changer, Voltage Follower, V-to-I and I-to-V converters, Summing amplifier, Instrumentation amplifier, Integrator, Differentiator, Logarithmic amplifier, Antilogarithmic amplifier, Comparators, Schmitt trigger, Low-pass, high-pass and band-pass filters, Active filters.

UNIT III - ANALOG MULTIPLIER AND PLL (9)

Analog Multiplier- Applications- Squarer and frequency doubler, Gilbert Multiplier cell – Variable transconductance technique, Operation of the basic PLL,Capture range, Lock in range and Pull in time , Application of PLL for AM detection, FM detection, FSK modulation and demodulation.

UNIT IV - DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS (9)

Introduction- D/A converter – specifications -Binary weighted resistor type, R-2R Ladder type, High speed sample-and-hold circuits, A/D Converters –specifications - Flash type - Successive Approximation type - Single Slope type – Dual Slope type.

UNIT V - WAVEFORM GENERATORS AND SPECIAL FUNCTION IC's (9)

Sine-wave generators, and Triangular wave generator, Saw-tooth wave generator, CL8038 function generator, Timer IC 555- Astable and Monostable operation, IC Voltage regulators – Three terminal fixed and adjustable voltage regulators - IC 723 general purpose regulator -Monolithic switching regulator, Frequency to Voltage and Voltage to Frequency converters, Video Amplifier, Opto-couplers and fibre optic IC.

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOK:

f. S. Salivahanan and V.S. Kanchana Bhaaskaran, "Linear Integrated Circuits", Tata McGraw Hill (2008).

REFERENCES:

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

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

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

15EC403 – ELECTROMAGNETIC FIELDS

L	T	P	C
3	2	0	4

OBJECTIVE:

- To acquire the knowledge of electromagnetic field that allows the students to build a strong foundation to design antennas, waveguides and microwave devices

COURSE OUTCOMES:

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

CO1 : To apply vector calculus to static electric- magnetic fields in different engineering situations.
CO2 : To analyze fields a potentials due to static changes
CO3 : To evaluate static magnetic fields
CO4 : To understand the relation between the fields under time varying situations
CO5 : To acquire knowledge about electromagnetic waves and its polarization.

UNIT I - ELEMENTS OF VECTOR CALCULUS (9)

Introduction to vector calculus-Cartesian, cylindrical, and spherical coordinate systems – Divergence, gradient and curl – Divergence and Stokes' theorems- Coulomb's Law -Gauss Law & its applications.

UNIT II - ELECTROSTATICS (9)

Electric field intensity – Continuous Charge Distribution, Electric Field due to Charge Distribution, Electric Field due to charges distributed uniformly on an infinite, finite line and circular disc. Relationship between potential and electric field– Electric flux density. Current and Current Density – Boundary conditions for electric fields between free space and conductors, and between dielectrics – Poisson's & Laplace's equations.

UNIT III - MAGNETOSTATICS (9)

Biot-Savart 's law, Magnetic field intensity due to finite and infinite line– Ampere's circuital law and its applications– Magnetic flux density – Force on a moving charge (Lorentz force), force on a differential current element, and force between differential current elements (Ampere force law) – Torque on a loop carrying a current I- Magnetic Boundary conditions.

UNIT IV - TIME VARYING ELECTRIC AND MAGNETIC FIELDS (9)

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

UNIT V - ELECTROMAGNETIC WAVES (9)

Derivation of Wave Equation in free space and conducting medium- Wave equation in Phasor form-Reflection of Plane Waves by a perfect dielectric at normal incidence.– Wave polarization: linear, elliptic, and circular polarizations.

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

TEXT BOOK:

g. William H.Hayt and John Buck "Engineering Electromagnetics," 8th Edition, Tata McGraw Hill, New Delhi, 2012.

h. Matthew N.O.Sadiku: "Elements of Engineering Electromagnetics" Oxford University Press, 4th Edition, 2007.

i. E.C. Jordan & K.G. Balmain "Electromagnetic Waves and Radiating Systems." Pearson Education/PHI 4th 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					
4		x	x							x		
5						x					x	x

Approved by Fourth Academic Council

15EC404-MICROPROCESSORS AND ITS APPLICATIONS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To learn the architecture, programming, interfacing and system design of 8085 and 8086
- To introduce the need & use of Interrupts in 8085 & 8086 based systems.
- To develop the programming skill in 8085 & 8086.
- To introduce interfacing of commonly used peripherals and Microprocessor Based system Design.

COURSE OUTCOMES:

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

CO1 : Understand 8085 Microprocessor architecture and interrupt structure
CO2 : Write assembly language programs based 8085 Architecture and Instruction set
CO3 : Understand 8086 Microprocessor Architecture and Instruction set.
CO4 : Design Interfacing various peripherals
CO5 : Design microprocessor and microprocessor based system design.

UNIT 1 ARCHITECTURE OF 8 BIT MICROPROCESSOR (9)

Origin and classification of Microprocessor - 8085 Architecture - Pin configuration – Types of Interrupts - Memory Interfacing- I/O Interfacing – Data transfer protocols : Serial and Parallel

UNIT II PROGRAMMING OF 8 BIT MICROPROCESSOR (9)

Addressing modes - Instruction formats, Instruction set – Data transfer, Arithmetic, Logical, Branching - Subroutines - Assembly language programming

UNIT III ARCHITECTURE OF 16 BIT MICROPROCESSORS (9)

8086 Microprocessor Architecture – Accessing Memory location –Interrupts Pin details of 8086 - Addressing modes – overview of Instruction Set – 8086 Programming – Open source MASM Tool

UNIT 1V PERIPHERAL DEVICES AND THEIR INTERFACING (9)

Architecture, Interfacing and programming of ICs- PPI 8255 - 8279 Keyboard & Display Controller - 8253/54 Timer - 8257 DMA Controller - 8259 Interrupt Controller – Program development process-Modular programming.

UNIT V SYSTEM DESIGN USING MICROPROCESSOR (9)

Requirements definition- systematic definition-system implementation-testing and debugging -Interfacing with peripherals – ADC, DAC Interfacing, Sensors Interfacing, LCD Display Interfacing -Traffic light control, Stepper motor control – I2C Interfacing

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. Senthilkumar, Saravanan, Jeevanantham, Shan “Microprocessor & Interfacing”, Oxford University press, 2012.
2. Kenneth L.Short “Microprocessor and Programmed logic”8th ed., Pearson 2012.

REFERENCES:

4. Krishna Kant “Microprocessors and Microcontrollers” PHI Learning, 2007
5. A K Ray, K M Bhurchandi “Advanced microprocessors and Peripherals” Second edition, Tata McGraw-Hill, 2012.
6. Muhammad Ali Mazidi, Janice Gillispie Mazidi “The 80x86 IBM PC and Compatible Computers” Fifth edition, Pearson 2008.
7. Douglas V Hall, “Microprocessors and Interfacing, Programming and Hardware,” TMH, 2006.

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

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

15EC405 - ELECTRONIC CIRCUITS - II

L	T	P	C
3	0	0	3

OBJECTIVES:

- To study the feedback Amplifiers.
- To understand the concepts of various oscillator circuits.
- To design the narrow band amplifiers.
- To study about wave shapers and blocking oscillators.

COURSE OUTCOMES:

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

CO1 : Understand the feedback amplifiers.
CO2 : Understand the concepts of oscillator circuits.
CO3 : Design the different types of narrow band amplifier.
CO4 : Design of multivibrators and wave shapers.
CO5 : Acquire knowledge about Blocking oscillators and Time Base circuits.

UNIT I - FEEDBACK AMPLIFIERS (9)

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

UNIT II - OSCILLATORS (9)

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

UNIT III - TUNED AMPLIFIERS (9)

Tuned Amplifier: single and double tuned amplifiers – analysis of capacitor coupled single tuned amplifier – double tuned amplifier - effect of cascading single tuned amplifiers – Stagger tuned amplifiers -large signal tuned amplifiers: Class C tuned amplifier – efficiency and applications of Class C tuned amplifier - Stability of tuned amplifiers - Neutralization - Hazeltine neutralization method.

UNIT IV - WAVE SHAPING AND MULTIVIBRATOR CIRCUITS (9) RC & RL Integrator and Differentiator circuits – Storage, Delay and calculation of transistor switching times –

Speed-up Capaitor - Collector coupled and Emitter coupled Astable multivibrator – Monostable multivibrator – Bistable multivibrators – Triggering methods for Bistable multivibrators – Schmitt trigger circuit.

UNIT V - BLOCKING OSCILLATORS AND TIMEBASE GENERATORS (9)

Pulse transformers – equivalent circuit – response – applications, Blocking Oscillator : Free running blocking oscillator – Astable Blocking Oscillators with base timing – Push-pull Astable blocking oscillator with emitter timing, Triggered blocking oscillator: Monostable blocking oscillator with base timing –Time base circuits : Voltage-Time base circuit, Current-Time base circuit - UJT sawtooth waveform generator

TOTAL :(L: 45)= 45 PERIODS

TEXT BOOK:

1. S. Salivahanan N. Suresh Kumar, Electronic Devices and Circuits, 3rd Edition, McGraw- Hill, New Delhi, 2014.

REFERENCES:

4. Schilling and Belove, "Electronic Circuits", 3rd Edition, Tata McGraw- Hill, New Delhi, 2002.
5. Millman and Halkias. C., “Integrated Electronics”, Tata McGraw-Hill, New Delhi, 2001.
6. David A. Bell, “Electronic Devices and Circuits”, 4th Edition, Prentice Hall, 2007.
7. S. Salivahanan N. Suresh Kumar, Electronic Circuits II, 1st Edition, Tata McGraw- Hill, New Delhi, 2015.
8. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 9th Edition, Pearson Education / Prentice Hall, 2007.

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

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

15EC411 - ANALOG CIRCUIT DESIGN LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVE:

- To Study the role of analog IC"s in Practical

Applications **COURSE OUTCOMES:**

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

CO1 : Understand the working of Inverting and Non-inverting amplifier
CO2 : Design Differentiator and Integrator using IC 741.
CO3 : Design filter and Timers using IC741.
CO4 : Design of Astable and monostable multivibrators using NE555 Timer.
CO5 : Study of voltage regulator using IC723.

LIST OF EXPERIMENTS:

4. Design of Inverting and Non Inverting amplifier for a specified gain using OP-Amp IC741.
5. Design of differentiator and integrator for a specified gain using OP-Amp IC741.
6. Design of a sinusoidal oscillator for specified frequency based on Wien Bridge oscillators using IC-741.
7. Design of a sinusoidal oscillator for specified frequency based on RC phase shift oscillators using IC-741.
8. Design of Astable Multivibrators using NE555 Timer.
9. Design of Monostable Multivibrators using NE555 Timer.
10. Design and testing of Active Filter LPF for specified frequency.
11. Design and testing of Active Filter HPF for specified frequency.
12. Study of Voltage Regulator using IC723.

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			
4			x		x					x		x
5		x				x					x	x

15EC412- ELECTRONIC CIRCUITS - II AND SIMULATION LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

- To gain design knowledge of negative feedback amplifiers.
- To learn about designing of various types of oscillators.
- To understand working Multivibrators and Wave shapers.
- To learn simulation software used in circuit design.

COURSE OUTCOMES:

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

CO1: Design Negative Feedback amplifiers.
CO2: Design different types of oscillator circuits.
CO3: Design Tuned circuits and Multivibrators.
CO4: Use P-SPICE to simulate given electronic circuits.
CO5: Develop and Create to new project.

LIST OF EXPERIMENTS:

2. Design and verify current shunt feedback amplifiers.
3. Design of Voltage series feedback amplifiers.
4. Design and verify frequency response of Tuned Amplifiers.
5. Design of RC Phase Shift Oscillator and determine frequency of oscillation.
6. Design of Hartley Oscillators and determine frequency of oscillation.
7. Design of Schmitt Trigger Circuits and plot output response.
8. Design of Astable Multivibrators and calculate Time period.
9. Design of Monostable Multivibrators and determine Quasi duration.

SIMULATION USING PSPICE:

5. Simulate the Active filters and plot their frequency response.
6. Simulate the Differential amplifier and plot its response.
7. Simulate the Astable Multivibrators and plot the waveforms.
8. Simulate Saw-tooth wave generator using UJT and plot the waveforms.

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	
4	x	x			x							x
5	x				x						x	x

15GYC12- SOFT SKILLS – LISTENING AND SPEAKING

L	T	P	C
0	0	2	0

OBJECTIVES:

To enable students

- 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, 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

REFERENCE:

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

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

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

15EC501 - ANALOG COMMUNICATION

L	T	P	C
3	0	0	3

OBJECTIVE:

- To provide knowledge on complete analysis of analog communications.
- To provide the basic concepts of pulse modulation techniques.
- To analyze channel coding theorem.

COURSE OUTCOMES:

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

CO1 : Acquire the knowledge about amplitude modulation and demodulation schemes.
CO2 : Acquire the knowledge about angle modulation and demodulation schemes.
CO3 : Analyze the effects of noise in continuous wave signal.
CO4 : Know the concept of analog pulse modulation.
CO5 : Acquire knowledge about coding techniques.

UNIT- I AMPLITUDE MODULATION (9)

Generalized block diagram of communication system - Electromagnetic Spectrum -Need for modulation – Generation and Demodulation of AM, DSBSC, SSB and VSB Signals- Comparison of Amplitude Modulation Systems.

UNIT-II ANGLE MODULATION (9)

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

UNIT-III NOISE DETECTION AND RECEIVERS (9)

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

UNIT-IV PULSE MODULATION SYSTEMS (9)

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

UNIT-V INFORMATION THEORY (9)

Concept of Amount of Information, Average information, Entropy, Information rate, Source coding to increase average Information per bit, Shannon-Fano coding, Huffman coding, Shannon"s T heorem, Channel Capacity, Bandwidth- S/N trade-off, Mutual information and channel capacity.

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

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

REFERENCES:

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

15EC502 - MICROCONTROLLER AND INTERFACING

L	T	P	C
3	0	0	3

OBJECTIVE:

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

COURSE OUTCOMES:

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

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

UNIT - I 8051 MICROCONTROLLER (9)

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

UNIT - II 8051 PROGRAMMING (9)

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

UNIT- III 8051 INTERFACING (9)

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

UNIT- IV PIC MICROCONTROLLER (9)

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

UNIT- V PIC MICROCONTROLLER PERIPHERAL FEATURES (9) I/O Ports – Compare/Capture/PWM modules (CCP) - Master Synchronous Serial Port module (MSSP) – I2C bus – ADC Interfacing - Addressing modes - Instruction set – Programming.

TOTAL :(L: 45) =45 PERIODS

TEXT BOOKS:

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

REFERENCES:

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

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

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

15ECC01 - DIGITAL SIGNAL PROCESSI NG
(Common to ECE and E&I Branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

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

COURSE OUTCOMES:

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

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

UNIT I - FAST FOURIER TRANSFORMS (9)

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

UNIT II -DIGITAL 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(Rectangular, Hamming, Hanning, Blackman)- Comparison of design methods of FIR filters. Realization of FIR Structure.

UNIT III - DIGITAL IIR FILTERS (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 Im pulse Invariant T echniques). Realization of IIR Structure.

UNIT IV - FINITE WORD LENGTH EFFECT (9)

Number Representation, T ypes of Number Representation, Binary Fixed Point and Floating Point –Comparison, Quantization Noise - Truncation and Rounding, Input Quantization Error-Steady state Input and Output Noise Power, Zero input Limit Cycle Oscillation-Dead band, Signal Scaling.

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 :(L: 45) = 45 PERIODS

TEXT BOOK:

1. John G.Proakis, D.G.Manolakis and D.Sharma, “Digital Signal Processing, Algorithms and Applications”, Pearson Education, 2012.

REFERENCES:

1. P.Ramesh Babu, “Digital Signal Processing”, 4th Edition, SciTech Publications (India) Pvt Limited, 2007.
2. Oppenheim V.A.V and Schaffer R.W, “Discrete – time Signal Processing”, 2nd Edition, Prentice Hall, 2013.
3. S.K.Mitra, Digital Signal Processing, 4rh Edition, TMH, 2010.
4. Lawrence R Rabiner and Bernard Gold, “T heory 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)

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

15EC503 – TRANSMISSION LINES AND WAVEGUIDES

L	T	P	C
3	0	0	3

OBJECTIVE:

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

COURSE OUTCOMES:

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

CO 1 : Interpret the lumped circuit model of a transmission line with circuit theory and determine characteristic impedance, propagation constant and reflection coefficient.

CO 2 : Computation of the SWR, reflection coefficient parameters using smith chart and design single stub matching and double stub matching.

CO 3 : Deduce the field configuration of parallel plate, rectangular and circular waveguide

CO 4 : Calculate losses and Q-factor of Microstrip line.

CO 5 : Know the E and H field distribution in Microstrip, Strip lines and Coplanar lines.

UNIT I - TRANSMISSION LINE THEORY (9)

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

UNIT II - IMPEDANCE MATCHING AND TUNING (9)

Standing waves – nodes – standing wave ratio impedance matching-single stub matching. Half wavelength and Quarter wave transformer. Measurement of VSWR, impedance, single stub and double stub matching problems using Smith chart.

UNIT III - GUIDED WAVES BETWEEN PARALLEL PLANES (9)

Study of Waves between parallel planes of perfect conductor. Application of the restrictions to Maxwell"s equations – Transmission of TM waves between Parallel planes – Transmission of TE waves between Parallel planes. Transmission of T EM waves between Parallel planes –Velocities of the waves.

UNIT IV - GUIDED WAVES BETWEEN RECTANGULAR PLANES (9)

Applications of Maxwell"s equations to the rectangular waveguide. TM waves in rectangular waveguide. TE waves in rectangular waveguide – Dominant mode in rectangular waveguide-The TEM wave coaxial lines. Excitation modes. Guide termination and resonant cavities.

UNIT V - PLANAR TRANSMISSION LINES (9)

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

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. E.C.Jordan, K.G. Balmain: “E.M.waves& Radiating systems”, Pearson education, 2006.
2. John D. Ryder, “Network lines and Fields”, PHI, 2013

REFERENCES:

1. David M. Pozar, "Microwave Engineering", John Wiley fourth Edition 2013 (5 th unit)
2. Simon Ramo, John R. Whinnery"Fields And Waves In Communication Electronics", Wiley student Edition publications third edition 2008
3. G.S.N. Raju, Electromagnetic Field Theory & T ransmission Lines, Pearson Education, 2006.
4. Dr.P.Dhananjayan, "T ransmission lines and waveguides", Laxmi publication Fifth Edition, June 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						
3	x	x		x								x
4	x	x	x	x								
5			x	x	x	x					x	

15EC511 - MICROPROCESSORS AND MICROCONTROLLERS INTERFACING LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVE:

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

COURSE OUTCOMES:

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

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

LIST OF EXPERIMENTS:

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

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
4	x	x		x							x	
5			x		x	x						x

15EC512 - DIGITAL SIGNAL PROCESSING LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVE:

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

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

LIST OF EXPERIMENTS:

MATLAB BASED EXPERIMENTS:

1. Generation of Signals Using Mat lab Function.
2. Implementation of DIT and DIF Algorithms.
3. Implementation of Linear convolution and Circular convolution.
4. Implementation of FIR Filter Design.
5. Implementation of IIR Filter Design.
6. Study of Power Spectrum Estimation.

DSP PROCESSOR BASED EXPERIMENTS:

1. Simulation of Waveform Generator.
2. Simulation of Convolution -Using C Coding.
3. Design of FIR filter.
4. Design of IIR filter.

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

15GY511 – SOFT SKILLS APTITUDE AND REASONING – I

(Common to All Branches)

L	T	P	C
0	0	2	0

OBJECTIVE:

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

COURSE OUTCOMES:

At the end of the course, the 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, T enses, 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 : (L:30)=30 PERIODS

TEXT BOOKS:

1. Thorpe, Edgar and Shawick T horpe. 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. 4 th 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 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

15EC601 – DIGITAL COMMUNICATION

L	T	P	C
3	0	0	3

OBJECTIVE:

- To introduce the basic concepts of Digital Communication in baseband and passband domains and to give an exposure to coding techniques and spread spectrum communication.

COURSE OUTCOMES:

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

CO1 : Convert analog signal to digital signal for Baseband transmission.
CO2 : Apply proper techniques to retrieve the signal at the receiver.
CO3 : Identify and analyze the performance parameters of various digital modulation techniques.
CO4 : Adopt various error control coding techniques for error free communication.
CO5 : Apply the spread spectrum techniques to get reliable communication.

UNIT I - BASEBAND FORMATTING TECHNIQUES (9)

Introduction – Sources and signals, Basic signal processing operations in Digital Communications –Sampling process: Sampling theorem, Reconstruction of a message process from its samples, Signal distortion in sampling, Practical Aspects of sampling and signal recovery. Quantization: Uniform and Non -uniform (A-law & μ-law) - Encoding techniques for Analog Sources: T emporal waveform encoding- Pulse code modulation, Differential pulse code modulation, Delta Modulation – Coding Speech at low bit rates, Applications. Classification of line codes.

UNIT II - BASEBAND SHAPING FOR DATA TRANSMISSION (9)

Matched Filter Receiver – Probability of Error – Inter symbol Interference- Nyquist criterion for distortion less base band Binary T ransmission- Correlative level coding –Eye patterns - Equalization.

UNIT III – DIGITAL MODULATION TECHNIQUES (9)

Digital Modulation Formats – Coherent Binary Modulation Techniques (BPSK,BFSK) – Coherent Quadrature Modulation Techniques (QPSK, QAM) – Comparision of Binary and Quaternary modulation techniques – Power Spectra – Synchronization.

UNIT IV – ERROR CONTROL CODING (9)

Rationale Memoryless coding and types of codes - Linear Block Codes , Cyclic Codes, Convolutional Codes, BH Code, RS Code, Linear Codes, Concept of Error Free Communication.

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

Pseudo-Noise Sequences – Direct Sequence Spread Spectrum with Coherent BPSK – Signal Space Dimensionality and Processing Gain – Probability of Error – Frequency of Spread Spectrum – T DMA – FDMA – CDMA – OFDMA.

TOTAL : (L:45)=45 PERIODS

TEXT BOOK:

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

REFERENCES:

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

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

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

Approved by Sixth Academic Council

15ECC02 – VLSI DESIGN

(Common to ECE and E&I Branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To introduce the technology, design concepts, electrical properties and modeling of Very Large Scale Integrated Circuits.

COURSE OUTCOMES:

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

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

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

CO3 :Model the digital system using Hardware Description Language.

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

CO5 :Analyze the physical design process of VLSI design flow.

UNIT I - MOS TECHNOLOGY AND DESIGN PROCESS (9)

Basic MOS Transistors – Enhancement and Depletion Mode Transistor Action – nMOS Fabrication – CMOS Fabrication: n-well – p-well – twin tub – BiCMOS Technology – T ransient Response – Rise Time – Fall Time – Stick Diagrams: nMOS Design Style – CMOS Design Style – Design Rules and Layout.

UNIT II – BASIC ELECTRICAL PROPERTIES OF MOS AND BICMOS CIRCUITS (9)

Drain to Source Current I_{ds} Vs Voltage V_{ds} Relationships – MOS T ransistor Characteristics – MOS T ransistor Transconductance g_m and Output Conductance g_{ds} – Pass T ransistor and The nMOS Inverter – Determination of Pull-up to Pull-down Ratio – Alternative forms of Pull-up – T he CMOS inverter – Latch up in CMOS Circuits.

UNIT III – SUB SYSTEM DESIGN AND LAYOUT (9)

Switch Logic – Pass Transistors and T ransmission Gates – Gate Logic: T he Inverter – T wo-input nMOS, CMOS and BICMOS Nand Gates – Two-input nMOS, CMOS and BICMOS Nor Gates – Pseudo nMOS Logic – Dynamic CMOS Logic – Clocked CMOS Logic: CMOS domino Logic – n-p CMOS Logic.

UNIT IV - CMOS SUB SYSTEM DESIGN (9)

Overview of Verilog HDL-Modeling Concepts- Design of Adders: Carry look ahead – Carry Select– Carry Skip – Design of multipliers: T he Serial - Parallel Multiplier – Braun array – Baugh-Woolley – Pipelined Multiplier Array – Wallace Tree Multiplier.

UNIT V – ULTRA FAST VLSI CIRCUITS AND SYSTEMS (9)

Ultra fast Systems: Submicron CMOS Technology – Gallium Arsenide VLSI Technology – Gallium Arsenide Crystal Structure – Technology Development : Gallium Arsenide Devices – Metal Semiconductor FET (MESFET) – GaAs Fabrication.

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. Douglas A. Pucknell, “Basic VLSI Systems and Circuits”, Prentice Hall of India, T hird Edition, Reprint 2008.
2. Samir Palnitkar, “Verilog HDL – Guide to Digital Design and Synthesis”, Pearson Education, T hird Edition, 2003.
3. N.Weste, K.Eshraghian, “Principles of CMOS VLSI Design”, Second Edition, Addision Wesley 2008.

REFERENCES:

1. John P.Uyemera, “ Introduction to VLSI Circuits and Systems”, John Wiley & Sons, Reprint 2009.
2. M.J.Smith, “Application Specific Integrated Circuits”, Addisson Wesley, 1997.
3. Wayne Wolf,” Modern VLSI Design – System On Chip”, PHI 2006, T hird 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							
3	x	x			x	x	x					
4	x	x		x	x						x	
5	x		x		x							

15EC602 – ANTENNA AND WAVE PROPAGATION

L	T	P	C
3	2	0	4

OBJECTIVE:

- To impart knowledge on the fundamental antenna parameters and mechanism of radio wave propagation.

COURSE OUTCOMES:

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

CO1 : Know the basic radiation mechanism and antenna parameters.
CO2 : Design and characterize the various antenna arrays.
CO3 : Analyze the wire antennas and aperture antennas.
CO4 : Gain knowledge on the measurements of Antenna parameters.
CO5 : Compare the wave propagation in free space.

UNIT I - ANTENNA FUNDAMENTALS (9+3)

Radiation mechanism - single wire, two wire, dipole and current distribution on thin wire, Radiated field components - Hertzian dipole, Half wave Dipole and Monopole Antenna. Antenna Parameters- Radiation Pattern, Beam Width, Radiation Power Density, Directivity and Gain, Bandwidth, Polarization, Input Impedance, Efficiency, Antenna Effective Length and Area, Antenna T emperature, Reciprocity Principle.

UNIT II - DESIGN OF ARRAYS (9+3)

Linear Array - T wo element array, N-element linear array- Broadside array, End fire array- Directivity, Pattern Multiplication, Non-uniform excitation- Binomial Array

UNIT III – SPECIAL ANTENNAS (9+3)

Wire Antennas- Small Loop Antenna, V-Antenna, Rhombic antenna, Helical antenna and Yagi-Uda antenna, Frequency Independent Antenna - Spiral and Log periodic antenna, Aperture antennas - Horn antenna, Parabolic Reflector antenna, Microstrip antenna, MEMS antenna.

UNIT IV - ANTENNA MEASUREMENTS (9+3)

Antenna Measurements: Measurement of antenna impedance - Pattern measurements - Measurement of Antenna Gain - Beam width - Radiation resistance - Antenna efficiency – Directivity – Polarization - Measurement of Noise Figure and Noise Temperature.

UNIT V - WAVE PROPAGATION (9+3)

Fundamentals of Free Space Propagation, Ground Wave Propagation, Sky Wave propagation - Structure of ionosphere, Critical frequency, Virtual height , MUF, Skip distance, Effects of earth‟s magnetic fields, Fading, Whistlers, Space Wave Propagation, Duct Propagation.

TOTAL: (L: 45 + T:15) = 60 PERIODS

TEXT BOOKS:

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

REFERENCES:

1. Balanis, “Antenna Theory - Analysis and Design”, Third Edition, John Wiley & Sons, 2005.
2. R.S.Elliot, “Antenna Theory and Design”, IEEE Press, John Wiley, 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					x
3		x				x		x	x		x	x
4		x			x		x			x		
5		x	x		x		x	x		x		x

Approved by Sixth Academic Council

15GEC01-PRINCIPLES OF MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVE:

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

COURSE OUTCOMES:

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

CO1 : 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 T aylor and Fayol – Functions of management – Strategies for International business.

UNIT II - PLANNING (9)

Nature and purpose of planning - Planning process - T ypes of plans – Objectives – Managing by objective (MBO) Strategies - T ypes of strategies - Policies - Decision Making - T ypes 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 – T raining - Performance Appraisal.

UNIT IV - DIRECTING (9)

Creativity and Innovation - Motivation and Satisfaction - Motivation Theories - Leadership – T ypes 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 - T ypes 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, 8 th edition Second Reprint 2010.

REFERENCES:

1. Andrew J. Dubrin, “Essentials of Management”, T homson Southwestern, 9th ed., 2012.
2. Stephen P. Robbins and Mary Coulter, “Management”, Prentice Hall of India, 10 th 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	

15EC611- COMMUNICATION SYSTEMS AND NETWORKS LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVE:

- To demonstrate the concepts of generation and detection of analog, pulse and digital modulation schemes.
- To understand the concepts of computer networks and data transmission.

COURSE OUTCOMES:

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

CO1 : T ransmit and receive data using Analog, Pulse and Digital modulation and demodulation schemes.
CO2 : Analysis the response of pre-emphasis and de-emphasis
CO3 : Obtain the working knowledge of computer hardware & Operating Systems, software and networking skills.
CO4 : Build some simple networking models using the Network simulator modeling tool and perform simulations that help them evaluate their design approaches and expected network performance.
CO5 : Implement and compare the various routing algorithms for wire/wireless networks.

LIST OF EXPERIMENTS:

Communication Systems:

1. Generation and Detection of Amplitude modulation signals.
2. Generation and Detection of Frequency Modulation Sampling process.
3. Generation of Pulse Modulation waveforms– PAM / PWM / PPM.
4. Generation of Delta Modulation waveforms.
5. Generation and detection of ASK, PSK, FSK, QPSK waveforms.
6. Generation of Line Coding and Decoding techniques.
7. Response of Pre-Emphasis / De-emphasis Circuits.

Networks :

1. Implementation and study of stop and wait protocol & Data encryption and decryption.
2. Implementation and study of Go back-N and selective repeat protocols.
3. Implementation of distance vector routing algorithm & Link state routing algorithm.
4. To create scenario Transfer of files from PC to PC using Windows socket processing.
5. Wired LAN protocol.
   To create scenario and study the performance of CSMA/CD protocol through simulation.
6. Wireless LAN protocols.
   To create scenario and study the performance of network with CSMA / CA protocol and compare with CSMA/CD protocols.
7. To create scenario Ethernet LAN using n nodes (6), change error rate and data rate and compare the throughput using NS-2

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

15EC612- VLSI DESIGN LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVE:

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

COURSE OUTCOMES:

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

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

LIST OF EXPERIMENTS

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

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

II. Design and simulation of Sequential Logic Circuit using Verilog HDL

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

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

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

IV. FPGA Implementation

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

TOTAL :(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							
3	x	x			x		x					
4	x	x		x							x	
5	x		x		x							

Approved by Sixth Academic Council

15GY611 – SOFT SKILLS APTITUDE AND REASONING – II
(Common to All Branches)

L	T	P	C
0	0	2	0

OBJECTIVE:

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

COURSE OUTCOMES:

At the end of the course, the 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, T heme 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 : (L:30)=30 PERIODS

TEXT BOOKS:

1. Thorpe, Edgar and Shawick T horpe. 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: T ata 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 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

Approved by Sixth Academic Council

15GE611 - COMPREHENSION

L	T	P	C
0	0	2	1

OBJECTIVE:

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

COURSE OUTCOME:

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

CO1 : Understand and comprehend any given problem related to Electronics and comm unication Engineering field.

METHOD OF EVALUATION:

The student will be assessed for his understanding of the basic principles of the core engineering subjects. The internal assessment for a total of 50 marks will be evaluated by a committee comprising of the faculty members of the department. The committee will conduct three written examinations of objective question type from the subjects (Test1 - Electronic Devices, Analog Circuits and Digital Circuits; T est 2- Networks, Signals and Systems and Microprocessor; Test 3- Electromagnetics, Communications, VLSI and Digital Signal Processing (DSP)). T he end semester examination, which carries a total of 50 marks, will be an objective question type examination conducted by a committee of one internal examiner appointed by the COE of our college.

TOTAL = 30 PERIODS

REFERENCES:

1. Dr.Sanjay Sharma “Electronics and Communication Engineering,” 2nd Edition, S.K.Kataria & Sons Publication, New Delhi, 2013.
2. G.K.Mithal: “Electronics and T elecommunication Engineering” G.K.Publications, Noida, 2009.

MAPPING OF CO AND PO’S												
CO	PO’S											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x									x	x

Approved by Sixth Academic Council

15EC701 - MICROWAVE ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVE:

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

COURSE OUTCOMES:

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

CO1: Calculate the power distribution in microwave components.

CO2: Analyze the different types of microwave tubes.

CO3: Compute the impedance and loss measurements.

CO4: Identify the various microwave semiconductor devices and its characteristics.

CO5: Formulate the application of microwave systems.

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

Circuit and S parameter representation of N ports-Reciprocity T heorem-Lossless networks and unitary conditions-ABCD parameters-Cascaded networks-Relations between S-Y and ABCD parameters-Effect of Changing the reference planes in the S matrix-S Matrix of a Directional Coupler-waveguide tees and rat race coupler-Waveguide Corners-Bends-T wists-Matched loads and movable shorts.

UNIT-II MICROWAVE TUBES (9)

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

UNIT-III MICROWAVE MEASUREMENTS (9)

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

UNIT-IV MICROWAVE SEMICONDUCTOR DEVICES (9)

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

UNIT-V APPLICATIONS OF MICROWAVE SYSTEMS (9)

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

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Annapurna Das and Sisir K-Das, "Microwave Engineering" T ata McGraw-Hill 2013.
2. David M Pozar," Microwave Engineering", John Wiley & Sons, 2nd Edition, 2003.

REFERENCES:

1. R-E-Collin, "Foundations for Microwave Engineering", IEEE Press 2nd Edition, 2002
2. Samuel Y-LIAO, "Microwave Devices and Circuits", Pearson/Prentice Hall of India, 3rdEdition Reprint 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						
3	x	x		x	x							
4	x		x	x			x				x	x
5	x		x		x					x		x

15EC702 - EMBEDDED AND REAL TIME SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVE:

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

COURSE OUTCOMES:

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

CO1: Describe the architecture of different ARM processor cores.

CO2: Understand the instruction set and Assembly Language Programming in ARM.

CO3: Categorize and understand the recent trends in Embedded Systems.

CO4: Learn the basic concepts of real time Operating system design.

CO5: Develop real time solutions in different RTOS environment.

UNIT- I ARCHITECTURE OF EMBEDDED SYSTEMS **(9)**

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

UNIT-II THE ARM RISC ARCHITECTURE **(9)**

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

UNIT-III ARM INSTRUCTION AND ASSEMBLY LANGUAGE PROGRAMMING **(9)**

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

UNIT-IV RTOS CONCEPTS **(9)**

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

UNIT-V RTOS IMPLEMENTATION **(9)**

Off the shelf operating system – embedded operating system – Real time operating system :VX works- Micro C/OS-II hand held operating system : Palm OS- symbian OS - Case study of coding for an Automatic Chocolate Vending Machine using MUCOS -RTOS- Case study of an Embedded system for an Adaptive Cruise Control Systems in a Car-Case study of an Embedded Systems for a Smart Card .

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Dr.K.V.K.K Prasad “Embedded Real-Time systems: concept, design & Programming” Dream tech Press, Reprint Edition, 2010.
2. Steve furber “ARM system On Chip Architecture” Pearson 16th Edition 2013.

1. Raj Kamal “Embedded Systems Architecture Programming and Design” 2nd Edition TMH, 2010
2. Wayne Wolf, “Computers as Components - Principles of Embedded Computer System Design”, Morgan Kaufmann Publisher, 2nd Edition 2006.

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

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

15EC711 – MICROWAVE AND OPTICAL LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

- To make students to apply knowledge of optical communication to various application areas.
- To enable the student to implement and maintain the various microwave components.
- To provide the student to solve problems in maintaining the optical and microwave components.
- To make the students to learn and calculate the numerical aperture of a fiber.
- To motivate the students understand the characteristics of Gunn diode and Reflex Klystron.

COURSE OUTCOMES:

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

CO1: Apply knowledge of optical communication to various application areas.

CO2: Implement and maintain the various microwave components.

CO3: Solve problems in maintaining the optical and microwave components.

CO4: Calculate the numerical aperture of a fiber.

CO5: Understand the characteristics of Gunn diode and Reflex Klystron.

LIST OF EXPERIMENTS:

Microwave Lab Experiments:

1. Determine the mode Characteristics of Reflex Klystron.
2. Determine the standing wave ratio and reflection coefficient using Reflex Klystron.
3. Plot the V-I characteristics of Gunn diode and PIN diode.
4. Determine the frequency & wavelength in a rectangular waveguide Working on T E10 mode
5. Measure unknown impedance with Smith Chart.
6. Plot the radiation pattern of a Horn Antenna using polar graph.

1. Measure the Numerical Aperture of Optical Fiber
2. Plot the DC Characteristics of LED and Photo detector.
3. Find the characteristics of optical signal using analog and digital link.
4. Determine the system bandwidth by intensity modulation using optical fiber.
5. Measurement of attenuation in a single mode fiber.
6. Mode characteristics of fiber.

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						x
5				x			x				x	

15EC712 - EMBEDDED SYSTEMS LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

- To obtain a broad understanding of the emerging technologies in embedded system Microcontroller.
- To gain knowledge about automation using embedded systems.
- To gain knowledge about wired networks

COURSE OUTCOMES:

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

CO1: Develop applications using I/O ports in Microcontrollers.

CO2: Design embedded systems with wireless applications.

CO3: Design system for real world applications using peripherals..

CO4: Gain the embedded systems using wired protocols.

CO5: Made automation and provide solution to problems in design.

LIST OF EXPERIMENTS:

1. Program to toggle all the bits of Port P1 continuously with 250 ms delay using
2. Program to toggle only the bit P1.5 continuously with some delay. Use T imer 0 in mode 0, mode 1, mode 2 and mode 3 to create delay using 89C51.
3. Program to transmit and receive a message serially with GPS/Modem/RF using 89C51 Microcontroller.
4. Program to interface 7 segment display to display a message on it using 89C51.
5. Program to interface keypad. Whenever a key is pressed, it should be displayed on LCD using 89C51.
6. Program to get analog input from Temperature sensor and display the temperature Value on LCD using ADC with 89C51 Microcontroller.
7. Program to control the speed of a DC motor using DAC with 89C51 Microcontroller.
8. Program to interface Stepper Motor with 89C51 Microcontroller and rotate the motor in clockwise and antilock wise directions.
9. To demonstrate the basic linux commands on Raspberry pi &install Android on Raspberry Pi
10. Study the functions and ports of a ARDUINO& Design a Heart Beat sensor.

TOTAL :(P: 60)= 60 PERIODS

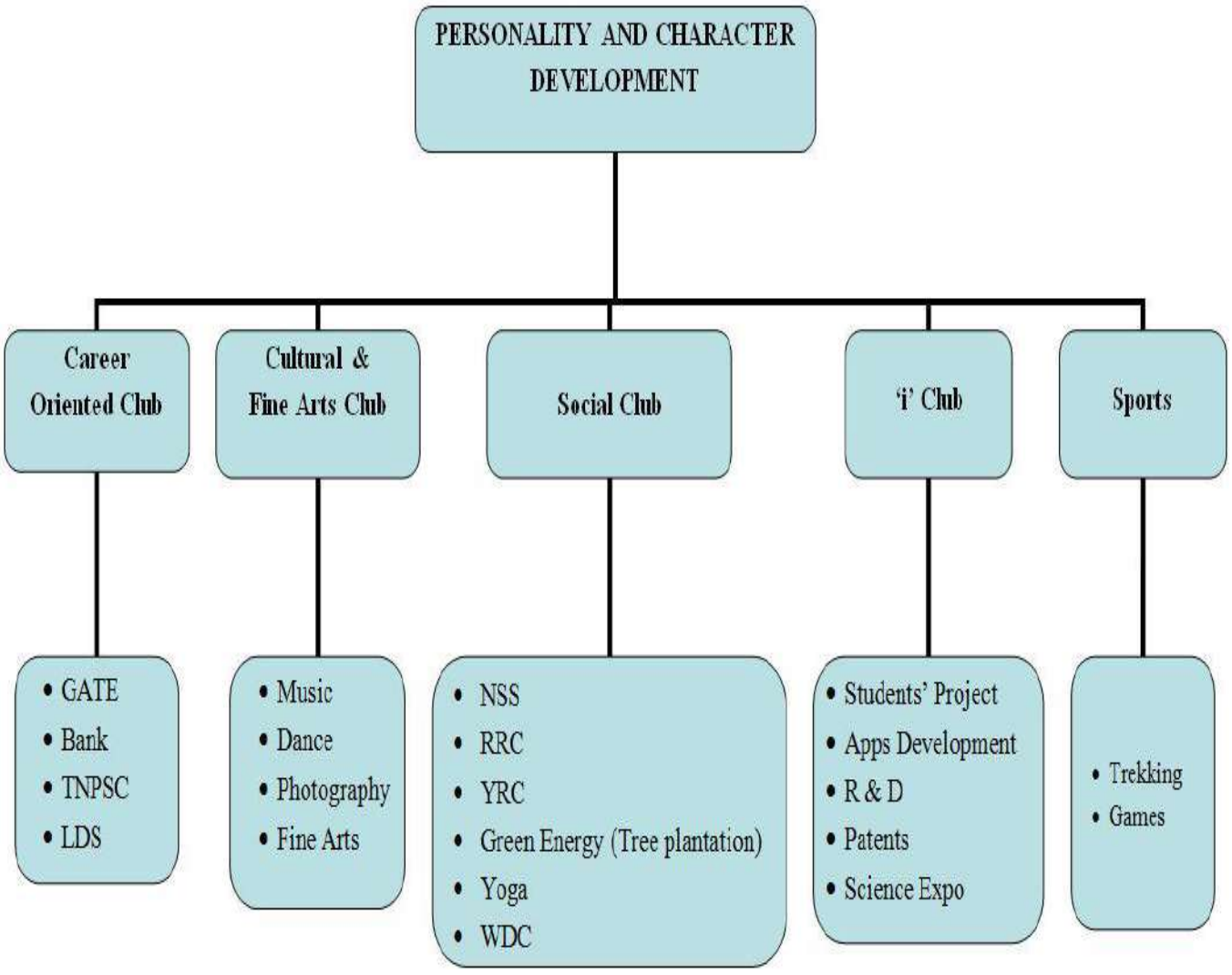
Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

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

Approved by Sixth Academic Council

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. **Trekking:** •To provide opportunities to explore nature and educating about the purity of nature •To improve physical and mental health.

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

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

(Cumulatively for Four Semesters)

15EC831 - PROJECT WORK

L	T	P	C
0	0	24	12

OBJECTIVE:

- To practice the fundamental 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

CO1: Formulate a problem in the field of Electronics and communication Engineering through literature survey and its reviews.

CO2: Identify the objectives of the project by understanding the source of a problem.

CO3: Analyze the problem based on a methodology and tabulate the results.

CO4: Develop methodology using appropriate tools for the problem.

CO5: Conclude the results and prepares a report on the project.

DISCREPTION:

T he 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. T he progress of the project is evaluated based on a minimum of three reviews. T he review committee may be constituted by the Head of the Department. A project report i s 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: 360 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		

15ECX01 - MEDICAL ELECTRONICS

L	T	P	C
3	0	0	3

OBJECTIVE:

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

COURSE OUTCOMES:

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

CO1 : Gain knowledge about the Bio potential recording systems and its signal characteristics.
CO2 : Learns various Non Electrical Parameters for further analysis.
CO3 : Differentiate between diagnostic and therapeutic equipments.
CO4 : Comprehend the various medical instrumentation methods.
CO5 : Develops knowledge on the advanced medical instrumentation techniques.

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

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

UNIT-II NON ELECTRICAL PARAMETER MEASUREMENT (9)

Colorimeter, Auto analyzer, Blood flow meter, Cardiac output, Respiratory measurement, Blood pressure, Temperature and Pulse measurement, Measurement of PCO2- Measurement of PO2,Blood Cell Counters.

UNIT-III DIAGNOSTIC EQUIPMENTS (9)

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

UNIT-IV THERAPEUTIC EQUIPMENTS (9)

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

UNIT-V ADVANCED TECHNIQUES IN MEDICAL INSTRUMENTATION (9)

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

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOK:

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

REFERENCES:

1. Khandpur, R.S., “Handbook of Biomedical Instrumentation”, Tata Mc Graw-Hill, New Delhi, 2003.
2. Joseph J.Carr and John M.Brown, “Introduction to Biomedical Equipment T echnology”, John Wiley and Sons, New York, 2004.
3. www.rch.org.au/bme_rch/electrical_safety/
4. omicsonline.org/a-hospital-healthcare-monitoring-system-using-wireless-
http://europepmc.org/backend/ptpmcrender.fcgi?accid=PMC1413324&blobtype=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
2	x	x	x	x		x						
3	x	x	x	x							x	
4		x	x	x	x				x			
5			x	x	x	x					x	

15ECX02 – DIGITAL IMAGE PROCESSING

L	T	P	C
3	0	0	3

OBJECTIVE:

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

COURSE OUTCOMES:

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

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

UNIT I - DIGITAL IMAGE FUNDAMENTALS (9)

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

UNIT II - IMAGE TRANSFORMS (9)

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

UNIT III - IMAGE ENHANCEMENT AND RESTORATION (9)

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

UNIT IV - IMAGE COMPRESSION (9)

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

UNIT V - IMAGE SEGMENTATION AND REPRESENTATION (9)

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

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOK:

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

REFERENCES:

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

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

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						
5		x					x				x	

15ECX03 - RADAR AND NAVIGATIONAL AIDS

L	T	P	C
3	0	0	3

OBJECTIVE:

- To make the student understand the principles of Radar and its use in military and civilian environment

COURSE OUTCOMES:

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

CO1 : Derive and discuss the Range equation and the nature of detection..

CO2 : Apply Doppler principle to radars and understand tracking radars.

CO3 : Rejuvenate principles of antennas and its propagation related to radars and to learn about transmitters and receivers.

CO4 : Know the principles of navigation in addition to approach and landing aids.

CO5 : Conversant with the concept of advance radar system.

UNIT - I INTRODUCTION TO RADAR (9)

Basic Radar –The simple form of the Radar Equation- Radar Block Diagram-Determination of co-ordinates in radar-Target resolution-Predicition of range performance- Radar Frequencies –Applications of Radar – The Origins of Radar.

UNIT - II MTI AND PULSE DOPPLER RADAR (9)

Introduction to Doppler and MT I Radar- Delay Lines and Cancellers- Staggered Pulse Repetition Frequencies – Doppler Filter Banks - Digital MT I Processing - Moving Target Detector - MT I from a Moving Platform (AMIT) – Pulse Doppler Radar .

UNIT- III RADAR TRANSMITTERS AND RECEIVERS (9)

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

UNIT- IV HYPERBOLIC SYSTEMS OF NAVIGATION (9)

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

UNIT- V DME AND TACAN (9)

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

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

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

REFERENCES:

1. Peyton Z. Peebles:, "Radar Principles", Johnwiley, 2004.
2. J.C T oomay, " Principles of Radar", 2nd Edition –PHI, 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						
2		x	x			x						
3		x	x		x							
4		x	x		x							
5		x	x			x		x				

15ECX04 – SENSORS AND ITS APPLICATIONS

L	T	P	C
3	0	0	3

OBJECTIVE:

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

COURSE OUTCOMES:

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

CO1 : Know basic concepts of various sensors and transducers.
CO2 : Identify various the various transducers used for various applications.
CO3 : Know the use of sensors and transducers in the field of instrumentation.
CO4 : Know many modern devices and technologies used in sensors.
CO5 : Develop knowledge in selection of suitable sensor based on requirement and applications.

UNIT I - INTRODUCTION (9)

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

UNIT II - MECHANICAL AND ELECTRO MECHANICAL SENSORS (9)

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

UNIT III - THERMAL SENSOR (9)

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

UNIT IV - MAGNETIC SENSOR (9)

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

UNIT V - SENSORS AND THEIR APPLICATIONS (9)

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

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOK:

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

REFERENCES:

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

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

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

15ECX05 - COMPUTER HARDWARE INTERFACING

L	T	P	C
3	0	0	3

OBJECTIVE:

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

COURSE OUTCOMES:

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

CO1 : Design the system using CPU architecture and memory.
CO2 : Learn the different types of motherboard.
CO3 : Analyze the operations of storage devices.
CO4 : Acquire the knowledge about I/O peripherals.
CO5 : Analyze the I/O operations of various bus architecture.

UNIT I - CPU AND MEMORY (9)

CPU essentials – processor modes – modern CPU concepts – Architectural performance features – the Intel„s CPU – CPU over clocking – over clocking requirements – over clocking the system – Essential memory concepts – memory organizations – memory packages – modules – logical memory organizations – memory considerations – memory types – memory techniques.

UNIT II -MOTHERBOARDS (9)

Active motherboards – sockets and slots – Intel D850GB – Pentium4 mother board – form factor – upgrading a mother board – chipsets – motherboard BIOS – POST – BIOS features – BIOS and Boot sequences – power supplies and power management – concepts of switching regulation – potential power problems – power management.

UNIT III - STORAGE DEVICES (9)

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

UNIT IV - I/O PERIPHERALS (9)

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

UNIT V -BUS ARCHITECTURE (9)

Buses – Industry standard architecture (ISA), peripheral component Interconnect (PCI) – Accelerated Graphics port (AGP) – plug-and-play devices – SCSI concepts – USB architecture. Case Study: Software Modem, Audio Player, Video Accelerator.

TOTAL :(L: 45) =45 PERIODS

TEXT BOOK:

1. Stephen J.Bigelow, ―T rouble Shooting, maintaining and Repairing PCs, Tata McGraw-Hill, NewDelhi, 2001.

REFERENCES:

1. Craig Zacker & John Rourke, ―T he complete reference: PC hardware, Tata McGraw -Hill, New Delhi, 2012.
2. Mike Meyers, Introduction to PC Hardware and T roubleshooting, T ata McGraw-Hill, New Delhi, 2003.
3. B.Govindarajulu, ―IBM PC and Clones hardware trouble shooting and maintenance, Tata McGraw - Hill, New Delhi, 2011.

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

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

15ECX06 – CONTROL SYSTEMS ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVE:

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

COURSE OUTCOMES:

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

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

UNIT I - SYSTEMS AND THEIR REPRESENTATIONS (9)

Mathematical Model of Control system, open loop & closed loop Control System, Transfer function concept – Mechanical Rotational systems, Mechanical T ranslational Systems electrical circuits – Stepper Motor, Block diagram reduction and signal flow graphs.

UNIT II - TIME RESPONSE ANALYSIS (9)

Time response – T ime domain specifications – T ypes of test inputs, First order System and Second order system : Step Response of Second Order Under damped System – Steady state error, Static error constants, generalized error coefficient .

UNIT III - FREQUENCY RESPONSE ANALYSIS AND DESIGN (9)

Frequency response, frequency domain specifications, Bode plots – Nyquist stability criterion, Correlation between frequency domain and time.

UNIT IV - STABILITY ANALYSIS AND COMPENSATION (9)

Stability - Concept and definition - Bounded input Bounded output stability, Location of poles – Routh Hurwitz criterion, Root locus techniques.

UNIT V - STATE-SPACE ANALYSIS (9)

Introduction to state space analysis – concepts of state variables & model, State models for Linear CT Systems, Solutions of state equations

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOK:

1. I.J. Nagrath and M.Gopal, “Control Systems Engineering”, New Age International, 5 th Edition, 2008.

REFERENCES:

1. Smarajit Ghosh, “Control System (Theory and Applications)”, Pearson Education, 2005.
2. A.Nagoor Kani, “Control Systems”, RBS Publications-2nd Edition. 2002.
3. K. Ogata, “Modern Control Engineering”, Pearson 4th Edition. 2005.
4. I. J Norman S. Nise, “Control System Engineering”, John Wiley & Sons, 4th Edition, 2004.

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

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							

15ECX07 - NANO ELECTRONICS

L	T	P	C
3	0	0	3

OBJECTIVE:

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

COURSE OUTCOMES:

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

CO1 : Know the basics of nano electronics.
CO2 : Demonstrate carbon nano tubes.
CO3 : Discuss the various applications of nanobiology.
CO4 : Describe the properties of nanosensors.
CO5 : Summarize how nanomedicines can impact the future.

UNIT I – INTRODUCTION AND EXPERIMENTAL METHODS OF NANOELECTRONICS (9)

Nano and nature – Nano the beginning – Electron microscope – scanning probe microscope – optical microscope – other kinds of microscope –X-Ray diffraction –associated techniques.

UNIT II - CARBON NANOTUBES (9)

Synthesis and purification – filling of nanotubes – mechanism of growth – electronic structure – transport properties – mechanical properties – physical properties – application – nanotubes of other materials – carbon nanotube FET .

UNIT III - NANOBIOLOGY (9)

Interaction between biomolecules and nanoparticle surfaces – different types of inorganic materials used for the synthesis of hybrid nano-bio assemblies – applications of nano in biology –nanoprobes for analytical applications.

UNIT IV – NANOSENSORS (9)

Sensor – nanosensor – nanoscale organization for sensors –characterization – perception –nanosensors based on quantum size effects – electrochemical sensors – sensors based on physical properties – nanobiosensors.

UNIT V - NANOMEDICINES (9)

Approach to developing nanomedicines – various kinds of nanosystems in use – protocols for nanodrug administration – nanotechnology in diagnostic application – materials for use in therapeutic applications.

TOTAL :(L: 45)= 45 PERIODS

TEXT BOOK:

1. T . Pradeep, NANO: T he Essentials – Understanding Nanoscience and Nanotechnology,Tata McGraw Hill education private limited, 2012.

REFERENCES:

- Michael Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons and Burkhard Raguse, Nanotechnology: Basic Science and Emerging Technologies, Chapman & Hall / CRC, 26 - Feb-2014.
- Rainer Waser (Ed.), Nanoelectronics and Information Technology: Advanced Electronic Materials and Novel Devices, Wiley-VCH, 2012

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

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								

15ECX08 - MEMS AND ITS APPLICATION

L	T	P	C
3	0	0	3

COURSE OBJECTIVE:

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

COURSE OUTCOMES:

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

CO1 : Know the fabrication methodology used in MEMS.
CO2 : Analyze about MEMS materials and its Fabrication techniques .
CO3 : Recent advancements in the field of MEMS and its Switches.
CO4 : Utilize the materials for common micro components and devices.
CO5 : Analyze the integration and packaging of RF MEMS devices.

UNIT- I MEMS AND ITS FUNDAMENTAL DEVICES (9)

MEMS Overview-Micro fabrication for MEMS: Bulk Micromachining, Wafer bonding, Surface Micromachining, , LIGA process, Micromachining of polymeric MEMS devices. Electromechanical transducers: Piezoelectric Transducers, Elctrostrictive T ransducers, Magnetostrictive T ransducers, Electrostatic actuators, Electromagnetic T ransducers and Electrodynamic T ransducers.

UNIT- II MEMS MATERIALS AND FABRICATION TECHNIQUES (9)

Metals-semiconductors-thin films for MEMS and their deposition techniques-materials for polymer MEMS: Classification of polymers, UV radiation curing, SU-8 for polymer MEMS. Bulk micromachining for silicon-based MEMS-Silicon surface micromachining.

UNIT- III MEMS SWITCHES (9)

Switch parameters-Basics of switching-Switches for RF and microwave applications-Actuation mechanisms for MEMS devices-Dynamics of switch operation-MEMS switch design, modeling and evaluation- MEMS switch design considerations.

UNIT- IV MEMS INDUCTORS AND CAPACITORS (9)

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

UNIT- V INTEGRATION AND PACKAGING OF RF MEMS DEVICES (9)

Role of MEMS Packages: Mechanical support,Electrical Interface, Protection from the environment and Thermal considerations. T ypes of MEMS packages-Flip-Chip assembly-Multichip module packaging: Wafer bonding-RF MEMS packaging and its reliability

TOTAL : (L:45)=45 PERIODS

TEXT BOOK:

1. RF MEMS & their Applications by Vijay K. Varadan, K. J. Vinoy and K. A. Jose John Wiley & Sons, 2011.

REFERENCES:

1. RF MEMS: Theory, Design, and Technology, Gabriel M. Rebeiz, John Wiley & Sons, 2004.
2. Tai-Ran Hsu , “MEMS and Microsystems: Design and Manufacture,” McGraw-Hill, 1st Edition, ISBN: 0072393912. , 2002.

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

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

15ECX09 – HIGH SPEED NETWORKS

L	T	P	C
3	0	0	3

OBJECTIVE:

- To acquire the knowledge of High Speed Networks that will make the students learn about the concepts used in networks.

COURSE OUTCOMES:

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

CO1 : Acquire the knowledge about Asynchronous Transfer Protocol.
CO2 : Analyze the different extents of quality of service to different applications.
CO3 : Explain various algorithms in TCP and ATM congestion control.
CO4 : Classify different queuing disciplines.
CO5 : Acquire knowledge about protocol mechanisms.

UNIT I- HIGH SPEED NETWORKS (9)

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

UNIT II- CONGESTION AND TRAFFIC MANAGEMENT (7)

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

UNIT III- TCP AND ATM CONGESTION CONTROL (11)

TCP Flow control – T CP Congestion Control: Retransmission Timer Management, Exponential RTO backoff, KARN"s Algorithm, Window management – Performance of T CP over ATM -T raffic and Congestion control in ATM – Requirements, Attributes, T raffic Management Frame work, Traffic Control. ABR rate Control, RM cell formats, ABR Capacity allocations – GFR traffic management.

UNIT IV- INTEGRATED AND DIFFERENTIATED SERVICES (9)

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

UNIT V- PROTOCOLS FOR QOS SUPPORT (9)

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

TOTAL :(L: 45)= 45 PERIODS

TEXT BOOK:

1. William Stallings, "HIGH SPEED NET WORKS AND INT ERNET ", Pearson Education, Second Edition, 2012

REFERENCES:

1. Warland, Pravin Varaiya, "High performance communic ation networks", Second Edition, Jean Harcourt Asia Pvt. Ltd., , 2001.
2. Irvan Pepelnjk, Jim Guichard, Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003.
3. Abhijit S. Pandya, Ercan Sea, "ATM Technology for Broad Band Telecommunication Networks", CRC Press, New York, 2004.

Mapping of Course 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			
4						x			x			
5							x					x

15ECX10- MODERN MICROPROCESSORS AND MICROCONTROLLERS

L	T	P	C
3	0	0	3

OBJECTIVE:

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

COURSE OUTCOMES:

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

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

UNIT- I MICROPROCESSOR ARCHITECTURE (9)

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

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

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

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

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

UNIT- IV MOTOROLA 68HC11 MICROCONTROLLERS (9)

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

UNIT- V MSP430 MICROCONTROLLER (9)

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

TOTAL :(L: 45) =45 PERIODS

TEXT BOOKS:

1. Daniel T abak , „" Advanced Microprocessors" McGraw Hill.Inc., 1995 (For Unit I Only)
2. James L. Antonakos , " T he Pentium Microprocessor „" Pearson Education , 1997. (For Unit II & III Only)
3. Gene .H.Miller ." Micro Computer Engineering," Pearson Education, 2004. (For Unit IV Only)
4. John davies " MSP430 MICROCONTROLLER basics"Elsevier,2008. (For Unit V Only)

REFERENCES:

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

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

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

15ECX11 - PROTOCOLS AND ARCHITECTURES FOR WSN

L	T	P	C
3	0	0	3

OBJECTIVE:

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

COURSE OUTCOMES:

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

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

UNIT-I OVERVIEW OF WIRELESS SENSOR NETWORKS (9)

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

UNIT-II ARCHITECTURES (9)

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

UNIT-III NETWORKING SENSORS (9)

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

UNIT-IV INFRASTRUCTURE ESTABLISHMENT (9)

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

UNIT-V ROUTING PROTOCOL (9)

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

TOTAL :(L: 45)= 45 PERIODS

TEXT BOOK:

1. Holger Karl & Andreas Willig, “Protocols And Architectures for Wireless Sensor Networks” , John Wiley, 2007.

REFERENCES:

1. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information Processing Approach”, Elsevier, 2007.
2. Kazem Sohraby, Daniel Minoli, & T aieb Znati, “Wireless Sensor Networks- Technology,Protocols, And Applications”, John Wiley, 2007.
3. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003.

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

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

15ECX12 - TELECOMMUNICATION SWITCHING AND NETWORKS

L	T	P	C
3	0	0	3

OBJECTIVE:

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

COURSE OUTCOMES:

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

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

UNIT- I MULTIPLEXING (9)

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

UNIT-II DIGITAL SWITCHING (9)

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

UNIT- III NETWORK SYNCHRONIZATION CONTROL AND MANAGEMENT (9)

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

UNIT- IVDIGITAL SUBSCRIBER ACCESS (9)

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

UNIT-V TRAFFIC ANALYSIS (9)

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

TOTAL :(L: 45) =45 PERIODS

TEXT BOOK:

1. John.C. Bellamy, “Digital Telephony”, John Wiley, 2003, 3rd Edition, Reprint 201 1.

REFERENCES:

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

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

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

15ECX13- MULTIMEDIA COMPRESSION TECHNIQUES

L	T	P	C
3	0	0	3

OBJECTIVE:

- To acquire the knowledge on the concepts in multimedia and information theory & the standards of text, audio, image and video compression.

COURSE OUTCOMES:

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

CO1 : Know the concept of information theory, models and coding.
CO2 : Acquire the knowledge of text compression coding techniques.
CO3 : Study the audio compression coding and speech compression techniques.
CO4 : Know the image compression approaches, coding and JPEG standards.
CO5 : Identify the wavelet based video compression.

UNIT I - INTRODUCTION (9)

Overview of Information theory-redundancy-overview of human codes, visual system -human visual system-taxonomy of compression techniques-overview of source coding-source models-scalar quantization-rate distortion-vector quantization-structure vector quantizes.

UNIT II - TEXT COMPRESSION (9)

Compaction techniques - Static Huffman coding - Dynamic Huffman coding - Arithmetic coding - Lempel-Ziv coding - Lempel-Ziv Welsh coding.

UNIT III - AUDIO AND SPEECH COMPRESSION (9)

Audio compression techniques –frequency domain and filtering - Basic sub band coding - Application to speech coding - G.722 - Application of audio coding: MPEG audio - Silence compression – Speech compression techniques - vocoders - Linear predictive coder.

UNIT IV - IMAGE COMPRESSION (9)

Approaches to image compression - Predictive techniques - PCM, DPCM, Graphics Interchange Format, Tagged image file format, Digitized documents, Digitized pictures, JPEG, Quad tree -DCT coding- EZW coding-SPIHT coding- JPEG 2000 standards.

UNIT V - VIDEO COMPRESSION (9)

Video signal representation - Video compression techniques - MPEG1,2,4 - Motion estimation - H.261, H.263 - Overview of wavelet based compression- PLV performance - Real time compression.

TOTAL (L: 45) = 45 PERIODS

TEXT BOOKS:

1. Sayood Khaleed, "Introduction to Data Compression", Morgan Kauffman, 4th Edition, 2014.
2. Fred Halsall, James F. Kurose, "Multimedia communication - Applications, Networks, Protocols and standards", Pearson Education Limited, 2004.

REFERENCES:

1. David Solomon, "Data Compression the complete reference", Springer, 4th Edition, 2007.
2. Jerry D. Gibson, "Multimedia Communications: Directions and Innovations", Morgan Kaufmann, 2nd Edition, 2001.

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

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

15ECX14- SATELLITE COMMUNICATION

L	T	P	C
3	0	0	3

OBJECTIVE:

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

COURSE OUTCOMES:

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

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

UNIT-I SATELLITE ORBITS (9)

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

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

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

UNIT-III SATELLITE ACCESS (9)

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

UNIT-IV EARTH SEGMENT (9)

Earth Station T echnology- T errestrial Interface, T ransmitter and Receiver, Antenna Systems T VRO, MAT V, CAT V, Test Equipment Measurements on G/T , C/No, EIRP, Antenna Gain.

UNIT-V SATELLITE APPLICATIONS (9)

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

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

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

REFERENCES:

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

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

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

15ECX15- DATA COMMUNICATION AND NETWORKS

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand the state-of-the-art in Different network layers and protocols, architectures and applications.

COURSE OUTCOMES:

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

CO1 : Comprehend Processes T o Communicate With Each Other Across A Computer Network.
CO2 : Analyze T he Services, Roles And Features Of T he Data Link Layers Of Data Networks.
CO3 : Identify solution for each routing /switching functionality at network layer.
CO4 : T race the flow of information from one node to another node in the network.
CO5 : Choose the required functionality at each layer for given application.

UNIT-I INTRODUCTION TO COMMUNICATION NETWORKS (9)

Components of Network – Data Representation - Data Flow –Physical structure: T ypes of Connection - Categories of Network – Internet connection of network- Networking devices: hubs, repeaters, Bridges switches and routers, gateways. Modem and its types - Protocols and its standards - ISO / OSI Reference Model -Addressing: Physical, Logical, Port & Specific addresses - T ransmission Media: Guided Media and Unguided Media.

UNIT-II DATA LINK LAYER (9) Introduction –T ypes of Error - Error Detection & Correction - Framing - Flow and Error Control - Noiseless channels & Noisy Channels - Wired LAN : Ethernet – IEEE standards : LLC and MAC – Wireless LAN : IEEE 802.11 – Bluetooth.

UNIT-III NETWORK LAYER (9)

Switching: Circuit switched networks, Packet switched networks, Datagram networks and Virtual Circuit Networks – Logical Addressing: IPv4, IPv6 – T ransition from IPv4 to IPv6 – Address Mapping: ARP, RARP, BOOT P & DHCP, ICMP - IGMP – Forwarding- Routing Protocols: Unicast Routing, Multicast Routing protocols.

UNIT-IV TRANSPORT LAYER (9)

Process to process delivery - Concepts of User Datagram Protocol (UDP) - Concepts of T ransmission Control Protocol (T CP) – Congestion Control – Quality of service – T echniques to achieve QoS: T oken Bucket and Leaky Bucket.

UNIT-V APPLICATION LAYER (9)

Domain Name Space (DNS) –Remote Logging - Email: Architecture, User Agent, SMT P - FTP – WWW- HTTP - Introduction to Cryptography and security – Symmetric key Cryptography - Asymmetric key Cryptography.

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOK:

1. Behrouz A. Forouzan, “Data Communication and Networking”, 4th Edition, Tata McGraw-Hill, 2011.

REFERENCES:

1. Tanenbaum, Andrew S and David Wetherall, ―Computer Networks, 5th Edition, PHI Learning, New Delhi, 2010.
2. Kurose, James F. and Ross, Keith W., ―Computer Networking: A T op-Down Approach Featuring the Internet, 6th Edition, Pearson Education, 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	
2	x		x	x					x			
3		x	x				x				x	x
4	x								x		x	x
5	x		x	x				x			x	

15ECX16- WIRELESS COMMUNICATION

L	T	P	C
3	0	0	3

OBJECTIVE:

- To provide knowledge on complete analysis of wireless communications.
- To provide the basic concepts of wireless propagation and modulation techniques.
- To analyze advanced transceiver schemes.

COURSE OUTCOMES:

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

CO1 : Anal the concept of different propagations and challenges available.
CO2 : Compare various wireless propagation mechanisms.
CO3 : Analyze the various wireless modulation techniques.
CO4 : Analyze the signal processing techniques applied in wireless systems.
CO5 : Apply various spread spectrum techniques in transceivers for reliable communication.

UNIT- I SERVICES AND TECHNICAL CHALLENGES (9)

T ypes of Services, Requirements for the services, Multipath propagation, Spectrum, Limitations, Noise and Interference limited systems, Principles of Cellular networks, Multiple Access Schemes.

UNIT-II WIRELESS PROPAGATION MECHANISM (9)

Propagation Mechanisms (Qualitative treatment), Propagation effects with mobile radio, Channel Classification, Narrowband and Wideband models.

UNIT-III WIRELESS MODULATION SCHEMES (9)

Structure of a wireless communication link, Modulation and demodulation – Quadrature Phase Shift Keying, π/4-Differential Quadrature Phase Shift Keying, Offset-Quadrature Phase Shift Keying, Binary Frequency Shift Keying, Minimum Shift Keying, Gaussian Minimum Shift Keying.

UNIT-IV SIGNAL PROCESSING IN WIRELESS SYSTEMS (9)

Principle of Diversity, Macro diversity, Micro diversity, Signal Combining Techniques, T ransmit diversity, Equalizers - Linear and Decision Feedback equalizers.

UNIT-V ADVANCED TRANSCEIVER SCHEMES (9)

Spread Spectrum Systems- Cellular Code Division Multiple Access Systems- Principle, Power control, Effects of multipath propagation on Code Division Multiple Access, Orthogonal Frequency Division Multiplexing .

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. Andreas.F. Molisch, “Wireless Communications”, John Wiley – India, 2006.
2. Simon Haykin & Michael Moher, “Modern Wireless Communications”, Pearson Education, 2007.

REFERENCES:

1. Rappaport. T .S., “Wireless communications”, Pearson Education, 2003.
2. Gordon L. Stuber, “Principles of Mobile Communication”, Springer International Ltd., 2001.
3. Andrea Goldsmith, Wireless Communications, Cambridge University Press, 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							x
4	x		x	x								x
5	x	x		x	x							

15ECX17 - OPTICAL COMMUNICATION

L	T	P	C
3	0	0	3

OBJECTIVE:

- To introduce the concepts on optical fiber communication and establish the knowledge on optical sources and receivers.

COURSE OUTCOMES:

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

CO1: Understand the structure of optical fibers and wave propagation mechanisms.

CO2: Obtain the knowledge on the losses and dispersions occurred in the optical cable.

CO3: Characterize the Optical sources and detectors.

CO4: Calculate the link budget analysis of optical receiver section.

CO5: Familiar with design considerations of fiber optic systems and measurements.

UNIT I - OPTICAL FIBERS - STRUCTURE (9)

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

UNIT II – ATTENUATION AND DISPERSION (9)

Attenuation, Signal dispersion in fibers – Overview of Dispersion origins, Modal Delay, Group delay , material dispersion , Wave Guide dispersion , Dispersion in single mode fibers, Polarization mode dispersion , RI profile and cut off wavelength, Dispersion Management, Dispersion Shifted Fibers.

UNIT III – OPTICAL SOURCES (9)

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

UNIT IV – PHOTODETECTOR AND OPTICAL RECEIVER OPERATION (9)

PIN Photo detector, Avalanche Photodiodes, Photodetector noise - Detector response time, Avalanche multiplication of Noise, Fundamental Receiver operation-Error sources, Front End Amplifiers, Digital Receiver Performance-Probability of error, Quantum limit, Point to point link systems considerations - Link Power budget, Rise time budget.

UNIT V – OPTICAL NETWORKS AND PERFORMANCE MEASUREMENTS (9)

Operational principles of WDM, EDFA"s, Solitons, Basic concepts of SONET/SDH, Performance Measurement-Measurement standards, T est Equipments, Power Measurements, Attenuation Measurements, Dispersion Measurements, OT DR.

TOTAL: (L: 45) = 45 PERIODS

TEXT BOOK:

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

REFERENCES:

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

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

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

15IT503-OBJECT ORIENTED PROGRAMMING CONCEPTS

L	T	P	C
3	0	0	3

OBJECTIVE:

- Understand the concept of object oriented programming
- Design classes in object oriented programming
- Design simple applications using C++.

COURSE OUTCOMES:

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

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

UNIT I - INTRODUCTION (9)

Object Oriented Paradigm : Evolution - Elements of Object Oriented Programming - C++ fundamentals – Data types – Access modifier – Classes & Objects - Function and Data members - Default arguments – Friend function- Static members. Case study: Student Management System.

UNIT II - CONSTRUCTORS AND STATIC POLYMORPHISM (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. Case Study: Library Book Searching.

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. Case Study: Multi Agent System.

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. Case Study: Student Mark Analysis.

UNIT V I/O STREAMS AND FILE HANDLING (9)

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

TOTAL :(T: 45) = 45 PERIODS

TEXT BOOK :

1. B. T rivedi, “Programming with ANSI C++”, Oxford University Press, 2013.

REFERENCES :

1. E.Balagurusamy, “Object Oriented Programming with C++”, Tata McGraw Hill, Third Edition.
2. Ira Pohl, “Object Oriented Programming using C++”, Pearson Education, SecondEdition Reprint 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
2		x	x								x	
3		x						x				x
4		x	x								x	
5	x		x								x	

Approved by Sixth Academic Council

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 : Know the concepts of Interfaces, Packages and T hreads.
CO4 : Know the basics of Applet, AWT .
CO5 : 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 T ypes – 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: T ypes 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 – T hread Programming and Handling – T hread 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 :(T: 45) = 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, 9th ed, 2012.

REFERENCES :

1. P. Naughton, H. Schildt, “Java T he Complete Reference 4e,” Oracle ,9th ed,2014.
2. http://java .sun.com/docs/books/tutorial
3. Deitel & Deitel, “Java How to Program,” PH-India, 9th ed, 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
2		x	x								x	
3		x						x				x
4		x	x								x	
5	x		x								x	

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 Iinternet.
- 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 - T ypes of Cellular T echnologies - Cellular Fall-Back - Determining Location

UNIT II - Sensor, Scheduling and Processing (9)

IOT Sensors - T ypical 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 - T ypes of Analytics - Analytics T ools and Languages

UNIT V - Implementing an IOT Solution and Life Cycle 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 , T he Definitive guide “T he Internet of T hings for Business”, 2nd Edition, Aeris, August 2016.
2. Cuno Pfister, “Getting Started with the Internet of T hings”, O‟Reilly, 1st Edition May 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
2		x	x								x	
3		x						x				x
4		x	x								x	
5	x		x								x	

15GEC03 – PROFESSIONAL ETHICS AND HUMAN VALUES

L	T	P	C
3	0	0	3

OBJECTIVE:

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

COURSE OUTCOMES:

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

CO1 : Know 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 : Know 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 – T ypes of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg"s theory – Gilligan"s T heory – Consensus and Controversy – Models of professional roles - T heories about right action – Self-interest – Customs and Religion – Uses of Ethical T heories.

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 , T ata 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 T QM - 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 T eamwork, 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, T ypes.

UNIT IV - TQM TOOLS AND TECHNIQUES- II (9)

Control Charts - Process Capability - Concepts of Six Sigma - Quality Function Deployment (QFD) - T aguchi quality loss function - T PM - 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., "T otal quality Management", Pearson Education Asia, Third Edition, Indian Reprint, 2011.

REFERENCES:

1. James R. Evans and William M. Lindsay, "T he Management and Control of Quality", 8th ed., First Indian Edition, Cengage Learning, 2012.
2. Subburaj Ramasamy , “T otal Quality Management”, T ata McGrawHill, First reprint 2009.
3. Suganthi. L and Anand Samuel, "T otal Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.
4. Janakiraman. B and Gopal .R.K., "T otal 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				

15MYX01 - BASIC STATISTICS AND NUMERICAL ANALYSIS

(For ECE Branch Only)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand the basic concept of statistics and Numerical Analysis for Engineering Field.

COURSE OUTCOMES:

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

CO1 : Solve problems from different fields using Statistical tools.
CO2 : Acquainted with the basic concepts in numerical methods and their uses.
CO3 : Solve huge amount of Experimental data by using interpolation method.
CO4 : Acquire the knowledge of numerical differentiation and integration.
CO5 : Provide the solution to ordinary differential equations using initial value problem.

UNIT I - BASIC STATISTICS (9)

Measures of central tendency-Arithmetic mean and its properties, weighted arithmetic mean, Geometric mean, Harmonic mean, Median, Mode.

UNIT II - SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS (9)

Solution of equation – Newton Raphson method – Solution of linear system by Gaussian elimination and Gauss – Jordon method – Iterative methods: Gauss-Seidel method.

UNIT III - INTERPOLATION AND APPROXIMATION (9)

Divided differences in unequal intervals – Lagrangian Polynomials –– Newton‟s forward and backward difference formulas for equal intervals.

UNIT IV - NUMERICAL DIFFERENTIATION AND INTEGRATION (9)

Numerical Differentiation using interpolation formulae – Numerical integration by Trapezoidal and Simpson‟s 1/3 rule – Romberg‟s method – T wo and T hree point Gaussian quadrature formulae.

UNIT V - INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS (9)

Single step methods: T aylor series method – Euler‟s method for first order equation – Fourth order Runge – Kutta method for solving first order equations – Multistep methods: Milne‟s predictor and corrector methods.

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. S.C.Gupta and V. K. Kappor, “Fundamentals of Mathematical Statistics”, Sultan Chand and Sons, 11th ed., 2002.
2. T . Veerarajan. and T . Ramachandran., “Numerical Methods with programming in C”, 2nd ed., Tata McGraw-Hill, 2006, First reprint 2007.
3. P. Kandasamy, K.T hilagavathy 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”, T ata 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.
5. Suganthi. L and Anand Samuel, "T otal Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.
6. Janakiraman. B and Gopal .R.K., "T otal Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

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

Approved by Sixth Academic Council

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 Modelling methods and building simulation

UNIT III PRINCIPLES OF ENERGY (9)

Principles of Energy conscious building design – Energy conservation in buildings – Day lighting – Water heating and photovoltaic systems – Advances in thermal insulation – Heat gain / loss through building components – Solar architecture

UNIT IV ENERGY CONSERVATION (9)

Passive solar heating – Direct gain – Thermal storage wall – Sunspace – Convective air loop – Passive cooling – Ventilation – Radiation – Evaporation and Dehumidification – Mass effect – Design guidelines

UNIT V MONITORING AND CONTROL SYSTEMS (12)

Energy conservation in building – Air conditioning – HVAC equipment – Computer packages for thermal design of buildings and performance prediction – Monitoring and instrumentation of passive buildings – Control systems for energy efficient buildings – Illustrative passive buildings – Integration of emerging technologies – Intelligent building design principles.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. J.K. Nayak and J.A. PrajapatiHadbook on Energy Consious Buildings, Solar Energy Control MNES, 2006.
2. J.A. Clarke, Energy Simulation in Building Design (2e) Butterworth 2001.

REFERENCES:

1. J.R. Williams, Passive Solar Heating, Ann Arbar Science, 1983.
2. R.W. Jones, J.D. Balcomb, C.E. Kosiewiez, G.S. Lazarus, R.D. McFarland and W.O. Wray, Passive Solar Design Hanbook, Vol.3, Report of U.S. Department of Energy (DOE/CS-0127/3), 1982.
3. M.S. Sodha, N.K., Bansal, P.K. Bansal, A.Kumar and M.A.S. Malik. Solar Passive Building, Science and Design, Pergamon Press, 1986.
4. J.L. Threlkeld, Thermal Environmental Engineering, Prentice Hall, 1970.

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

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

15CEZ02 WASTE MANAGEMENT

(*Common to All branches except Civil Engineering)*

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand of the basic principles of waste and resource management will be supplemented, where appropriate, by practical problem-solving exercises.
- To provide detailed knowledge and skills in the management, treatment, disposal and recycling options for solid wastes.
- To provide details on resource efficiency plays in conserving resources and contributing to a low carbon economy.

COURSE OUTCOMES:

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

CO1: Understand and apply the basic for solving practical waste management challenges.
CO2: Understand the collection of waste and recycling.
CO3: Understand the fundamental principles of existing and emerging technologies for the treatment of waste.
CO4: Appreciate the role of decision-making tools in the critical assessment of major waste issues.
CO5: Understand the economy and financial aspects of waste management.

UNIT I INTRODUCTION & TYPES OF SOURCES (9)

Problems and need of solid and hazardous waste management - Waste management planning - Toxicology and risk assessment - Legislations on management and handling of different types of wastes.

UNIT II WASTE GENERATION RATES (9)

Composition - Hazardous Characteristics – TCLP tests – waste sampling- reduction of wastes at source – Recycling and reuse. Handling and segregation of wastes at source – storage and collection of municipal solid wastes – Analysis of Collection systems - Need for transfer and transport – Transfer stations -labeling and handling of hazardous wastes.

UNIT III WASTE PROCESSING (9)

Processing technologies – biological and chemical conversion technologies – Composting - thermal conversion technologies - energy recovery – incineration – solidification and stabilization of hazardous wastes - treatment of biomedical wastes.

UNIT IV DISPOSAL (9)

Site selection - design and operation of sanitary landfills - secure landfills and landfill bioreactors – leachate and landfill gas management – landfill closure and environmental monitoring – landfill remediation

UNIT V ECONOMY AND FINANCIAL ASPECTS (9)

Elements of integrated waste management - Economy and financial aspects of waste management. Other Waste Types: Nuclear and Radio Active Wastes.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. 1. Hilary Theisen and Samuel A, Vigil, George Tchobanoglous, Integrated Solid Waste Management, McGraw- Hill, New York, 1993.

REFERENCES:

1. CPHEEO, Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organization, Government of India, New Delhi, 2000
2. Michael D. LaGrega, Philip L Buckingham, Jeffrey C. E vans and Environmental Resources Management, Hazardous waste Management, Mc-Graw Hill International edition, New York, 2001.
3. Vesilind P.A., Worrell W and Reinhart, Solid waste Engineering, Thomson Learning Inc., Singapore, 2002.
4. Charles A. Wentz, Hazardous Waste Management, Second Edition, Pub: McGraw Hill International Edition, New York, 1995.

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

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

Approved by Seventh Academic Council

15CEZ03 AIR POLLUTION MANAGEMENT
(*Common to All branches except Civil Engineering)*

L	T	P	C
3	0	0	3

OBJECTIVE:

- To study about the characteristics and effects of air and noise pollution and the methods of controlling the same.
- To know about source inventory and control mechanism.

COURSE OUTCOMES:

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

CO1: Understand about nature and characteristics of air pollutants.
CO2: Identify the basic elements of atmosphere and its stability.
CO3: Design stacks and particulate air pollution control devices to meet applicable standards.
CO4: Understand the basic concepts of air quality management.
CO5: Identify, formulate and solve air and noise pollution problems.

UNIT I SOURCES AND EFFECTS OF AIR POLLUTANTS (9)

Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution – Source inventory – Effects of air pollution on human beings, materials, vegetation, animals – global warming-ozone layer depletion, Sampling and Analysis – Basic Principles of Sampling – Source and ambient sampling – Analysis of pollutants – Principles.

UNIT II DISPERSION OF POLLUTANTS (9)

Elements of atmosphere – Meteorological factors – Wind roses – Lapse rate - Atmospheric stability and turbulence – Plume rise – Dispersion of pollutants – Dispersion models – Applications.

UNIT III AIR POLLUTION CONTROL (12)

Concepts of control – Principles and design of control measures – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment - gaseous pollutant control by adsorption, absorption, condensation, combustion – Pollution control for specific major industries.

UNIT IV AIR QUALITY MANAGEMENT (8)

Air quality standards – Air quality monitoring – Preventive measures - Air pollution control efforts – Zoning – Town planning regulation of new industries – Legislation and enforcement – Environmental Impact Assessment and Air quality.

UNIT V NOISE POLLUTION (7)

Sources of noise pollution – Effects – Assessment - Standards – Control methods – Prevention.

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Anjaneyulu, D., “Air Pollution and Control Technologies”, Allied Publishers, Mumbai, 2002.
2. Rao, C.S. Environmental Pollution Control Engineering, Wiley Eastern Ltd., New Delhi, 1996.
3. Rao M.N., and Rao H. V. N., Air Pollution Control, Tata McGraw Hill, New Delhi, 1996.

REFERENCES:

1. Heumann. W.L., "Industrial Air Pollution Control Systems", McGraw Hill, New Yark, 1997.
2. Mahajan S.P., "Pollution Control in Process Industries", Tata McGraw Hill Publishing Company, New Delhi, 1991.
3. Peavy S.W., Rowe D.R. and Tchobanoglous G. "Environmental Engineering", McGraw Hill, New Delhi, 1985.
4. Garg, S.K., “Environmental Engineering Vol. II”, Khanna Publishers, New Delhi, 1998
5. Mahajan, S.P., “Pollution Control in Process Industries”, Tata McGraw Hill, New Delhi, 1991.
6. Thod Godesh, "Air Quality, Lewis India Edition, 2013.

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

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

15CEZ04 BUILDING SERVICES

(*Common to All branches except Civil Engineering)*

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand about electrical systems in building and its specifications.
- To know about the concepts of refrigeration and other safety installations as per NBC
- Planning and scheduling the frequency of inspection and maintenance of building including drainage

COURSE OUTCOMES:

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

CO1: Know about the basic electrical systems in buildings
CO2: Gain knowledge about the modern lighting systems.
CO3: Study about the HVAC systems.
CO4: Be familiar with the concept of planning considerations and fire safety installation in buildings.
CO5: Study about the concepts of plumbing and drainage in building.

UNIT I ELECTRICAL SYSTEMS IN BUILDINGS (9)

Basics of electricity – Single / Three phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems and their choice – Planning electrical wiring for building – Main and distribution boards – Transformers and switch gears – Layout of substations

UNIT II PRINCIPLES OF ILLUMINATION & DESIGN (9)

Visual tasks – Factors affecting visual tasks – Modern theory of light and colour –Synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candela – Solid angle illumination – Utilisation factor – Depreciation factor – MSCP – MHCP – Lans of illumination – Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering. Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

UNIT III REFRIGERATION PRINCIPLES & APPLICATIONS (9)

Thermodynamics – Heat – Temperature, measurement transfer – Change of state – Sensible heat – Latent heat of fusion, evaporation, sublimation – saturation temperature – Super heated vapour – Sub cooled liquid – Pressure temperature relationship for liquids – Refrigerants – Vapour compression cycle – Compressors – Evaporators – Refrigerant control devices – Electric motors – Starters – Air handling units – Cooling towers – Window type and packaged air-conditioners – Chilled water plant – Fan coil systems – Water piping – Cooling load – Air conditioning systems for different types of buildings – Protection against fire to be caused by A.C. Systems

UNIT IV FIRE SAFETY INSTALLATION (9)

Causes of fire in buildings – Safety regulations – NBC – Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies, fire escapes and A.C. systems. Special features required for physically handicapped and elderly in building types – Heat and smoke detectors – Fire alarm system, snorkel ladder – Fire lighting pump and water storage – Dry and wet risers – Automatic sprinklers.

UNIT V PLUMBING AND DRAINAGE (9)

Plumbing fixtures and fixture fittings – Water conserving fittings – Over flows – Strainers and connectors – Prohibited fixtures – Special fixtures – Installation of water closet – Urinals - Flushing devices – Floor drains – Shower stall – Bath tub – Bidets – Minimum plumbing facilities – Rain water harvesting systems – Necessity – Construction – Different types .

TOTAL: L: 45 = 45 PERIODS

TEXT BOOKS:

1. Udayakumar, “A Text Book on Building Services”, Eswar Press, 2007.
2. Handbook for Building Engineers in Metric systems, NBC, New Delhi, 1968.

REFERENCES:

1. E.R.Ambrose, “Heat Pumps and Electric Heating”, John and Wiley and Sons, Inc., New York, 1968.
2. Handbook for Building Engineers in Metric systems, NBC, New Delhi, 1968.
3. R.G.Hopkinson and J.D.Kay, “The Lighting of buildings”, Faber and Faber, London, 1969.
4. William H.Severns and Julian R.Fellows, “Air-conditioning and Refrigeration”,John Wiley and Sons, London, 1988.
5. A.F.C. Sherratt, “Air-conditioning and Energy Conservation”, the Architectural Press, London, 1980.

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

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

15CSZ01 SOFTWARE ENGINEERING METHODOLOGIES
(Common to All branches except CSE Branch)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To Understand the life cycle models of software process
- To Understand fundamental concepts of requirements engineering.
- To learn the systematic procedure for software design
- To Implement the strategies for software testing
- To explore the significance of project planning and management.

COURSE OUTCOMES:

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

CO1: Identify the key activities in managing a software project.
CO2: Compare different process models.
CO3: Implement the Concepts of requirements engineering.
CO4: Apply systematic procedure for software design and deployment.
CO5: Compare and contrast the various testing and maintenance.

UNIT I: SOFTWARE PROCESS (9)

Introduction –Software Engineering Paradigm – life cycle models (water fall, incremental, spiral, WINWIN spiral, evolutionary, prototyping, object oriented) - system engineering – computer based system – verification – validation.

UNIT II: SOFTWARE REQUIREMENTS (9)

Functional and non-functional - user – system –requirement engineering process – feasibility studies – requirements – elicitation – validation and management – software prototyping – prototyping in the software process – rapid prototyping techniques – user interface prototyping -Software document. Analysis and modeling – data, functional and behavioral models – structured analysis and data dictionary.

UNIT III: SOFTWARE DESIGN (9)

Design process – Design Concepts-Design Model– Design Heuristic – Architectural Design – Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components.

UNIT IV: SOFTWARE TESTING (9)

Taxonomy of software testing – levels – test activities – types of software test – black box testing – testing boundary conditions – structural testing – test coverage criteria based on data flow mechanisms – regression testing – testing in the large - software testing strategies - testing using extreme programming.

UNIT V: SOFTWARE PROJECT MANAGEMENT (9)

Estimation – FP Based, LOC Based, Make/Buy Decision, COCOMO II - Planning – Project Plan, Planning Process, RFP Risk Management – Identification, Projection, RMMM - Scheduling and Tracking –Relationship between people and effort, Task Set & Network, Scheduling, EVA – Process and Project Metrics

. **TOTAL (L:45) = 45 PERIODS**

TEXT BOOK:

1. Roger S. Pressman, “Software Engineering – A Practitioner’s Approach”, 7th ed., Mc Graw-Hill International Edition, 2010.

REFERENCES :

1. Ian Sommerville, “Software Engineering”, 9th ed., Pearson Education Asia, 2011.
2. Rajib Mall, “Fundamentals of Software Engineering”, Third Edition, PHI COURSE Private Limited, 2009.
3. Pankaj Jalote, “Software Engineering - A Precise Approach”, Wiley India, 2010.
4. Kelkar S.A., “Software Engineering”, Prentice Hall of India Pvt Ltd, 2007.
5. Stephen R.Schach, “Software Engineering”, Tata McGraw-Hill Publishing Company.

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

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

15CSZ02 DESIGN THINKING

(Common to All branches except CSE Branch)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To acquire Design Thinking skills.
- To learn by doing projects.
- To solve so called "wicked problems" (problems for which neither question nor answer is well defined).

COURSE OUTCOMES:

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

CO1: Have a sense of self-efficacy & creative confidence

CO2: Interpret and visualize the scenario.

CO3: Know how to manage a Design Thinking workshop Layout, roles, times and process.

CO4: Apply Design thinking tools to increase research output.

CO5: Do experiments by creating prototype and by obtaining feedback.

UNIT I INTRODUCTION TO DESIGN THINKING (9)

Overview - Use of Design Thinking – Design Process. Getting Started: Define Challenges – Create a Project Plan. Design Thinking Tools.

UNIT II DISCOVERY (9)

Understand the Challenge: Review the Challenge - Build your Team - Refine your Plan. Prepare Research: Identify Sources of Inspiration - Select Research Participants - Prepare For Fieldwork. Gather Inspiration: Immerse Yourself in Context - Seek Inspiration In Analogous Settings - Learn From Experts - Learn From Users.

UNIT III INTERPRETATION (9)

Tell Stories: Capture Your COURSEs- Share Inspiring Stories. Search for meaning: Find Themes - Make Sense of Findings - Define Insights. Frame Opportunities: Create a Visual Reminder - Make Insights Actionable.

UNIT IV IDEATION (9)

Generate Ideas: Prepare for Brainstorming - Facilitate Brainstorming - Select Promising Ideas - Sketch to Think. Refine Ideas - Do a Reality Check - Describe Your Idea.

UNIT V EXPERIMENTATION AND EVOLUTION (9)

Make Prototypes: Create a Prototype. Get Feedback: Identify Sources for Feedback - Select Feedback Participants - Facilitate Feedback Conversations - Capture Feedback COURSEs - Integrate Feedback. Track COURSEs: Define Success - Document Progress. Move Forward: Plan Next.

TOTAL :(L: 45) = 45 PERIODS

REFERENCES:

1. http://www.designthinkingforeducators.com/toolkit
2. https://hbr.org/2008/06/design-thinking
3. http://asimetrica.org/wp-content/uploads/2014/06/design-thinking.pdf

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

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

13CSZ03 OPEN SOURCE SOFTWARE
(*Common to All branches except CSE Branch)*

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand the basics of open source operating systems.
- To gain the knowledge of working with Linux platform and open source database.
- To be familiar with programming languages PHP, Perl, Python.

COURSE OUTCOMES:

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

CO1: Install and run open-source operating systems.
CO2: Gather information about Free and Open Source Software projects from software releases and from sites on the internet.
CO3: Develop programs using PHP.
CO4: Solve problems using Python programming.
CO5: Develop programs using Perl.

UNIT I: INTRODUCTION **(9)**

Introduction to Open sources – Need of Open Sources – Advantages of Open Sources –Application of pen Sources. Open source operating systems: LINUX: Introduction – General Overview – Kernel Mode and user mode – Process – Advanced Concepts – Scheduling – Personalities – Cloning – Signals –Development with Linux.

UNIT II: OPEN SOURCE DATABASE (9)

MySQL: Introduction – Setting up account –Starting, terminating and writing your own SQL programs – Record selection Technology – Working with strings –Date and Time – Sorting Query Results – Generating Summary – Working with metadata – Using sequences –MySQL and Web.

UNIT III: OPEN SOURCE PROGRAMMING LANGUAGES **(9)**

PHP: Introduction – Programming in web environment – variables – constants – data types – operators – Statements – Functions – Arrays – OOP –String Manipulation and regular expression – File handling and data storage – PHP and SQL database – PHP and LDAP – PHP Connectivity – Sending and receiving E-mails –Debugging and error handling – Security – Templates.

UNIT IV: PYTHON **(9)**

Syntax and Style – Python Objects – Numbers – Sequences – Strings –Lists and Tuples – Dictionaries – Conditionals and Loops – Files – Input and Output –Errors and Exceptions – Functions – Modules – Classes and OOP –Execution Environment.

UNIT V: PERL **(9)**

Perl backgrounder – Perl overview – Perl parsing rules – Variables and Data – Statements and Control structures – Subroutines, Packages, and Modules- Working with Files –Data Manipulation.

TOTAL (L:45) = 45 PERIODS

TEXT BOOKS:

1. Remy Card, Eric Dumas and Frank Mevel, “The Linux Kernel Book”, Wiley Publications, 2003.
2. Steve Suchring, “MySQL Bible”, John Wiley, 2002.

REFERENCES:

1. Rasmus Lerdorf and Levin Tatroe, “Programming PHP”, O’Reilly, 2002
2. Wesley J. Chun, “Core Phython Programming”, Prentice Hall, 2001
3. Martin C. Brown, “Perl: The Complete Reference”, 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.
4. Steven Holzner, “PHP: The Complete Reference”, 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.

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

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

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, duple 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,
4. 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	L	T	P	C
(Common to All Branches except EEE branch)	3	0	0	3

OBJECTIVE:

- To disseminate an overview of various electric machines used in industries, power generation and home appliances with a technical know-how on the control techniques

COURSE OUTCOMES:

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

CO1: Understand the constructional details and principle of operation of DC motors,induction machines, alternators, transformers and fractional horse-power motors

CO2: Evaluate the performance of starting and operating characteristics of various electrical machines used in industrial and domestic applications

CO3: Choose an appropriate method of speed control and braking for the drive motors

CO4: Understand the concepts of synchronous motors

CO5: Understand the manufacturing concepts in machines

UNIT I : DC MOTORS **(9)**

Construction and working principle, emf equation, torque equation, starting and running characteristics, speed control, braking, duty of operation, choice of motors.

UNIT II : TRANSFORMERS **(9)**

Construction and working principle, equivalent circuit, regulation and efficiency, autotransformers, industrial applications – welding transformer and furnace transformer.

UNIT III : THREE PHASE INDUCTION MACHINES **(9)**

Construction and working principle. Induction motors - torqueequation, torque–slip characteristics, starting and running characteristics, speed control, braking, choice of motor for industrial applications and traction.

UNIT IV : SYNCHRONOUS MACHINES **(9)**

Construction, principle of operation and types, various types of excitation systems, stand alone and grid connected modes of operation, voltage and frequency control.

UNIT V : FRACTIONAL HORSE POWER MACHINES **(9)**

Factory Automation: Flexible Manufacturing Systems concept – Automatic feeding lines, ASRS, transfer lines, automatic inspection – Computer Integrated Manufacture – CNC - Intelligent automation - Industrial networking, - Bus standards - HMI Systems - DCS and SCADA - Wireless controls.

TOTAL: 45 PERIODS

TEXTBOOKS:

1. D.P.Kothari and I.J.Nagrath, 'Electric Machines', McGraw Hill Education Private Limited, 4th ed, 2010.
2. Ashfaq Husain, 'Electric machines', Dhanpat Rai & Company, 2nd ed, 2002.

REFERENCES:

1. Gopal K. Dubey, 'Fundamentals of Electrical Drives', Narosa publishing house, 2nd ed, 2011.
2. A Fitzgerald , Charles Kingsley , Stephen Umans, 'Electric Machinery', McGraw Hill Education Private Limited, 6th ed, 2002.
3. K. Murugesh Kumar, 'Induction & Synchronous Machines', Vikas Publishing House Pvt Ltd., 2009.
4. Edward Hughes, 'Electrical and Electronic Technology', Dorling Kindersley (India) Pvt. Ltd., 10th ed, 2011.

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

15EEZ04 WIND AND SOLAR ELECTRICAL SYSTEMS

L	T	P	C
3	0	0	3

(Common to All Branches except EEE branch)

OBJECTIVE:

- To familiarize the students with basics of solar and wind energy systems and various techniques for the conversion of solar and wind energy into electrical energy.

COURSE OUTCOMES:

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

CO1: Describe the solar radiation, measurements and characteristics of solar PV cell.
CO2: Develop the model of a PV system and its applications.
CO3: Describe the basic types and mechanical characteristics and model of wind turbine.
CO4: Analyze the electrical characteristics and operation of various wind-driven electrical generators.
CO5: Understand various power electronic converters used for hybrid system.

UNIT I INTRODUCTION TO SOLAR (9)

Basic characteristics of sunlight – solar spectrum – insolation specifics– irradiance and irradiation pyranometer – solar energy statics- Solar PV cell – I-V characteristics –P-V characteristics– fill factor- Modeling of solar cell– maximum power point tracking.

UNIT II PHOTO VOLATIC (9)

PV module – blocking diode and bypass diodes– composite characteristics of PV module – PV array– PV system –PV-powered fan–PV fan with battery backup – PV-powered pumping system – PV powered lighting systems–grid- connected PV systems.

UNIT III WIND ENERGY (9)

Wind source–wind statistics-energy in the wind –turbine power characteristics - aerodynamics – rotor types – parts of wind turbines– braking systems–tower- control and monitoring system.

UNIT IV GENERAL CHARACTERISTICS OF INDUCTION GENERATORS (9)

Grid-connected and self-excited systems – Steady state equivalent circuit - Performance predetermination – Permanent magnet alternators: steady-state performance.

UNIT V HYBRID SYSTEMS (9)

Power electronic converters for interfacing wind electric generators – Power quality issues - Wind-diesel systems – Wind-solar systems.

TOTAL = 45 PERIODS

TEXT BOOKS:

1. S N Bhadra, S Banerjee and D Kastha, 'Wind Electrical Systems', Oxford University Press, 1st Edition, 2005.
2. Chetan Singh Solanki, 'Solar Photovoltaics: Fundamentals, Technologies and Applications' PHI Learning Publications, 2nd Edition, 2011.

REFERENCES:

1. Roger A. Messenger and Jerry Ventre, "Photovoltaic Systems Engineering", Taylor and Francis Group Publications, 2nd Edition, 2003.
2. M. Godoy Simoes and Felix A. Farret, "Alternative Energy Systems: Design and Analysis with Induction Generators", CRC Press, 2nd Edition, 2008.
3. Ion Boldea, 'The Electric Generators Handbook- Variable Speed Generators', CRC Press, 2010.
4. Bin Wu, Yongqiang Lang, Navid Zargari, Samir Kouro, "Power Conversion and Control of Wind Energy Systems", IEEE Press Series on Power Engineering, John Wiley & Sons, 2011.
5. S. Sumathi,L. Ashok Kumar,P. Surekha ,'Solar PV and Wind Energy Conversion Systems', Springer 2015.

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

15EIZ01 AUTOTRONIX

(Common to ALL Branches Except EIE)

L	T	P	C
3	0	0	3

OBJECTIVE:

This course focuses on the extent and nature of electronic circuitry in automotive systems including monitoring and control circuits for engines, emission control system, ignition systems and fuel systems. The course imparts applications of sensors on automotive systems.

COURSE OUTCOMES:

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

CO1: Understand the application of electronics in automotive industry.
CO2: Identify different control systems in automotives and their control.
CO3: Design and implement various control algorithms in automotives.
CO4: Demonstrate different instrumentation systems in automotives.
CO5: Identify, formulate and solve real time engineering problems.

UNIT I FUNDAMENTALS OF AUTOMOTIVE ELECTRONICS (9)

Electronic Engine Management System – Components – Open and Closed Loop Control Strategies – PID Control – Look Up Tables – Introduction – Modern Control Strategies Like Fuzzy Logic and Adaptive Control – Controlled Parameters – SI and CI Engines.

UNIT II SENSORS AND ACTUATORS (9)

Introduction – Basic Sensor Arrangement – Types Of Sensors – Hall Effect Sensor – Hot Wire Anemometer – Thermistor – Piezo-Electric Sensor – Piezo-Resistive Sensors – Oxygen Concentration Sensor – Lambda Sensor – Crankshaft Angular Position Sensor – Cam Position Sensor – Mass Air Flow (MAF) Rate – Manifold Absolute Pressure (MAP) – Throttle Plate Angular Position – Engine Oil Pressure Sensor – Vehicle Speed Sensor – Stepper Motors – Relays – Detonation Sensor – Emission Sensors.

UNIT III SPARK IGNITION ENGINE MANAGEMENT (9)

Feedback Carburetor System – Throttle Body Injection – Multi Point Fuel Injection System – Injection System Controls –Advantage of Electronic Ignition Systems – Three Way Catalytic Converter – Conversion Efficiency Versus Lambda – Group and Sequential Injection Techniques – Fuel System Components – Advantages of Electronic Ignition Systems – Solid State Ignition Systems – Principle Of Operation – Types – Contact Less Electronic Ignition System – Electronic Spark Timing Control.

UNIT IV COMPRESSION IGNITION ENGINE MANAGEMENT (9)

Fuel Injection System – Parameters Affecting Combustion – Noise and Emissions in CI Engines – Pilot, Main, Advanced – Post Injection and Retarded Post Injection – Electronically Controlled Unit Injection System – Layout of the Common Rail Fuel Injection System – Fuel Injector – Fuel Pump – Rail Pressure Limiter – Flow Limiter – Working Principle – EGR Valve Control in Electronically Controlled Systems.

UNIT V DIGITAL ENGINE CONTROL SYSTEM (9)

Open Loop and Closed Loop Control System – Engine Cooling and Warm Up Control – Idle Speed Control – Acceleration and Full Load Enrichment – Deceleration Fuel Cut-off – Fuel Control Maps – Open Loop Control of Fuel Injection – Closed Loop Lambda Control – Exhaust Emission Control – On Board Diagnostics: Diagnostics – Future Automotive Electronic Systems.

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. Arthur Primrose Young, Leonard Griffiths, “Automobile Electrical and Electronic Equipment: Theory and Practice for Students, Designers, Automobile Electricians and Motorists”, London Butterworths, Ninth Edition, 1986.
2. William Ribbens, “Understanding Automotive Electronics: An Engineering Perspective”, Butterworth-Heinemann, Seventh Edition, 2013.

REFERENCES:

1. Allan Bonnick, “Automotive Computer Controlled Systems” Taylor & Francis, Fifth Edition, 2001.
2. Tom Denton, “Automobile Electrical and Electronics Systems”, Butterworth- Heinemann, Fourth Edition, 2004.
3. Robert Bosch GmbH and Horst Bauer, “Gasoline-Engine Management”, Bentley Publishers, Second Edition, 2006.

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

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

15EIZ02 FIBER OPTIC SENSORS

(Common to ALL Branches Except EIE)

L	T	P	C
3	0	0	3

OBJECTIVE:

- This course introduces fundamental physical principles of both classical and modern optics as well as principles of optical design used in the engineering of optical systems.
- The course also provides exposure to practical aspects of optical materials and devices.
- The intention of the course is to provide foundation of basic principles, design methodology, and practical considerations needed to design or use optical and laser instruments in engineering practice.

COURSE OUTCOMES:

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

CO1: Understand the basic concepts of optical fibres and their properties.

CO2: Have adequate knowledge about the Industrial applications of optical fibres.

CO3: Relate and identify different types of lasers and their applications.

CO4: Demonstrate industrial applications of lasers.

CO5: Understand holography and medical applications of laser.

UNIT I OPTICAL FIBRES AND THEIR PROPERTIES (9)

Principles of light propagation through a fibre - Different types of fibres and their properties, fibre characteristics – Absorption losses – Scattering losses – Dispersion – Connectors & splicers – Fibre termination – Optical sources – Optical detectors.

UNIT II INDUSTRIAL APPLICATION OF OPTICAL FIBRES (9)

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

UNIT III LASER FUNDAMENTALS (9)

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

UNIT IV INDUSTRIAL APPLICATION OF LASERS (9)

Laser for measurement of distance, length, velocity, acceleration, current, voltage and atmospheric effect – Material processing – Laser heating, welding, melting and trimming of material – Removal and vaporization.

UNIT V HOLOGRAM AND MEDICAL APPLICATIONS (9)

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

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. J.M. Senior, 'Optical Fibre Communication – Principles and Practice', Prentice Hall of India, 2009.
2. J. Wilson and J.F.B. Hawkes, 'Introduction to Opto Electronics', Prentice Hall of India, 2001.

REFERENCES:

1. Donald J.Sterling Jr, 'Technicians Guide to Fibre Optics', 3rd Edition, Vikas Publishing House, 2000.
2. M. Arumugam, 'Optical Fibre Communication and Sensors', Anuradha Agencies, 2002.
3. John F. Read, 'Industrial Applications of Lasers', Academic Press, 2004.
4. Monte Ross, 'Laser Applications', McGraw Hill, 2008
5. G. Keiser, 'Optical Fibre Communication', McGraw Hill, 2003.
6. Mr. Gupta, 'Fiber Optics Communication', Prentice Hall of India, 2004.

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

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

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	

Approved by Seventh Academic Council

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 Investigations‖, 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:

3. Understand system requirements for mobile applications.
4. Generate suitable design using specific mobile development frameworks.
5. Generate mobile application design.
6. Implement the design using specific mobile development frameworks.
7. Deploy the mobile applications in marketplace for distribution.

.

COURSE OUTCOMES:

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

CO1: Describe the requirements for mobile applications

CO2: Explain the challenges in mobile application design and development

CO3: Implement the design using Android SDK

CO4: Implement the design using Objective C and iOS

CO5: Deploy mobile applications in Android and iPone marketplace for distribution

UNIT I INTRODUCTION **(9)**

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

UNIT II BASIC DESIGN **(9)**

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

UNIT III ADVANCED DESIGN **(9)**

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

UNIT IV TECHNOLOGY I - ANDROID **(9)**

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

UNIT V TECHNOLOGY II - IOS **(9)**

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

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. http://developer.android.com/develop/index.html.

2. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012

REFERENCES:

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

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

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

15ITZ04 - SOFTWARE PROJECT MANAGEMENT

(Common to All branches except IT Branch)

L	T	P	C
3	0	0	3

OBJECTIVE:

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

.

COURSE OUTCOMES:

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

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

CO2: Apply appropriate approaches to plan a new project.

CO3: Apply appropriate methodologies to develop a project schedule.

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

UNIT I INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT (9)

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

UNIT II PROJECT EVALUATION (9)

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

UNIT III ACTIVITY PLANNING (9)

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

UNIT IV MONITORING AND CONTROL (9)

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

UNIT V MANAGING PEOPLE AND ORGANIZING TEAMS (9)

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

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOK:

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

REFERENCES:

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

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

Mapping of COs and POs

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

15MEZ01 SIX SIGMA

(Common to All Branches except Mechanical Engineering)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To introduce the techniques and phases of six sigma
- To acquire knowledge on design for six sigma during product development stage
- To introduce the lean concepts in service sectors

COURSE OUTCOMES:

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

CO1: Formulate the six sigma project definition for process improvement in an industry
CO2: Summarize the stages in preparation of technical requirements and team formation
CO3: Create a project definition document and/or assess the process condition through collected data
CO4: Apply the six sigma tools the analyze the process parameters and/or identify the scope for process improvement
CO5: Recommend a system to sustain the results and/or list the tools in design for six sigma and lean servicing

UNIT I : INTRODUCTION **(9)**

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

UNIT II : PREPARATION PHASE **(9)**

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

UNIT III : DEFINE AND MEASURE PHASE **(9)**

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

UNIT IV: ANALYZE AND IMPROVE PHASE **(9)**

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

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

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

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. Michael L George, David T Rowlands, and Bill Kastle, “What is Lean Six Sigma”, McGraw Hill, New York, 2004
2. Betsi Harris Ehrlich, “Transactional Six Sigma and Lean Servicing”, St. Lucie Press, 2002.

REFERENCES:

1. Kai Yang and Basem El Haik, “Design for Six Sigma”, McGraw Hill, New York, 2004
2. Thomas Pyzdek, “Six Sigma Handbook: Complete Guide for Green belts, Black belts and Managers at All Levels”, Tata McGraw Hill Companies Inc, 2003
3. Donald W Benbow and Kubiak T M, “Certified Six Sigma Black Belt Handbook”, Pearson Education,2007
4. Urdhwarashe, “Six Sigma for Business Excellence”, 1st ed., Pearson Education India, 2010
5. Gopalakrishnan. N, “Simplified Six Sigma: Methodology, Tools and Implementation, Prentice Hall India, 2012.

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

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

15MEZ02 PROJECT MANAGEMENT
(Common to All Branches except Mechanical Engineering)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To gain knowledge about project, project management and its basics
- To know stages of project management in an organization
- To understand the roles and responsibilities of a project manager

COURSE OUTCOMES:

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

CO1: Demonstrate the skill set of a project manager
CO2: Develop skills in managing project works by effective team building
CO3: Strategize proper plan and premeditate the risks related to projects
CO4: Phase the project work as various stages and develop skills to control the project
CO5: Apply project management concepts by identifying and carrying out a real time project

UNIT I : PROJECTS, PROJECT MANAGEMENT AND PROJECT MANAGER (9)

Project Management - process context - interpersonal and behavioral context - organizational context - defining project success - responsibilities of project manager - common challenges expected to face - skill requirements and functional competencies - unofficial job duties - value of introspection and self-awareness to the soft side

UNIT II : PROJECT DEFINITION, EFFECTIVE TEAM BUILDING (9)

Evolution of projects - understanding the problem - identification of optimum solution - development of solution and preliminary plan - formal launching of project - evaluation of political environment - mechanics of building a team - team leadership - fostering teamwork and synergism - getting the most from team members

UNIT III : PROJECT PLANNING, RISK AND UNCERTAINTY (9)

Project Planning - estimating - scope management - time management - cost management - project management software - understanding risk and uncertainty - managing risk - identifying what can hurt you - quantifying how badly you can get hurt - analyzing the biggest threats - responding to high-threat problems - accommodating uncertainty

UNIT IV: PROJECT CONTROL AND INTERFACES (9)

Project Control - Establishing a Baseline of Measurement - Information Needs - Information Gathering - ensuring Good Information - Analyzing the Information - Reacting to the Information - Project Interfaces - Roles of Internal Stakeholders and External Stakeholders - Other Interfaces - Considerations in Interface Management

UNIT V : PROJECT COMMUNICATION, DOCUMENTATION AND CONCLUSION (9)

Configuration plan - documentation and communication road map - methods of communicating - guidelines for effective communication - conducting high quality meetings - communication skills - key project documentation - early termination - key elements in project closure - punch list approach - project completion checklist

TOTAL (L:45) : 45 PERIODS

TEXTBOOKS:

1. Gary R. Heerkens, "Project Management", 2nd ed., McGraw-Hill Book Company, 2013

REFERENCES:

1. Harold Kerzner, "Project Management", 12th ed., John Wiley & Sons, 2017
2. John M Nicholas, Herman Steyn, "Project Management for Engineering, Business and Technology", 5th ed., Taylor&Francis, 2016
3. Prasanna Chandra, "Projects : Planning, Analysis, Selecting, Financing, Implementation and Review",
4. 8th ed., McGraw Hill Education, 2017
5. Eric W Larson and Clifford F Gray, Gautam V Desai, "Project Management: The Managerial Process",
6. 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**	

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. Prem Kumar Gupta , D.S. Hira “Operations Research”, S. Chand & Company Ltd., New Delhi, Third Edition, 2003.
2. 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

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	

Approved by Seventh Academic Council

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

Statistics – Definition, Types. Types of variables – Organizing data – Descriptive Measures: Mean, Standard Deviation, Mean Deviation. **(9)** Median, Mode,

UNIT II INTRODUCTION TO PROBABILITY **(9)**

Basic definitions and rules for probability - conditional probability - independence of events - Probability distributions: Binomial, Poisson and Normal distributions.

UNIT III TESTING OF HYPOTHESIS **(9)**

Hypothesis testing: one sample and two sample tests for means and proportions of large samples(z-test), one sample and two sample tests for means of small samples (t-test), F-test for two sample standard deviations. ANOVA one way and two ways.

UNIT IV NON-PARAMETRIC METHODS **(9)**

Chi-square test for single sample standard deviation. Chi-square tests for independence of attributes and goodness of fit. Rank sum test. Kolmogorov – Smirnov – test for goodness of fit, comparing two populations. Mann – Whitney U test and Kruskal Wallis test.

UNIT V CORRELATION, REGRESSION AND TIME SERIES ANALYSIS **(9)**

Correlation analysis, estimation of regression line. Time series analysis: variations in time series, Trend analysis, Cyclical variations, seasonal variations and irregular variations (Self-study).

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOKS:

1. Richard I.Levin, David S.Rubin, Statistics for Management, 7th Ed, 2011.
2. Aczel A.D. and Sounderpandian J., Complete Business Statistics 6th edition, Tata McGraw – Hill, Publishing company Ltd, New Delhi, 2012.

REFERENCES:

1. Srivatsava TN and Shailaja rego, Statistics for Management Tata McGraw Hill, 2008.
2. Ken Black, Business Statistics, 6th Ed., Wiley India Edition, 2009.
3. Anderson D.R. Sweeney D.J. and Williams T.A., Statistics for business and economics, 9th edition, Thomson (South- Western) Asia, Singapore, 2012.
4. N.D.Vohra, Business Statistics, Tata McGraw Hill, 2012.

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

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

Approved by Seventh Academic Council

15PYZ01- NANOMATERIALS
(Common to All Branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To provide basic knowledge about nanomaterials
- To understand the properties of nanomaterials and the mechanisms used in characterization
- To provide in-depth knowledge in characterization of nanomaterials in engineering and biology.
- To provide knowledge various testing mechanisms adopted for nanomaterials
- To understand the ways of full utilization of nanomaterials in various fields

COURSE OUTCOMES:

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

CO1 : Acquire knowledge of basics of nanomaterials
CO2 : Understand the peculiar properties of nanomaterials
CO3 : Know the various microscopy techniques involved in analysis of nanomaterials
CO4 : Understand the synthesis of different types of nanomaterials
CO5 : Appreciate the application of nanomaterials in engineering and biology

UNIT I - FUNDAMENTAL PRINCIPLES OF NANOMATERIALS **(9)**

Size & scale, units, scaling Laws, atoms, molecules & clusters, super molecules, nanoscale phenomena; Tunneling, Chemical Bonds (types and strength); Intermolecular forces, molecular and crystalline structures; Hierarchical structures and functionality; Surfaces and interfaces, bulk to surface transition, self-assembly and surface reconstruction.

UNIT II – PROPERTIES OF NANO MATERIALS **(9)**

Size dependence of properties, phenomena and properties at nanoscale; Mechanical/frictional, optical, electrical transport; Magnetic properties.

UNIT III – SYNTHESIS OF NANOMATERIALS **(9)**

Fabrication techniques: Self-assembly, self-replication, sol-gels; Langmuir-Blodgett thin films, nanolithograph, bio-inspired syntheses, microfluidic processes; Chemical vapor deposition; Semiconductors, cadmium sulfide, silicon, fullerenes carbon nanotubes; Nano-composites, nanoporous materials, biological materials.

UNIT IV –NANOMATERIAL CHARACTERIZATION **(9)**

Electron microscopy, scanning probe microscopies, near field microscopy, micro- and near field Raman spectroscopy, surface-enhanced Raman, spectroscopy, X-ray photoelectron spectroscopy.

UNIT V –APPLICATIONS OF NANOMATERIALS **(9)**

Nanoelectronics, Nanosensors, environmental, biological, energy storage and fuel cells.

TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. Edelstein A. A. and Cammarata R .C., "Nanomaterials- Synthesis, Properties and Applications", Institute of Physics Publishing, 1998.
2. Nalwa H.S., "Handbook of Nanostructured Materials and Nanotechnology", Vols. 1- 5, Academic Press 2000.

REFERENCES:

1. Benedek et al G., "Nanostructured Carbon for Advanced Applications", Kluwer Academic Publishers 2001.

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

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

15PYZ02- NUCLEAR PHYSICS AND REACTORS
(Common to All Branches)

L	T	P	C
3	0	0	3

OBJECTIVE:

- To provide knowledge of building block of nature –Nuclei –and its interaction with light
- To provide knowledge about the various reactors and power generation
- To empower knowledge in core science of reactor designing.
- To provide the understanding of different types of reactors
- To provide understanding of effective methods to utilize the nuclear energy

COURSE OUTCOMES:

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

CO1 : Acquire knowledge regarding fundamentals of nuclear reactions
CO2 : Understand the interaction of light with matter
CO3 : Acquire the knowledge about power generation form nuclear reactions
CO4 : Understand the mechanisms involved in reactor designing
CO5 : Enhance knowledge of thermal energy generation and reactor safety

UNIT I - STRUCTURE OF NUCLEI AND REACTIONS **(9)**

Fundamental particles, structure of nuclei; Binding Energy – nuclear stability – radioactive decay-nuclear reactions

UNIT II – INTERACTION OF RADIATION WITH MATTER **(9)**

Neutron interactions- energy loss in scattering collisions. Nuclear fission reaction- gamma ray interaction with matter-charged particles.

UNIT III – NUCLEAR REACTOR AND NUCLEAR POWER **(9)**

Fission chain reaction – reactor fuels. Nuclear power resources- power plants –nuclear reactors

UNIT IV–NUCLEAR REACTOR THEROY **(9)**

One group reactor equation –slab reactor –thermal reactor –reflected reactor

UNIT V –HEAT REMOVAL FROM NUCLEAR REACTORS **(9)**

Heat generations in reactors – heat flow in reactors, heat transfer mechanism. Radiation shielding: Gamma ray shielding, nuclear reactor shielding.

TOTAL (L:45) : 45 PERIODS

TEXT BOOK:

1. Leroy Murray Raymond: Nuclear Reactor Physics", Prentice Hall

REFERENCE:

1. R. Lamarsh John, J. Baratta Anthony, "Introduction to Nuclear Engineering".

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

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

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

Basic principles -Keplerian orbits and Kepler equations. Orbital elements, from velocity and position Perturbation theory and applications, Data receiving and handling **(9)** information.

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:

1. Space Science and Technology by Hans Mark, John Wiley and Sons.
2. The Cambridge encyclopedia of Space, missions, applications and exploration by Verger et at, Cambridge University Press 2003
3. Space environment and it's interaction with spacecraft by C. Uberoi and S.C. Chakravorty, IISc — ISRO Educational Program
4. 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

CO1: Identify the role and importance of chemistry in daily life.

CO2: Understand the thermodynamic and predict the feasibility of chemical reactions.

CO3: Use the modern engineering tools for building materials and their industrial applications

CO4: Acquire the knowledge of industrial importance of phase rule and alloys.

CO5: 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 l. 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**						

Approved by Seventh Academic Council

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						

Approved by Seventh Academic Council