Sri Chandrasekharendra Saraswathi Viswa MahaVidyalaya

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Approved by AICTE, New Delhi | Enathur, kanchipuram-631561

Department of Electronics and Communication Engineering

BE – ECE
First year syllabus
(2024 -2025)

"Your Journey to Knowledge Begins Here"

CURRICULUM

SEMESTER - I

Sl.No	Course Code	Course Name	Category	Hours Per Week			C	IA	EA	TM
				L	T	P				
1.		English	AEC- 1	2	0	0	2	40	60	100
2.		Mathematics –I (Calculus & Differential Equations)	BSC	3	1	0	4	40	60	100
3.		Engineering Physics	BSC	3	0	0	3	40	60	100
4.		Universal Human Values	VAC - 1	2	0	0	3	40	60	100
5.		Environmental Science and Engineering	MC-1*	2	0	0	0	100	-	100
6.		Design Thinking	VSEC-1	2	0	0	2	40	60	100
7.		Engineering Physics Lab	BSC	0	0	2	2	40	60	100
8.		IDEA Workshop Lab	DIY-1	0	0	2	2	40	60	100
Total							**18**			

SEMESTER - II

Sl.No	Course Code	Course Name	Category	Hours Per Week			C	IA	EA	TM
				L	T	P				
1.		Mathematics–II (Linear Algebra, Transform Calculus and Numerical Methods)	BSC	3	1	0	4	40	60	100
2.		Engineering Chemistry	BSC	3	0	0	3	40	60	100
3.		Basic Electrical & Electronics Engineering	ESC	2	1	0	3	40	60	100
4.		Programming for Problem Solving	ESC	3	0	0	2	40	60	100
5.		Engineering Graphics and Design [T&P]	ESC	2	0	1	3	40	60	100
6.		Engineering Chemistry Lab	BSC	0	0	2	2	40	60	100
7.		Basic Electrical & Electronics Engineering Lab	ESC	0	0	2	2	40	60	100
8.		Programming for Problem Solving Lab	ESC	0	0	2	2	40	60	100
9.		Soft Skills	VSEC-2	2	0	0	1	100	-	100
10.		Industrial Visit / Survey/ Technical Seminar	ELC	-	-	-	0	-	-	-
11.		NSS/Technical Club/ Green Cell/ Archeological Site Visit and Survey	CEA	-	-	-	0	-	-	-
Total							**22**	**-**	**-**	**-**

SEMESTER - III

S.No	Course Code	Course Name	Category	Hours per week			C	IA	EA	TM
				L	T	P				
1.		Mathematics–III (Probability And Statistics)	BSC	2	1	0	3	40	60	100
2.		Electronic Devices	PCC	3	0	0	3	40	60	100
3.		Digital System Design	PCC	3	0	0	3	40	60	100
4.		Signals And Systems	PCC	3	0	0	3	40	60	100
5.		Network Theory	PCC	3	0	0	3	40	60	100
6.		Object Oriented Programming using C++[T&P]	ESC	2	0	1	3	40	60	100
7.		Electronic Devices Laboratory	PCC	0	0	2	1	40	60	100
8.		Digital System Design Laboratory	PCC	0	0	2	1	40	60	100
9.		Ability Enhancement Course1*	AEC - I	-	1	0	0	100	-	100
10.		Vocational Skill Enhancement Course*	VSEC - III	0	0	2	1*	100	-	100
11.		Skill Development Course *	SEC - III	-	0	0	1*	100	-	100
			Total	**16**	**1**	**7**	**20**	-	-	

SEMESTER - IV

S.No	Course Code	Course Name	Category	Hours per week			C	IA	EA	TM
				L	T	P				
1.		Mathematics-IV (Calculus, Special Functions and Design of Experiments)	BSC	3	0	0	3	40	60	100
2.		Analog Electronics	PCC	3	0	0	3	40	60	100
3.		Analog And Digital Communication	PCC	3	0	0	3	40	60	100
4.		Microprocessor And Microcontrollers	PCC	3	0	0	3	40	60	100
5.		Data Structure [T&P]	PCC	2	0	1	3	40	60	100
6.		Electromagnetic Fields and Waveguides	PCC	3	0	0	3	40	60	100
7.		Analog Electronics Laboratory	PCC	0	0	2	1	40	60	100
8.		Analog And Digital Communication Laboratory	PCC	0	0	2	1	40	60	100
9.		Microprocessor and Microcontrollers Laboratory	PCC	0	0	2	1	40	60	100
10.		Micro Project	DIY - II	0	0	2	1*	40	60	100
11.		Sanskrit And Indian Culture *	MC*	1	0	0	1*	40	60	100
12.		Programming With MATLAB *	AEC - II	0	0	2	1*	-	-	100
13.		Summer Training Internship *	VSEC - IV	0	0	0	1*	-	-	100
			Total	**18**	**0**	**11**	**21**	**-**	**-**	

[**L** -Lecture, **T**- Theory, **P**-Practical, **C**-Credit, **IA**- Internal Assessment, **EA**- External Assessment, **TM**-Total Mark]

* **Not calculated for CGPA**

SEMESTER - I

Course Code		L	T	P	C	IA	EA	TM
Course Name	ENGLISH	2	0	0	2	40	60	100
Course Category	ABILITY ENHANCEMENT COURSE/ UMANITIES/SOCIAL SCIENCE/ MANAGEMENT COURSE	Syllabus Revision					V.1.0	
Pre-requisite								

Course Objectives:

The course should enable the students:

1. To enhance proficiency in English language skills.
2. To develop ability to think analytically, speculatively and imaginatively.
3. To see themselves as professionals, as part of a discipline with skills and abilitiesvaluable in business, teaching, publishing, etc.

Course Outcomes:

On completion of the course, the student will be able to:

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Understand the nuances of grammar and vocabulary in speaking and writing	K2
CO2	Listen and comprehend different spoken excerpts critically, infer and implied meanings.	K1
CO3	Speak convincingly, express their opinions clearly, initiate a discussion, negotiate, and argue using appropriate communicativestrategies.	K4
CO4	Read different genres of texts, infer implied meanings and critically analyze and evaluate them for ideas as well as for Method of presentation.	K2
CO5	Write effectively and persuasively and by using different techniques of writing such as narration, description, exposition and argument as well as creative, critical, analytical and Evaluative writing.	K4

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)	Program Specific

												Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	-	-	-	-	M	L	L	L	M	M	L	M	-	-	-
CO2	-	-	-	-	M	L	L	L	L	L	L	M	-	-	-
CO3	-	-	-	-	L	L	L	L	L	L	L	L	-	-	-
CO4	-	-	-	-	L	L	L	L	L	L	L	L	-	-	-
CO5	-	-	-	-	M	L	L	L	M	M	L	M	-	-	-

UNIT-I	VOCABULARY BUILDING	9 Hours

The concept of Word Formation - Root words from foreign languages and their use in English - Acquaintance with prefixes and suffixes from foreign languages in English to form Derivatives - Synonyms, antonyms, and standard abbreviations.

UNIT-II	BASIC WRITING SKILLS	9 Hours

Sentence Structures - Use of phrases and clauses in sentences - Importance of proper punctuation - Creating coherence - Organizing principles of paragraphs in documents - Techniques for writing precisely.

UNIT-III	IDENTIFYING COMMON ERRORS IN WRITING	9 Hours

Subject-verb agreement - Noun pronoun agreement - Misplaced modifiers - Articles - Prepositions - Redundancies – Clichés.

UNIT-IV	NATURE AND STYLE OF SENSIBLE WRITING	9 Hours

Describing – Defining – Classifying - Providing examples or evidence -Writing introduction and conclusion.

UNIT-V	WRITING PRACTICES	9 Hours

Comprehension - Précis Writing - Essay Writing.

UNIT-VI	ORAL COMMUNICATION	

(This involves interactive practice sessions in Language Lab)

Listening Comprehension - Pronunciation, Intonation, Stress and Rhythm - Common Everyday situations: Conversations and Dialogues - Communication at Workplace – Interviews - Formal

Presentations		
	Total Hours	**45 Hours**
Text Book(s)		
1.	Practical English Usage. MichaelSwan.OUP. 4th edition.	
2.	Remedial English Grammar. F.T.Wood.Macmillan.Jan-2014.	
3.	On Writing Well William Zinsser. Harper Resource e Book.9th May 2006.	
Reference Book(s)		
1.	Study Writing, Liz Hamp – Lyons and Ben Heasly, Cambridge University Press, 2nd edition, 31st Jan2007.	
2.	Communication Skills, Sanjay Kumar and Pushpa Lata, Oxford University Press, 2nd Edition, 2015.	

Course Code		L	T	P	C	IA	EA	TM
Course Name	MATHEMATICS -I (CALCULUS AND DIFFERENTIAL EQUATIONS)	3	1	0	4	40	60	100
Course Category	BASIC SCIENCE COURSE	Syllabus Revision					V.1.0	
Pre-requisite								

Course Objectives:
The course should enable the students -

1. To familiarize with techniques in calculus, differential equations, sequence and series.
2. It aims to equip with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics.

Course Outcomes:
On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	The concept of convergence and divergence and their testing that is fundamental to application of analysis to Engineering probes.	K3
CO2	The effective mathematical tools for the solutions of differential equations that model physical processes.	K5
CO3	To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.	K5
CO4	The mathematical tools needed in evaluating multiple integrals and their usage. To deal with functions of several variables those are essential in most branches of engineering.	K5
CO5	To improve the ability of numerical computations to find the solutions of a given polynomial and transcendental equations along knowing the process of inter and extrapolations that improves the ability of solving helps to perform computational engineering problems.	K3

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)	Program Specific

												Outcomes (PSOs)		
	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	S	S	S	S	S	-	M	-	-	M	M	M	_	_	_
CO2	S	S	S	S	S	-	-	-	M	M	L	M	_	_	_
CO3	S	S	S	S	S	-	M	-	L	M	L	M	_	_	_
CO4	S	S	S	S	S	-	M	L	M	M	M	M	_	_	_
CO5	S	S	S	S	S	-	L	-	L	M	L	M	_	_	_

UNIT-I	SEQUENCES AND SERIES	12 Hrs

Convergence of sequence and series -Tests for convergence -Comparison,-Ratio- Cauchy's Root-Raabe's test-logarithmic test- Fourier series: Half range sine and cosine series- Parseval's theorem.

UNIT-II	DIFFERENTIAL EQUATIONS	12 Hrs

Second order linear differential equations with constant coefficients– Cauch Euler equation, Legendre equation-Method of variation of parameters-First order partial differential equations: Formation of PDE -solutions of first order linear PDEs.

UNIT-III	CALCULUS	12 Hrs

Evaluation of definite integral-Applications of definite integrals- To evaluate surface areas and volumes of revolutions; Beta and Gamma functions and their properties.

UNIT-IV	MULTIVARIABLE CALCULUS	12 Hrs

Multiple Integration-double and triple integrals (Cartesian and polar)-change of order of integration in double integrals-Change of variables (Cartesian and polar) Applications - areas and volumes by double integration-Center of mass and Gravity (constant and variable densities).

UNIT-V	NUMERICAL METHODS	12 Hrs

Solution of polynomial and transcendental equations–Bisection method-Newton-Raphson method-Regula-Falsi method- Finite Differences-Interpolation using Newton's forward and backward difference formulae- Central difference interpolation-Gauss's forward and backward formulae.

	Total Hours	60 Hrs

Text Book(s)

1.	B.S.Grewal, "Higher Engineering Mathematics", Khanna Publishers, 43rd Edition Jan2010.
Reference Book(s)	
1.	G.B.Thomas and R.L.Finney, Calculus and Analytic geometry, Pearson, 9th Edition Jan2010.
2.	T.Veerarajan, Engineering Mathematics, Mc Graw-Hill, New Delhi, 3rd Edition 2011.
3.	B.V.Ramana, Higher Engineering Mathematics, Mc Graw Hill, New Delhi, 2010.
4.	N.P.Baliand M.Goyal, A text book of Engineering Mathematics, Laxmi Publications, 9th Edition, 2016.

Course Code		L	T	P	C	IA	EA	TM
Course Name	ENGINEERING PHYSICS	3	0	0	3	40	60	100
Course Category	BASIC SCIENCE COURSE	Syllabus Revision					V.1.0	
Pre-requisite								

Course Objectives:

The course should enable the students -

1. Theory of Interference-Newton strings, Michelson Interferometer and Fresnel and Fraunhoffer diffraction, Diffraction due to "n" slits - Plane Transmission grating.
2. Energy distribution in black body - Planck's law, De Broglie matter waves – dual nature and expression, Schrodinger Time Independent and Dependent, wave equation, Expression for particle in1-D box and applications.
3. Laser - Principles and Properties, Einstein's theory, Types of lasers – Nd: YAG and CO2 laser Applications of lasers – IR Thermograph, Optical fibers-Types of optical fibers, Acceptance angle and numerical aperture, Fiber losses, Applications in engineering and medicine.
4. PN Junction diode and Zener diode - V-I characteristics, BJT, SCR, FET, D-MOSFET, E-MOSFETCharacteristics, Characteristics of CMOS, Logic Gates and Universal Building Blocks.
5. Fundamentals of dielectric materials, Internal field and Clausius - Mossotti relation, Super conductors–properties and types - BCS theory, Nano materials – Synthesis, Ball milling and PVD method.Principle and properties of SMA and Biomaterials.

Course Outcomes:

On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	To develop an understanding of the principles of optics.	K2
CO2	Experience the diverse applications of the wave equation. Learn the mathematical tools needed to solve quantum Mechanics problems.	K4
CO3	To provide adequate knowledge on laser fundamentals types and applications and to expose the basics of signal propagation through fiber optics	K2
CO4	Understand the principles and concepts of semiconductor Physics. Understand and utilize the mathematical models of Semi conductor junctions and MOS transistors for circuits and systems.	K2
CO5	Acquire basic knowledge on various newly developed smart	K2

	materials.	

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2	PSO3
CO1	S	S	M	M	M	L	M	L	M	M	L	L	-	-	-
CO2	S	S	S	S	S	M	M	L	M	M	L	L	-	-	-
CO3	S	S	S	S	S	M	M	M	M	S	S	S	-	-	-
CO4	S	S	S	S	S	L	L	L	M	M	M	M	-	-	-
CO5	M	M	M	M	M	S	S	M	M	M	M	M	-	-	-

UNIT-I	WAVE OPTICS	9 Hours

Huygens' principle, superposition of waves –Theory of interference of light -Young's double slit experiment. Thin films- Newton's rings, Michelson interferometer-Anti reflection coating. Fresnel and Fraunhofer diffraction– diffraction due to 'n' slits- plane transmission grating. Rayleigh criterion for limit of resolution - resolving power ofgrating.

UNIT-II	QUANTUM PHYSICS	9 Hours

Black body radiation-Planck's law – Energy distribution function, Wave – particle duality-de Broglie matter waves – Concept of wave function and its physical significance – Heisenberg's Uncertainty Principle – Schrodinger's wave equation – Time independent and Time dependent equations – Particle in a one dimensional rigid box – tunneling (Qualitative) – Scanning tunneling microscope.

UNIT-III	PHOTONICS	9 Hours

Einstein's theory of matter radiation interaction and A and B coefficients; Properties of laser-spontaneous and stimulated emission, amplification of light by population inversion, different types of lasers: solid-state laser(Neodymium), gas lasers (CO_2), applications –IR Thermography.

Optical fibre- principle [TIR]-types-material, mode, refractive index-Fibre loss-Expression for acceptance angle and numerical aperture. Application-Communication.

UNIT-IV	SEMICONDUCTOR DEVICES AND APPLICATIONS	9 Hours

Introduction to P-N junction Diode and V-I characteristics, Zener diode and its characteristics, Introduction to BJT, its input-output and transfer characteristics, SCR characteristics, FET, MOSFET

and CMOS characteristics. Basic logic gates - NAND, NOR as Universal building block.		
UNIT-V	NEW ENGINEERING MATERIALS	9 Hours
Dielectric materials: Definition – Dielectric Breakdown – Dielectric loss – Internal field – Claussius Mossottirelation. **Superconducting materials:** Introduction – Properties- Meissner effect – Type I & Type II superconductors – BCStheory-Applications. **Nanomaterials:** Introduction – Synthesis of nano materials – Top down and Bottom up approach- Ball milling- PVDmethod- Applications. **Smart materials:** Shape memory alloys-Biomaterials (properties and applications).		
	Total Hours	45 Hours

Text Book(s)

1.	Optics by Subramaniam N & BrijLal, S Chand & Co. Pvt. Ltd., New Delhi, [unit 1].
2.	Modern Physics by R Murugeshan, Kiruthiga, Sivaprasath S Chand [all units].
3.	Quantum Mechanics by Sathyaprakash, PragatiPrakashan, Meerut. [unit 2].
4.	Applied Engineering Physics – Rajendran&Marikani (Tata McGraw Hill) [unit 3,5] 2009.
5.	Engineering Physics – Bhattacharya, Bhaskaran – Oxford Publications [unit 2,3,5] 2012.
6.	Engineering Physics I & II – G.Senthilkumar, VRB publications [unit 2,3] 2012.
7.	Applied Physics for Engineers – K.Venkatramanan, R.Raja, M.Sundarrajan(Scitech) [3,5] 2014.
8.	Principles of Electronics by V.K.Mehta, (S.Chand) [unit 5].

Reference Book(s)

1.	Fundamentals of Optics by Jenkins A Francis and White E Harvey, McGRaw Hill Inc., New Delhi.
2.	Quantum Mechanics by V. Devanathan, Narosa, Chennai.
3.	Engineering Physics by M.N.Avadhanulu, S.Chand& Company Ltd.
4.	Concepts of Modern Physics by Arthur Beisser, McGraw Hill, 7th edition.
5.	Optics by R.Agarwal, S.Chand publishers.
6.	Basic Electronics by B.L.Theraja, S.Chand publishers.
7.	Fundamentals of Physics, 6th Edition, D. Halliday, R. Resnick and J. Walker, John Wiley and Sons, NewYork.

Course Code		L	T	P	C	IA	EA	TM
Course Name	UNIVERSAL HUMAN VALUES	2	0	0	3	100	-	100
Course Category	VALUE ADDED COURSE	Syllabus Revision					V.1.0	
Pre-requisite	Nil							

Course Objectives:

The course should enable the students -

1. To appreciate the complementarities between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings
2. To facilitate the development of a Holistic perspective among students towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence.
3. To highlight Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.
4. This course is intended to provide a much-needed orientation input in value education to the young enquiring minds.

Course Outcomes:

On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Become more responsible in life and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.	K2
CO2	Have better critical ability.	K2
CO3	Become sensitive to their commitment towards what they have understood (human values, human relationship and human society).	K2
CO4	Apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.	K3

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3

CO1	-	-	-	-	-	S	M	L	L	M	L	L	L	L	L
CO2	-	-	-	-	-	-	-	M	-	-	M	S	L	M	L
CO3	-	-	-	-	-	S	S	M	M	S	M	L	L	L	M
CO4	-	-	-	-	-	L	M	L	S	M	L	L	L	M	M

UNIT-I	INTRODUCTION TO VALUE EDUCATION	9 Hours

Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfill the Basic Human Aspirations.

UNIT-II	HARMONY IN THE HUMAN BEING	9 Hours

Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health.

UNIT-III	HARMONY IN THE FAMILY AND SOCIETY	9 Hours

Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order.

UNIT-IV	HARMONY IN THE NATURE/EXISTENCE	9 Hours

Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, Holistic Perception of Harmony in Existence.

UNIT-V	IMPLICATIONS OF THE HOLISTIC UNDERSTANDING – A LOOK AT PROFESSIONAL ETHICS	9 Hours

Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession.

Total Hours	45 Hours

Text Book(s)

1.	The Textbook A Foundation Course in Human Values and Professional Ethics, R R Gaur, R

	Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 97893-87034-47-1.
2.	The Teacher‟s Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G
Reference Book(s)	
1.	Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
2.	Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3.	The Story of Stuff (Book).
4.	The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5.	Small is Beautiful - E. F Schumacher
6.	Slow is Beautiful - Cecile Andrews
7.	Economy of Permanence - J C Kumarappa
8.	Bharat Mein Angreji Raj – Pandit Sunderlal
9.	Rediscovering India - by Dharampal
10.	Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11.	India Wins Freedom - Maulana Abdul Kalam Azad
12.	Vivekananda - Romain Rolland (English)
13.	Gandhi - Romain Rolland (English)
14.	Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
15.	Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome’s report, Universe Books.
16.	A Nagraj, 1998, JeevanVidya EkParichay, Divya Path Sansthan, Amarkantak.
17.	P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
18.	A N Tripathy, 2003, Human Values, New Age International Publishers.
19.	Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantra Shodh, Amravati.
20.	E G Seebauer& Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers , Oxford University Press
21.	M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
22.	B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
23.	B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

Course Code		L	T	P	C	IA	EA	TM
Course Name	ENVIRONMENT SCIENCE AND ENGINEERING	2	0	0	0	100		100
Course Category	MANDATORY COURSE (MC)*	Syllabus Revision					V.1.0	
Pre-requisite								

Course Objectives:

The course should enable the students

1. To study the nature and facts about environment.
2. To finding and implementing scientific, technological, economic and political solutions to environmental problems.
3. To study the inter relationship between living organism and environment.

Course Outcomes:

On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Nature of environment and reasons for environmental problems.	K4
CO2	Ecosystem – structure, functions, simplified co-system models.	K6
CO3	Natural resources, reasons for over exploitation of resources.	K2
CO4	The interrelationship between living organism and environment.	K4
CO5	Public awareness of environmental is at infant stage.	K2

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O2	PS O3
CO1	L	L	L	L	-	M	M	S	M	M	M	L	-	-	-
CO2	M	M	M	M	L	M	M	S	M	M	M	L	-	-	-
CO3	-	-	-	-	M	M	M	S	M	M	M	L	-	-	-
CO4	L	L	L	L	M	M	M	S	M	M	M	L	-	-	-

CO5	L	L	L	L	M	M	M	S	M	M	M	L	-	-	-

UNIT-I	INTRODUCTION TO ENVIRONMENT AND ENVIRONMENTAL STUDIES	9 Hours

1.1. Introduction to environment – components – nature of environment – need of awareness–reasons for environmental problems – anthropocentric and eco centric views. 1.2. Environmental studies - multidisciplinary nature – scope and aim – sustainable development principles – RRR concept-Indian environmental movements–environmental calendar.

UNIT-II	ECO SYSTEM AND BIO DIVERSITY	9 Hours

2.1. Ecosystem – structure – functions – simplified ecosystem models (food chain and food webs and their types, energy flow) - forest – grassland – pond –ecosystems – ecological succession – ecological pyramids–Bio-geo chemical cycles of water–oxygen-carbon-phosphorous and sulphur. 2.2.Biodiversity – definition – types – species – genetic and ecosystem diversities-values of biodiversity – threats to biodiversity – conservation of biodiversity – endemism – biodiversity hotspots – Indian biodiversity– endemic species of India–IUCN lists – red – green and blue data books.

UNIT-III	NATURAL RESOURCES	9 Hours

3.1 Natural resources – definition – types – forest resources – uses –deforestation- reasons - effects – water resources – dams – effects of dams - food resources – modern agriculture– ill effects –energy resources -types–hydel–nuclear–solar–wind and biomass energy-world scenario–Indian scenario. 3.2 Population and environment–reasons for over exploitation of resources–population–demography – population curves – population explosion – effects – consumerism – effects – urbanization – reasons and effects – role of an individual.

UNIT-IV	ENVIRONMENT POLLUTION	9 Hours

4.1 Pollution–definition–types–air pollution –causes and effects–effects of CO2–CO – NOx – SOx –particulates–control of air pollution–water pollution–causes–effects–remedies–soil pollution– solid waste management – e-waste – ill effects of e-waste – proper recycling – Noise pollution – reasons–effects – control – nuclear pollution – cases – effects and control – thermal pollution causes – effects and remedies. 4.2 Legal provisions for protecting environment – article 48 A – 51 A (g) – Environment act1986 – Air act 1981 – Water act 1974 – wild life protection act – Forest act 1980 - problems in implementation–reasons.

UNIT-V	SOCIAL ISSUES AND ENVIRONMENTAL ETHICS	9 Hours

Present environmental scenario – green house effect – climate change–The Kyoto Protocol–

ozone layer depletion- The Montreal Protocol-acid rain–causes–effects-disparity among the nations– The Copenhagen UNFCCC summit – carbon currency- virtual water- genetically modified organisms, Disaster management. 5.2 Environmental ethics–introduction–people getting affected-resettlement and rehabilitation – issues involved –Sardhar Sarovar project – Tawa Matsya sang - Melting icebergs of Arctic.	
Total Hours	**45 Hours**
Text Book(s)	
1.	Anubha Kaushik and C.P. Kaushik, "Prospects of Environmental Science", New Age International publishers, 2019.
Reference Book(s)	
1.	Environmental Studies, N.Nandini, N. Sunitha and SucharitaTandon, Sapna Book House, 2019.
2.	Text book of Environmental Science, Ragavan Nambiar, Scitech Publications,2010.
3.	Text book of Environmental Chemistry and Pollution Control, S.S.Dara, S.Chandand Co., 7th Edition.
4.	Environmental Chemistry, Colin Baird, W.H.Freemanand company, NewYork, 4th Edition, 2008.
5.	Environmental Chemistry, Gary W.VanLoon and StephenJ. Duffy, Oxford University Press, 9thEdition 2017.
6.	New Trends in Green Chemistry, V.K. Ahluwalia and M. Kidwai, Anamaya Publishers, 1st Edition2012.

Course Code		L	T	P	C	IA	EA	TM
Course Name	DESIGN THINKING	2	0	0	2	40	60	100
Course Category	VOCATIONAL AND SKILL ENHANCEMENT COURSE -1	Syllabus Revision					V.1.0	
Pre-requisite								

Course Objectives:

1. To understand various learning process, understanding the problems and enhancement techniques on innovative engineering products.
2. To understand the importance of the design thinking tools.
3. To learn about the problem-solving techniques and gain the knowledge about Empathy methods.
4. To develop skills in ideation, product design tools and prototyping.
5. To develop skills in testing, innovations, and collaboration on novel products.

Course Outcomes:

On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Classify the various learning principles and styles, memory technologies, and assess the emotional experience when examining emotional expressions in engineering education in order to create novel products.	K2
CO2	Discover the importance of brainstorming and how to apply design thinking tools to produce new products through innovative thinking.	K3
CO3	Propose the suitable problem-solving techniques through different Empathy tools and methods on defining problem statement on new products.	K3
CO4	Generate new ideation techniques applied on new product design and evaluate prototype effectiveness on different suitable developed prototype models.	K3
CO5	Apply diffusive and convective mass transfer equations and correlations to solve problems for different applications.	K3

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O2	PS O3
CO1	M	L	L	L	-	-	-	-	-	-	-	-	-	-	-
CO2	M	M	L	L	-	-	-	-	-	-	-	-	-	L	M
CO3	L	M	M	M	L	L	-	-	-	-	-	-	L	M	M
CO4	M	M	M	S	M	L	L	L	M	L	M	M	L	M	L
CO5	M	M	M	M	-	M	-	L	M	M	-	M	L	L	M

UNIT-I	BASICS OF LEARNING, UNDERSTANDING AND ENHANCEMENT TECHINIQUES	9 Hours

An Insight to Learning Process –Principles and Dimensions of Learning Process – Understanding the Problems– Learning Styles– Human Centered Design –Assessing and Interpreting– Remembering and Understanding the Memory process–Problems in Learning Retention process – Memory Enhancement Techniques –Emotions and Psychology –Applications of Peer Learning– Examples.

UNIT-II	DESIGN THINKING TOOLS	9 Hours

Design Thinking process – Definition and Need of Design Thinking –Objectives and Features of Design Thinking–Concept of Brainstorming– Design Thinking Frameworks –Design Thinking Mindsets – Design Thinking Tools– Empathize, Define, Ideate, Prototype and Test–Applications of Design thinking.

UNIT-III	PROBLEM-SOLVING TECHNIQUES AND EMPATHYMAPPING	9 Hours

Ingenious & Problem-Solving Understanding – Problem Solving & techniques – Role of Empathy –Methods and tools of Empathy – Defining the problem – Analysis and Synthesis – Empathy Mapping& its types – Customer journey mapping – Jobs-to-be-done concept– Point of View on Problem Statement.

UNIT-IV	IDEATION, PRODUCT DESIGN AND PROTOTYPING	9 Hours

Ideation methods – Principles of creativity & its methods–Brains torming techniques – Product design process –Process of Engineering Product design – Stages of Product design – Conceptual design – Examples of best product designs and functions – Assignment on Engineering Product

Design – Prototype – Need of Prototype – Types of Prototype – Rapid Prototyping – Benefits of Prototyping.		
UNIT-V	**TESTING, INNOVATION AND COLLABORATION**	**9 Hours**
Testing – Purpose of testing – Types of testing – Sample Examples – Test Group Marketing – Creative thinking process – Innovation – Needs of Innovation –Types of innovation – Characteristics of Innovation – Collaboration – Process, tools and techniques of collaboration – Importance of Collaborative design – steps involved in collaborative design– Benefits, challenges and applications of collaboration –Feedback – Re-Design & Re-Create Feedback loop.		
	Total Hours	**45 Hours**

Text Book(s)

1.	Idris Mootee, Design thinking for strategic innovation, Wiley publications, 2013.
2.	Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011.
3.	Michael Lewrick, Patrick Link, and Larry Leifer, The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems, 2018, John Wiley & Sons.

Reference Book(s)

1.	Balaguruswamy, E., “Developing Thinking Skills (The Way to Success)”, Khanna Publisher, First Edition, January 2022.
2.	Tom Kelley, The Art of Innovation: Lessons in Creativity from IDEO, America's Leading Design Firm, Currency/Doubleday, 2001
3.	Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, HarperCollins Publishers Ltd, 2009
4.	Ulrich & Eppinger, Product Design and Development, 3rd Edition, McGraw Hill, 2004.
5.	Kevin Otto, Kristin Wood, Product Design: Techniques in Reverse Engineering and New Product Development, Pearson publications, 2001.

Course Code		L	T	P	C	IA	EA	TM
Course Name	ENGINEERING PHYSICS LABORATORY	0	0	2	2	40	60	100
Course Category	BASIC SCIENCE COURSE	Syllabus Revision					V.1.0	
Pre-requisite								

Course Objectives:

The course should enable the students -

1. To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

Course Outcomes:

On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Demonstrate the procedural preparation skill to conduct the experiment.	K3
CO2	Perform the experiment and tabulate the observationsmade.	K3
CO3	Obtain an expected experimental out-comes by different techniques and impart practical knowledge in real Time solution.	K6
CO4	Interpret ate the experimental results and conclusions.	K5
CO5	Understand principle, concept, working and applications of newtheory and articulation of the relevant theory.	K2

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3
CO1	S	S	M	M	L	L	L	-	M	M	M	L	-	-	-
CO2	S	S	S	S	S	L	L	-	M	M	M	L	-	-	-
CO3	S	S	S	S	S	L	L	-	M	M	M	L	-	-	-
CO4	S	S	S	S	S	M	M	-	L	L	L	-	-	-	-
CO5	S	S	S	S	L	L	L	-	L	L	L	L	-	-	-

	List of Experiments	45 Hours

1. Determination of Rigidity Modulus & Moment of Inertia using Torsional Pendulum.
2. Determination of Young's Modulus.
3. (a) Determination of Wavelength of Laser light using transmission grating.
   (b) Measurement of numerical aperture of an optical fiber.
4. Determination of radius of curvature of the given lens using Newton's Rings.
5. Determination of Velocity of sound waves in liquid using Ultrasonic interferometer.
6. Determination of wavelength of prominent colours of mercury spectrum using grating.
7. Determination of number of lines per meter of the grating using normal incidence method.
8. Determination of refractive index of the given prism using minimum deviation method.
9. Determination of emissivity of the surface of a black body.
10. Basic logic gates- Verification of truth tables
11. NAND-Universal building block
12. NOR-Universal building block
13. Zener diode- I-V characteristics
14. Study of LCR circuit

Text Book(s)

1.	Practical Physics - Ouseph and Rangarajan.
2.	Engineering Practical Physics-K. Srinivasan.
3.	Engineering Practical Physics - M.N. Avadhanulu.
4.	Experimental Physics – K.Venkatramanan, R.Raja, M.Sundarrajan (Scitech)

Course Code		L	T	P	C	IA	EA	TM
Course Name	IDEA LAB WORKSHOP	0	0	2	2	40	60	100
Course Category	DO IT YOURSELF	Syllabus Revision					V.1.0	
Pre-requisite								

Course Objectives:

The course should enable the students -

1. To learn all the skills associated with the tools and inventory associated with the IDEA Lab.
2. Learn useful mechanical and electrical and electronic fabrication processes.
3. Learn necessary skills to build useful and standalone system/ project with enclosures.
4. Learn necessary skills to create print and electronic documentation for the system/ project.

Course Outcomes:

On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Acquire knowledge in utilizing various tools, devices and machines used in engineering practice.	K3
CO2	Understand different measuring instruments and safety standards	K3
CO3	Analyze various operations in mechanical engineering workshop	K3
CO4	Understand electronic system design flow, fabrication and testing of the circuits.	K3
CO5	Apply mechanical, electrical, and electronic fabrication processes to develop different prototypes	K4

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2	PSO3

CO1	L	L	-	-	L	-	-	-	-	-	-	-	L	M	-
CO2	L	-	-	-	M	-	-	-	-	-	-	-	L	L	-
CO3	L	M	M	L	M	-	-	-	-	-	-	-	L	L	L
CO4	L		M	M	S	-	-	-	-	-	M	-	M	M	L
CO5	L	L	M		S	-	-	-	M	-	S	-	M	M	M

Course Content Mechanical Engineering

Introduction to basic hand tools: Tape measure, combination square, Vernier caliper, hammers, fasteners, wrenches, pliers, saws, tube cutter, chisels, vice and clamps, tapping and threading. Adhesives

Introduction to Power tools: Power saws, band saw, jigsaw, angle grinder, belt sander, bench grinder, rotary tools. Various types of drill bits.

3D printing and prototyping technology: 3D printing using FDM, SLS and SLA. Basics of 3D scanning, point cloud data generation for reverse engineering.

Course Content ECE/EEE

Familiarization and use of basic measurement instruments: DSO including various triggering modes, DSO probes, DMM, LCR bridge, Signal and function generator. Logic analyzer and MSO. Bench power supply (with 4-wire output).

Electrical Measurements: use of multimeters- tong testers- continuity testing-use of contactors-push button switches-relays-fuses - electrical cabling tools-optical cable connectors.

Electronic component familiarization: Understanding electronic system design flow. Schematic design and PCB layout and Gerber creation using EagleCAD. Documentation using Doxygen, Google Docs, Overleaf. Version control tools - GIT and GitHub.

Basic 2D and 3D designing using CAD tools such as FreeCAD, Sketchup, Prusa Slicer, FlatCAM, Inkspace, OpenBSP and VeriCUT.

Electronic circuit building blocks including common sensors: Arduino and Raspberry Pi programming and use. Digital Input and output. Measuring time and events. PWM. Serial communication. Analog input. Interrupts programming. Power Supply design (Linear and Switching types), Wireless power supply, USB PD, Solar panels, Battery types and charging.

List of Lab activities and experiments (Department of Mechanical Engineering)

1.	External thread cutting of bolts.
2.	Counter profile turning of wood using wooden lathe.
3.	Conversion of square prism to cylinder using bosch router.
4.	Cutting of square profile using 2D profile cutting machine.
5.	Cutting of Hexogon profile using 2D profile cutting machine.

6.	Fabrication practice of Safety grill for window using welding technique.
7.	Fabrication practice of joining two similar metals using TIG Welding.
8.	Printing of Cube using 3D printer.
9.	Printing of Cylinder using 3D printer.
List of Lab activities and experiments (Department of Electronics & Communication Engineering)	
1.	Familiarization of Active and Passive components, Resistorcolor coding, Different types of capacitor, Bread boardconnection, CRO and Function Generator, Schematic design andPCB layout and Gerber creation using KICAD, Tinker CAD andDifferent sensors.
2.	Schematic and PCB Design Layout of Analog Electronic circuits using KICAD Tool. 1.Simple LED 2.Voltage Regulator 3.Power supply 4.Inverting Amplifier
3.	Schematic and PCB Design Layout of Different sensor modulesusing KICAD Tool. 1. Voltage Sensors (LDR) 2. Proximity sensor 3. IR sensor
4.	(i). Interfacing a IR sensor with Arduino microcontroller. (ii). Interfacing a Relay shield with Arduino microcontroller. (iii). Interfacing a GSM (Global System for Mobile Communications) module with Arduino microcontroller
5.	Familiarization of Raspberry PI and perform Necessary SoftwareInstallation.
6.	Mini Project.
List of Lab activities and experiments (Department of Electrical & Electronics Engineering)	
1.	Study of cathode ray oscilloscope/digital storage oscilloscope.
2.	Study of Multimeter.
3.	Study of characteristics of the solar panel.
4.	Study of Characteristic regulated power supply.
5.	Measurement of ac power using clamp meter.
REFERENCE BOOKS:	
1.	AICTE's Prescribed Textbook: Workshop / Manufacturing Practices (with LabManual), ISBN: 978-9391505332
2.	All-in-One Electronics Simplified, A.K. Maini; 2021. ISBN-13: 978-9386173393, Khanna Book Publishing Company, New Delhi.
3.	Simplified Q&A - Data Science with Artificial Intelligence, Machine Learning and Deep Learning, Rajiv Chopra, ISBN: 978-9355380821, Khanna Book Publishing Company, New Delhi.
4.	3D Printing & Design, Dr. Sabrie Soloman, ISBN: 978-9386173768, Khanna Book Publishing Company, New Delhi.
5.	The Big Book of Maker Skills: Tools & Techniques for Building Great Tech Projects. Chris Hackett. Weldon Owen; 2018. ISBN-13: 978-1681884325.

6.	The Total Inventors Manual (Popular Science): Transform Your Idea into a Top-Selling Product. Sean Michael Ragan (Author). Weldon Owen; 2017. ISBN-13: 978-1681881584.
7.	Make: Tools: How They Work and How to Use Them. Platt, Charles. Shroff/Maker Media. 2018. ISBN-13: 978-9352137374
8.	The Art of Electronics. 3rd edition. Paul Horowitz and Winfield Hill. Cambridge University Press. ISBN: 9780521809269
9.	Practical Electronics for Inventors. 4th edition. Paul Sherz and Simon Monk. McGraw Hill. ISBN-13: 978-1259587542
10.	Encyclopedia of Electronic Components (Volume 1, 2 and 3). Charles Platt. Shroff Publishers. ISBN-13: 978-9352131945, 978-9352131952, 978-9352133703
11.	Building Scientific Apparatus. 4th edition. John H. Moore, Christopher C. Davis, Michael A. Coplan and Sandra C. Greer. Cambridge University Press. ISBN-13: 978-0521878586
12.	Programming Arduino: Getting Started with Sketches. 2nd edition. Simon Monk. McGraw Hill. ISBN-13: 978-1259641633
13.	Make Your Own PCBs with EAGLE: From Schematic Designs to Finished Boards. Simon Monk and Duncan Amos. McGraw Hill Education. ISBN-13 : 978-1260019193.
14.	Pro GIT. 2nd edition. Scott Chacon and Ben Straub. A press. ISBN-13 : 978-1484200773
15.	Venuvinod, PK., MA. W., Rapid Prototyping – Laser Based and Other Technologies, Kluwer, 2004.
16.	Ian Gibson, David W Rosen, Brent Stucker., “Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing”, Springer, 2010
17.	Chapman W.A.J, “Workshop Technology”, Volume I, II, III, CBS Publishers and distributors, 5th Edition,2002.

SEMESTER - II

Course Code		L	T	P	C	IA	EA	TM
Course Name	MATHEMATICS -II (LINEAR ALGEBRA, TRANSFORM CALCULUS AND NUMERICAL METHODS)	3	1	0	4	40	60	100
Course Category	BASIC SCIENCE COURSE	Syllabus Revision				V.1.0		
Pre-requisite								

Course Objectives:

The course should enable the students -

1. This course aims at familiarizing the prospective engineers with techniques in Linear
2. Algebra,Transform Calculus and Numerical Methods.
3. To understand the fundamental concepts in the above said topics.
4. To develop the ability to evaluate the problems in transform calculus and its application in various areas.

Course Outcomes:

On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Determine consistency of liner system of equations, Rank, Eigen values and Eigen vectors of the given square matrix also compute power, inverse of the matrix using cayley Hamilton theorem.	K6
CO2	Work numerically on the ordinary differential equations and partial differential equations using different methods through the theory of finite differences.	K6
CO3	Apply Laplace transform and its inverse to solve initial valueand other related problems.	K6
CO4	Use Fourier transforms and its inverse in practical applications of electronics engineering.	K6
CO5	Solving finite difference equation in z-transforms.	K6

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PS O2	PS O3
CO1	S	S	S	S	S	M	M	-	M	M	M	L	-	-	-
CO2	S	S	S	S	S	M	M	-	M	M	M	L	-	-	-
CO3	S	S	S	S	S	M	M	-	M	M	M	L	-	-	-

CO4	S	S	S	S	S	M	M	-	M	M	M	L	-	-	-
CO5	S	S	S	S	S	M	M	-	M	M	M	L	-	-	-

UNIT-I	MATRICES	12 Hours

Rank of a matrix, System of linear equations; Symmetric, skew-symmetric and orthogonalmatrices; Eigen values and eigenvectors; Diagonaization of matrices; Cayley-Hamilton theorem, Orthogonal transformation and quadratic to canonical forms.

UNIT-II	NUMERICAL METHODS	12 Hours

Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. Runge- Kutta method of fourth order for solving first order equations. Milne's predicator corrector methods. Partial differential equations: Finite difference solution two-dimensional Laplace equation and Poisson equation, Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank-Nicholson methods), Finite difference explicit method for wave equation

UNIT-III	TRANSFORM CALCULUS- I	12 Hours

Laplace Transforms : Definition, Properties of Laplace transforms: Linearity Property, First shifting property, Change of scale property – Transforms of derivatives - Transforms of integrals - Multiplication by t^n - Division by t - Evaluation of integrals by Laplace transform - Inverse transforms: Method of partial fractions – Other methods of finding inverse - Convolution theorem (Without proof) Application to differential equations.

UNIT-IV	TRANSFORM CALCULUS- II	12 Hours

Fourier integral theorem (without proof) - Fourier Sine and Cosine integrals – Complex form of Fourier integral - Fourier transform – Fourier sine and Cosine transforms – Properties of Fourier Transforms: Linear property, Change of scale property, Shifting property -Parseval's identity for Fourier transforms (without proof) – Application of transforms to boundary value problems: Heat conduction, Vibrations of a string, Transmission lines.

UNIT-V	TRANSFORM CALCULUS- III	12 Hours

Standard z-transforms of $1, a^n$ p ^{n} – Linearity property – Damping rule – Shifting rules – Multiplication by n - Initial and final value theorems (without proof) – inverse z –transforms – Convolution theorem (without proof) – Convergence of z-transforms – Two sided z- transform – Evaluation of inverse z-transforms: Power series method, Partial fraction method, inversion integral method.

	Total Hours	60 Hours

Text Book(s)

1.	Grewal B.S, Higher Engineering Mathematics, 41st Edition, Khanna Publishers, New

	Delhi, 2011.
Reference Book(s)	
1.	Alan Jeffrey, Advanced Engineering Mathematics, Academic Press.
2.	Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
3.	Gerald C.F and Wheatley P.O, Applied Numerical Analysis, Addison-Wesley Publishing Company.

Course Code		L	T	P	C	IA	EA	TM
Course Name	ENGINEERING CHEMISTRY	3	0	0	3	40	60	100
Course Category	BASIC SCIENCE COURSE	Syllabus Revision				V.1.0		
Pre-requisite								

Course Objectives:

The course should enable the students

1. To learn the basics of atomic structure, bonding and analytical methods
2. To learn various types ofreactions in organic chemistry

Course Outcomes:

On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Analyze microscopic chemistry in terms of atomic and molecular orbital's andintermolecular forces.	K2
CO2	Rationalize bulk properties and processes using thermodynamic considerations.	K4
CO3	Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.	K2
CO4	Rationalize periodic properties.	K4
CO5	List major chemical reactions that are used in the synthesis of various organic molecules.	K4

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2	PSO3
CO1	S	S	M	M	L	M	M	-	M	M	M	M	-	-	-
CO2	S	S	M	M	L	M	M	-	M	M	M	M	-	-	-
CO3	S	S	M	M	M	M	M	-	M	M	M	M	-	-	-
CO4	S	S	M	M	M	M	M	-	M	M	M	M	-	-	-
CO5	S	S	M	M	L	M	M	-	M	M	M	M	-	-	-

UNIT-I	ATOMIC STRUCTURE	9 Hours
Comparison between Rutherford's model of atom and Bohr's model - Bohr-Sommerfeld model (Concepts only)-its limitations - de Broglie theory - Heisenberg's uncertainty principle - Schrodinger's wave equation (derivation not needed)-significance of Ψ and Ψ^2 –shapes of different orbital's –Aufbau principle-Pauli Exclusion Principle- Hund's rule. Electronic configuration of atoms- Mosley's law – Modern periodic table - periodic properties: atomic size-ionization energies- electron affinity- electro negativity.		

UNIT-II	CHEMICAL BONDING	9 Hours
Types of bonds – ionic - covalent – coordinate bond - Molecular Orbital Theory –types of molecular orbitals- energy level diagrams- e⁻ns filling in MO – bond order – MO diagrams of H_2, He_2, N_2, O_2, CO and HF molecules- Metallic bond – band theory of solids (primitive treatment only) and the role of doping on band structures - Hybridization – definition - geometry of the molecules- CH_4, C_2H_4, C_2H_2- Molecular forces-Ionic, dipolar, van der waals interactions.		

UNIT-III	THERMAL AND ELECTROCHEMICAL EQUILIBRIA	9 Hours
Thermodynamic functions: State functions, Path functions, Internal energy, enthalpy, entropy and free energy-Gibbs Helmholtz equation and its applications .Feasibility of reaction - Ellingham diagrams. Types of electrodes- Standard electrodes-Standard hydrogen electrode, standard calomel electrode, Single electrode potential , electrochemical series - galvanic cell - emf - Nernst equation and its applications - Glass electrode, Potentiometric acid base titrations and Solubility equilibrium-Corrosion-types- Chemical corrosion-electrochemical corrosion-factors influencing and control measures.		

UNIT-IV	SPECTROSCOPIC TECHNIQUES AND APPLICATIONS	9 Hours
Electromagnetic radiations – wavelength – frequency – energy of a radiation - electromagnetic spectrum – changes brought about by the radiations - components of a spectrometer – rotational spectra of diatomic molecules – rigid and non-rigid rotor models (energy expressions only)- selection rule– schematic instrumentation – types of vibrations in molecules (CO_2, H_2O) – vibrational spectra (primitive treatment) – selection rule-instrumentation and applications – electronic transitions – electronic spectra — Beer-Lambert's law- instrumentation and applications– NMR – principle – chemical shift - instrumentation – NMR spectra of CH_4 – CH_3OH – xylene isomers – MRI (Introduction only).		

UNIT-V	STEREOCHEMISTRY & ORGANIC REACTIONS	9 Hours
Stereochemistry - Representation of 3D structures - Fisher projection, Newman and Sawhorse projection formulae – Ethane, 3-bromo-2-butanol Conformation of Ethane, Butane& Ethylene		

glycol, , Symmetry and Chirality - Stereo isomers, Enantiomers, Diastereomers. Configuration - R-S system. Optical activity - Lactic acid, Tartaric acid- Geometrical isomerism – cis-trans& E-Z notations.

Organic reactions - Substitution - S_N1 & S_N2 (Simple Example - mechanism not expected)– electrophilic substitutions – Friedel Crafts alkylations - Additions – 1,2-addition – types-addition of HX -Elimination – E^1& E^2 (Examples only, mechanism not expected) - Oxidations – CIS-hydroxylation with OsO_4, Reductions – Clemmensen&wolff-Kishner reductions, Cyclization – Diels Alder, Ring-Opening – Nylon-6 from caprolactum.

Synthesis of most commonly used drugs – Aspirin,Paracetamol.

Total Hours	**45 Hours**

Text Book(s)

1.	Textbook of Inorganic Chemistry, P.L.Soni, Sultan Chand & Sons, Delhi, 2013. (For units I and II).
2.	Principles of Physical Chemistry, B.R. Puri, L.R. Sharma and Madan S. Pathania, Shoban Lal Nagin Chand & Co., Jalandhar, 2000. (For units III and IV).
3.	Advanced Organic Chemistry, B. S. Bahl and Arun Bahl, S.Chand, Delhi, 2012. (For unit V).

Reference Book(s)

1.	Engineering Chemistry, P.C. Jain and Monika Jain, DhanpatRai Publishing Co Pvt. Ltd.,New Delhi, 2008.
2.	Applied Chemistry, K. Sivakumar, Anuradha Publications, Chennai, 2009.
3.	Textbook of Engineering Chemistry, S.S.Dara &S.S. Umare, S.Chand, Delhi, 2004.
4.	Fundamentals of Molecular Spectroscopy, C.N.Banwell and Elaine.M. McCash, 4th Edition,McGraw Hill Education, 2017.
5.	Physical Chemistry, P. W. Atkins and Julio De Paula, 10th Edition, Oxford UniversityPress, 2014.

Course Code		L	T	P	C	IA	EA	TM
Course Name	BASIC ELECTRICAL ENGINEERING	2	1	0	3	40	60	100
Course Category	ENGINEERING SCIENCE COURSE	Syllabus Revision				V.1.0		
Pre-requisite								

Course Objectives:

The course should enable the students -

1. This course equips students to have basic knowledge and understanding in solving algebraic,transcendental equation numerically.
2. To make the student knowledgeable in the area of matrix theory so that he/she will be familiar in MATLAB applications.
3. To familiarize the student with functions of several variables. This is needed in many branches of Engineering.

Course Outcomes:

On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Explain the basic electrical quantities and laws.	K2
CO2	Explain construction, types and applications of electrical machines.	K2
CO3	Study the working principles of power converters.	K2
CO4	Show the tariff or a given load and energy consumption.	K2
CO5	Introduce the components of low voltage electricalinstallations and its applications.	K3

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O2	PS O3
CO1	S	S	L	L	M	M	M	-	S	M	-	S	-	-	-
CO2	S	S	M	M	M	S	M	L	S	M	L	M	-	-	-
CO3	S	S	M	M	S	M	M	-	M	M	-	M	-	-	-

CO4	S	S	S	S	S	M	M	M	M	M	L	M	-	-	-
CO5	S	S	M	S	M	M	L	L	S	M	L	M	-	-	-

UNIT-I	DC CIRCUITS	9 Hours

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT-II	AC CIRCUITS	9 Hours

Representation of sinusoidal waveforms, peak and rms values, phasor representation, realpower, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III	TRANSFORMERS	9 Hours

Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit,losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT-IV	ELECTRICAL MACHINES	9 Hours

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

UNIT-V	POWER CONVERTERS AND ELECTRICAL INSTALLATIONS	9 Hours

DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation. Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

	Total Hours	45 Hours

Text Book(s)

1. D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.

Reference Book(s)

1. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.

2.	E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
3.	V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.

Course Code		L	T	P	C	IA	EA	TM
Course Name	PROGRAMMING FOR PROBLEM SOLVING	3	0	0	2	40	60	100
Course Category	ENGINEERING SCIENCE COURSE	Syllabus Revision					V.1.0	
Pre-requisite								

Course Objectives:

The course should enable the students -

1. Exposed to the syntax of C.
2. Familiar with programming in C.
3. To learn arrays, strings, functions, pointers, structures and unions in C.

Course Outcomes:

On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Develop algorithms for solving simple mathematical and engineering problems and examine the suitability of appropriate repetition and or selection structures for given problems.	K3
CO2	Solve matrix problems, merging, searching, sorting and string Manipulation problems using iteration, modularization or recursion as applicable.	K3
CO3	Organize files to perform text operations like editing, pattern Searching using structures.	K3
CO4	Implement the algorithms for matrix problems, merging, searching, sorting, and string manipulation and file problems and debug and test using any procedural programming language.	K3

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3
CO1	S	S	S	S	S	M	L	L	M	M	-	M	-	-	-
CO2	S	S	S	S	S	M	L	L	M	M	-	M	-	-	-

CO3	S	S	M	M	S	M	L	L	M	M	-	M	-	-	-
CO4	S	S	S	S	S	M	L	L	S	S	-	S	-	-	-

UNIT-I	Module - I	9 Hours

Introduction to components of computer system-Generation of programming languages-Types of Computers-Organization of Computers-Types of memory, Number systems- Idea of Algorithm-Pseudo code- Flow Chart with examples.

UNIT-II	Module - II	9 Hours

Introduction to C-Character set, Constants, Variables, Data Types-Operators – Arithmetic expressions and precedence-Decision Making statement - Looping statements.

UNIT-III	Module - III	9 Hours

Arrays and its types-Functions –Parameter passing in functions-call by value- call by reference Passing array to functions-Recursive function.

UNIT-IV	Module - IV	9 Hours

Structures and array of structures –Union, Basic searching –Linear and Binary, Basic sorting, String operations.

UNIT-V	Module - V	9 Hours

Introduction to Pointer, Pointer arithmetic-notion of linked list (no implementation) - File handling.

	Total Hours	45 Hours

Text Book(s)

1.	Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
2.	Balagurusamy. E, "Programming in ANSI C", Tata McGraw Hill, Third edition, 2006.
3.	Fundamentals of Computing and Programming- V.RameshBabu, R.Samyuktha, M.Muniratham by VRB Publishers 2012 edition.

Reference Book(s)

1.	Let Us 'C' – Yashawant Kanetkar, (Unit 2 to 5), BPB publications, 10th Edition, 2010.
2.	Ashok N Kamthane, "Computer Programming", Pearson education, Second Impression.
3.	Kernighan Venugopal.K and Kavichithra.C, "Computer Programming", New Age International Publishers, First Edition, 2007.
4.	B.W and Ritchie,D.M , The C programming language: second edition,Pearson education,2006.

Course Code		L	T	P	C	IA	EA	TM
Course Name	ENGINEERING GRAPHICS AND DESIGN [THEORY & PRACTICAL]	2	0	1	3	40	60	100
Course Category	ENGINEERING SCIENCE COURSE	Syllabus Revision				V.1.0		
Pre-requisite								

Course Objectives:

The course should enable the students

1. To develop in students, graphic skills for communication of concepts, ideas and design of engineeringproducts.
2. To expose them to existing national standards related to technical drawings.

Course Outcomes:

On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Draw orthographic projections of lines, planes and solids.	K3
CO2	Draw projections of solids including cylinder, prism andpyramid.	K3
CO3	Draw section of solids including cylinder, prisms andpyramids.	K3
CO4	Draw the development of surfaces including cylinder,Pyramid and prism.	K4
CO5	Draw projection of lines, planes, solids, orthographic, projection, Isometric projection, and section of solids including cylinder, cone, prism, pyramid and building drawing using AutoCAD.	K6

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O2	PS O3

CO1	S	S	S	S	S	M	M	-	M	M	M	L	-	-	-
CO2	S	S	S	S	S	M	M	-	M	M	M	L	-	-	-
CO3	S	S	S	S	S	M	M	-	M	L	M	L	-	-	-
CO4	S	S	S	S	S	M	M	-	M	M	M	L	-	-	-
CO5	S	S	S	S	S	L	M	-	M	L	M	L	-	-	-

Traditional Engineering Graphics:

Principles of engineering Graphics; Orthographic Projection; Descriptive Geometry; Drawing Principles; Isometric Projection; Surface Development; Perspective; Reading a Drawing;. Sectional Views; Dimensioning & Tolerances; True Length, Angle; intersection, Shortest Distance.

Computer Graphics:

Engineering Graphics Software; -Spatial Transformations; Orthographic Projections; Model Viewing; Co-ordinate Systems; Multi-view Projection; Exploded Assembly; Model Viewing; Animation; Spatial Manipulation; Surface Modeling; Solid Modeling; Introduction to Building Information Modeling (BIM).

(Except the basic essential concepts, most of the teaching part can happen Concurrently in the laboratory)

Module 1: Introduction to Engineering Drawing covering, Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloids, Hypocycloid and In volute; Scales – Plain, Diagonal and Vernier Scales

Module 2: Orthographic Projections covering**,** Principles of Orthographic Projections- Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes

Module 3: Projections of Regular Solids covering, those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

Module 4:Sections and Sectional Views of Right Angular Solids covering, Prism, Cylinder, Pyramid, Cone - Auxiliary Views; Development of surfaces of Right Regular Solids, Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

Module 5: Isometric Projections covering, Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.

Module 6: Overview of Computer Graphics covering, listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids
Module 7: Customization & CAD Drawing consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerance; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles
Module 8: Annotations, layering & other functions covering applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models. Part editing and two-dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multi view, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerance techniques; dimensioning and scale multi views of dwelling
Module 9: Demonstration of a simple team design project that illustrates Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis and tool-path generation for component manufacture; geometric dimensioning and tolerancing; Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying color coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modeling (BIM).
Total Hours | **45 Hours**

Text Book(s)

1.	Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House.
2.	Shah, M.B. &Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson

	Education.
3.	Agrawal B. & Agrawal C. M. (2012), Engineering Graphics: TMH Publication.
4.	Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, SciTech Publishers.

Course Code		L	T	P	C	IA	EA	TM
Course Name	ENGINEERING CHEMISTRY LAB	0	0	2	2	40	60	100
Course Category	BASIC SCIENCE COURSE	Syllabus Revision				V.1.0		
Pre-requisite								

Course Objectives:

The course should enable the students

1. To learn the basics and perform experiments involving volumetric analysis, colligative properties, simple synthesis and other instrumental technique.

Course Outcomes:

On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Estimate rate constants of reactions from concentration of reactants/products as afunction of time.	K5
CO2	Measure molecular/system properties such as surface tension, viscosity, Conductance of solutions, redox potentials and chloride content of water.	K4
CO3	Synthesize a small drug molecule.	K4
CO4	Analyze a salt sample.	K4

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	S	S	S	S	S	M	M	-	M	M	M	M	-	-	-
CO2	S	S	S	S	M	M	M	-	M	M	M	-	-	-	-
CO3	M	M	M	S	M	M	M	-	M	M	M	-	-	-	-
CO4	S	S	S	S	S	M	M	-	M	M	M	-	-	-	-

LIST OF EXPERIMENTS

1. Determination of surface tension and viscosity of a liquid or a solution

2. Thin layer chromatography / Paper chromatography for separation of a mixture.
3. Ion exchange column for removal of hardness of water
4. Determination of chloride content of water by volumetry.
5. Determination of M.wt of a non-volatile solute by Rast's method.
6. Determination of the rate constant of the reaction between $K_2S_2O_8$ and KI – Clock reactionmethod.
7. Conductometry -Verification of Debye-Huckel-Onsager equation for a strong electrolyte.
8. Potentiometry -Determination of formal redox potential of Fe^{3+}/Fe^{2+} couple
9. Synthesis of Nylon 66 by interfacial polymerization method.
10. Determination of Saponification/acid value of oil.
11. Systematic qualitative analysis of a salt
12. Lattice structures and packing of spheres
13. Models of potential energy surfaces – computational experiment.
14. Chemical oscillations- Potentiometric study of the oscillations of Belousov-Zhabotinsky reaction
15. Determination of the partition coefficient of I_2 between water and CCl_4
16. Verification of Freundlich isotherm for adsorption of acetic acid / oxalic acid by charcoal.
17. Determination of iso electric point of Gelatin sols by using capillary viscosmeter.

Total Hours	**45 Hours**

Text Book(s)

1.	Advanced Practical Physical Chemistry, J.B.Yadhav, Krishna Prakasan Media, 2016.
2.	Experiments in Applied Chemistry, Sunita Rattan, S.K. Kataria & Sons, 2012.

Course Code		L	T	P	C	IA	EA	TM
Course Name	BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB	0	0	2	2	40	60	100
Course Category	ENGINEERING SCIENCE COURSE	Syllabus Revision					V.1.0	
Pre-requisite								

Course Objectives:

The course should enable the students

1. This course equips students to have basic knowledge and understanding in solving algebraic,transcendental equation numerically.
2. To make the student knowledge able in the area of matrix theory so that he /she will be familiar in Matlab applications.
3. To familiarize the student with functions of several variables. This is needed in many branches ofengineering.

Course Outcomes:

On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Obtain load characteristics of Single Phase Induction Motor, Three Phase Induction Motor, Single Phase Transformer and Three Phase Alternator.	K3
CO2	Obtain Speed Control of DC Motor, Three Phase Induction Motor (Pole Changing Method).	K3
CO3	To demonstrate the working of Multi meter, CRO and LCR Meter and Measurement of Voltage, Current and Power.	K3
CO4	To Verify experimentally Kirchhoff's Law and Thevenin's Theorem.	K3
CO5	Obtain the B - H Curve of a Magnetic Material.	K4

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)	Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O2	PS O3
CO1	S	M	M	M	M	M	-	-	S	M	-	L	-	-	-
CO2	S	S	M	M	S	M	L	-	S	S	-	M	-	-	-
CO3	S	S	M	M	S	M	L	-	S	M	L	M	-	-	-
CO4	S	S	S	S	M	M	L	L	M	M	-	S	-	-	-
CO5	M	M	M	S	M	M	L	-	M	M	-	M	-	-	-

List of Experiments

1. Study of Electric Motors (AC & DC Motors)
2. Load Test on Single Phase Induction Motor
3. Load Test on Three Phase Induction Motor
4. Load Test on Single Phase Transformer
5. Load Test on Three Phase Alternator
6. Speed Control of DC Motor
7. Speed Control of Three Phase Induction Motor (Pole Changing Method)
8. Study of Multi meter, CRO and LCR Meter
9. Measurement of Voltage, Current and Power.
10. Verification of Kirchoff's Law
11. Verification of Thevenin's Theorem
12. B·H Curve of a Magnetic Material
13. Rectifier Circuit Analysis (AC – DC)
14. Inverter Circuit Analysis (DC – AC)
15. Chopper Circuit Analysis (DC – DC)
16. Series and Parallel RLC Circuit Analysis

Total Hours	**45 Hours**

Course Code		L	T	P	C	IA	EA	TM
Course Name	PROGRAMMING FOR PROBLEM SOLVING LABORATORY	0	0	2	2	40	60	100
Course Category	ENGINEERING SCIENCE COURSE	Syllabus Revision					V.1.0	
Pre-requisite								

Course Objectives:

The course should enable the students

1. To get a clear understanding of Programming Concepts of 'C' language.

Course Outcomes:

On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Develop algorithms for solving simple mathematical and engineering problems and examine the suitability of appropriate repetition and/or selection structures forgiven problems.	K3
CO2	Solve matrix problems, merging, searching, sorting and string Manipulation problems using iteration, modularization or recursion as applicable.	K3
CO3	Organize files to perform text operations like editing, pattern searching using structures	K3
CO4	Implement the algorithms for matrix problems, merging, searching, sorting, and string manipulation and file problems and debug and test using any procedural programming language.	K3

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3

CO1	S	S	S	S	S	M	L	L	M	M	-	M	-	-	-
CO2	S	S	S	S	S	M	L	L	M	M	-	M	-	-	-
CO3	S	S	M	M	S	M	L	L	M	M	-	M	-	-	-
CO4	S	S	S	S	S	M	L	L	S	S	-	S	-	-	-

LIST OF EXPERIMENTS

1. Basic programs in data types.
2. Evaluate Expressions using library Function.
   a. πr^2
   b. (A+B+(2C/3A)+A2+2B)
   c. √S(S-A) (S-B) (S-C)
   d. LOG ($x^3+y^3+z^3$)
3. Problems in Decision making statements.
   i. Find the Biggest among 3 numbers.
   ii. Find Even or odd
   iii. Arithmetic operations using Switch - Case Statements.
4. Problems in looping statements.
   i. Find the Sum of digits using (i) For loop (ii) While loop
   ii. Generate the Fibonacci series
   iii. Check whether the number is prime or not.
5. Find the Linear Search.
6. General sorting.
7. Matrix Manipulation-Addition, Subtraction and Multiplication.
8. String operations-string copy, string reverse, string concatenate.
9. Swapping of numbers using call by value, call by reference.
10. Find factorial using recursive functions.
11. Numerical methods-Quadratic Equation.
12. Display the student information & marks using Structure & Unions.
13. Demonstrate array of structures.
14. Pointer Arithmetic and Array access using Pointers.
15. Basic File Operations

45 Hours

Course Code		L	T	P	C	IA	EA	TM
Course Name	SOFT SKILLS	2	0	0	1	40	60	100
Course Category	VOCATION AND SKILL ENHANCEMENT COURSE	Syllabus Revision					V.1.0	
Pre-requisite	Knowledge of English Language							

Course Objectives:

The course should enable the students -

1. To develop communication skills and writing skills through individual / group activities.
2. To improve the quality of conversations in day to day life
3. To understand the thumb rules in English grammar
4. To improve vocabulary in English
5. To develop professional and positive attitudes

Course Outcomes:

On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Have good command over the language	K3
CO2	Write reports and technical documents effectively	K3
CO3	Understand the thumb rules in English Grammar	K3
CO4	Relate, choose and determine the usage of right vocabulary.	K4
CO5	Participate in group discussion, interviews and deliver presentations	K4

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	M	-	M	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	S	-	-	-	-	-
CO3	-	-	-	-	-	-	-	M	-	M	-	-	-	-	-

CO4	-	-	-	-	-	-	-	-	-	S	-	-	-	-	-
CO5	-	-	-	-	-	-	-	M	-	M	M	-	-	-	-

1	Importance of Developing Communication Skills
2	Common Errors in Spoken English
3	Error Correction Exercises
4	Thumb Rules in English Grammar
5	Grammar Exercises Related to Nouns, Verbs & Articles
6	Reading Comprehension – Sentences, Paragraphs & Passages
7	Effective Communication Skills – Good Vocabulary & Basic Grammar
8	Subject Verb Agreement
9	Vocabulary – Synonyms & Antonyms
10	Writing Essays, Reports etc
11	Conversations in Day to Day Life
12	Story Development from Hints
13	Speaking Exercises (Each student to speak for 3 minutes)
14	Spelling Exercise & Punctuation
15	Pronunciation
Total Hours	**45 Hours**

Text Book(s)

1.	Dr. NDV. Prasada Rao, "High School English Grammar and Composition", Wren and Martin, S. Chand Publishers, 2017 Edition.
2.	S. C. Gupta, "English Grammar and Composition", Very Useful for All Competitive Examinations, Arihant Publications, 2020 Edition.
3.	Howard Jackson, "Grammar and Vocabulary: A Resource Book for Students", Routledge Publications, 2002 Edition.

SEMESTER - III

Course Code		L	T	P	C	IA	EA	TM
Course Name	Mathematics-III (PROBABILITY AND STATISTICS)	3	1	0	4	40	60	100
Course Category	BASIC SCIENCE COURSE	Syllabus Revision						
Pre-requisite	Collection of data, Counting Techniques, Permutation and combination							

Course Objectives:

The course should enable the students

1. To introduce fundamental concepts of probability theory, including conditional probability, Bayes' theorem, and random variables.
2. To familiarize students with discrete and continuous probability distributions and their applications.
3. To develop an understanding of statistical measures such as central tendency, dispersion, correlation, and regression.
4. To equip students with techniques for curve fitting and conducting large sample hypothesis testing.
5. To enable students to perform small sample hypothesis tests using t, F, and chi-square distributions.

Course Outcomes:

On completion of the course,the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Apply basic concepts of probability, including Bayes' theorem and moment generating functions, to analyze random events.	K1
CO2	Use standard discrete and continuous probability distributions to model and solve real-world problems.	K3
CO3	Compute and interpret statistical measures such as mean, variance, correlation, regression, skewness, and kurtosis.	K3
CO4	Perform curve fitting using least squares and conduct large-sample hypothesis testing.	K4
CO5	Apply small-sample tests such as t-test, F-test, and chi-square test for inference and decision-making.	K5

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	S	S	S	S	M	M	M	-	M	M	M	M	M	-	S
CO2	S	S	S	S	M	M	M	-	M	M	M	M	M	-	S

CO3	S	S	S	S	M	M	M	-	M	M	M	L	L	-	S
CO4	S	S	S	S	M	M	M	-	M	M	M	L	L	-	S
CO5	S	S	S	S	M	M	M	-	M	M	M	L	M	M	S

UNIT-I	Probability	12Hours
Introduction to Probability,Probability spaces, conditional probability, Bayes' Theorem, Discrete and Continuous one dimensional random variables - Expectations, Moments, Variance of a sum, Moment generating function, Tchebyshev's Inequality.		

UNIT-II	Probability Distributions	12Hours
Discrete Distributions – Binomial, Poisson and Negative Binomial distributions, Continuous Distributions - Normal, Exponential and Gamma distributions.		

UNIT-III	Statistics	12Hours
Measures of Central tendency, Measures of dispersion, co efficient of variation, Moments, Skewness and Kurtosis, Correlation, Rank Correlation and Regression (Bivariate)		

UNIT-IV	Testing of Hypothesis-I	12Hours
Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.		

UNIT-V	Testing of Hypothesis-II	12Hours
Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.		

	Total Hours	60Hours

Text Book(s)

1.	T. Veerarajan, Probability, Statistics and Random Processes, Third edition, Tata McGraw-Hill, NewDelhi, 2010.
2	S.P. Gupta, Statistical Methods, 31st edition, Sultan chand and sons, New Delhi, 2002.

Reference Book(s)

1.	Loeve, M. (2012). Probability Theory I. United States: Springer New York.

Course Code		L	T	P	C	IA	EA	TM
Course Name	ELECTRONIC DEVICES	3	0	0	3	40	60	100
Course Category	PROGRAMME CORE COURSE	Syllabus Revision						
Pre-requisite	Basic Electrical Engineering							

Course Objectives:

The course should enable the students:

1. To know about semiconductor materials and their types.
2. To design and construct diode circuits.
3. To learn fundamentals of transistor and its variants.
4. To study frequency response of amplifiers under small signal conditions.
5. To understand construction and characteristics of JFET and MOSFET.

Course Outcomes:

On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Characterize the types of semiconductors.	K1
CO2	Design and construct circuits using various diodes.	K2
CO3	Design and construct circuits using BJT.	K2
CO4	Design and construct transistor amplifiers using h-parameters.	K4
CO5	Understand the characteristics of JFET and MOSFET.	K2

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PS O2	PSO 3
CO1	S	S	-	-	-	-	-	-	-	-	-	L	-	-	-
CO2	S	S	S	M	-	-	-	-	-	-	-	L	L	L	S
CO3	S	S	-	L	-	-	-	-	-	-	-	L	M	-	S
CO4	S	S	S	M	-	-	-	-	-	-	-	L	M	M	S
CO5	S	S	-	-	-	-	-	-	-	-	-	L	-	-	S

UNIT-I	SEMICONDUCTOR DIODE	9 Hours

Elemental & compound semiconductor materials, Bonding forces and Energy bands in intrinsic and extrinsic silicon, Charge carrier in semiconductors, carrier concentration, Junction properties, Equilibrium condition, biased junction, Steady state condition, breakdown mechanism (Rectifying Diodes, Zener Diodes), Metal Semiconductor Junction. Special diodes: Tunnel diodes, Varactor diodes, Schottky diode, Photo diodes, Photo detector, LED, Solar cell.

UNIT-II	DIODE CIRCUITS	9 Hours

Ideal and Practical diode, Clipper, Clamper. Power Supply: Rectifiers-Halfwave, Full wave, Bridge rectifier, filter circuits, Voltage regulation using shunt & series regulator circuits, Voltage regulationusingIC723		
UNIT-III	**BIPOLAR DEVICES**	**9 Hours**
Construction, basic operation, current components and equations, CB, CE and CC configuration, input and output characteristics, Early effect, Region of operations: active, cut-off and saturation region. BJT as an amplifier and switch - Photo transistor, Uni-junction Transistor (UJT) and Thyristors: UJT: Principle of operation, characteristics, UJT relaxation oscillator		
UNIT-IV	**SMALL SIGNAL ANALYSIS OF BJT**	**9 Hours**
Small signal Amplifier, Amplifier Bandwidth, Hybrid model, analysis of transistor amplifier using h-parameter, Multistage Amplifier: Cascading amplifier, Boot-strapping Technique, Darlington amplifier and Cascode amplifier, Coupling methods in multistage amplifier, Low and high frequency response, Hybrid π model, Current Mirror circuits.		
UNIT-V	**FET & IC**	**9 Hours**
JFET Construction, n-channel and p-channel, transfer and drain characteristics, parameters, Equivalent model and voltage gain, analysis of FET in CG, CS and CD configuration. Enhancement and Depletion MOSFET drain and transfer Characteristics. **Integrated Circuit Fabrication Process:** oxidation, diffusion, ion implantation, photolithography, etching, chemical vapor deposition, sputtering, twin-tub CMOS process		
	Total Hours	**45 Hours**

Text Book(s)	
1.	Donald.A. Neamen, Electronic Circuit Analysis and Design –2 nd Edition, Tata Mc Graw Hill, 2009.
2.	David A. Bell, "Electronic Devices and Circuits", Oxford Higher Education press, 5 th Edition, 2010.
Reference Book(s)	
1.	Salivahanan, Kumar & Vallavaraj, “Electronic Devices and Circuits”, TMH, 2016.
2.	Theodore F. Bogart, Jeffrey S. Beasley, “Guillermo Rico Electronic Devices & Circuits”, PHI, 2014.
3.	Millman & Halkias, “Electronic Devices and Circuits”, TMH, 2013.

Course Code		L	T	P	C	IA	EA	TM
Course Name	DIGITAL SYSTEM DESIGN	3	0	0	3	40	60	100
Course Category	PROGRAMME CORE COURSE	Syllabus Revision						
Pre-requisite	Basic electronics, Boolean algebra and Number systems.							

1. The course should enable the students –
2. To introduce basic postulates of Boolean algebra and shows the correlation between Boolean expressions.
3. To introduce the methods for simplifying Boolean expressions.
4. To outline the formal procedures for the analysis and design of combinational circuits and Sequential circuits.
5. To introduce the concept of memories and programmable logic devices.
6. To illustrate the concept of synchronous and asynchronous sequential circuits.

Course Outcomes:

On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Explain the basic theorems and properties of Boolean algebra.	K3
CO2	Utilize K- Map for gate level minimization of the given Boolean function	K5
CO3	Construct combinational logic circuits for the given requirement and determine their performance.	K5
CO4	Design synchronous and asynchronous sequential circuits using VERILOG.	K6
CO5	Illustrate the Classifications of memories and programmable logic devices.	K6

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O2	PSO3
CO1	S	M	M	M	-	-	-	-	-	-	S	S	S	S	M
CO2	S	S	S	S	-	-	-	-	-	-	M	L	M	S	M
CO3	-	S	S	M	-	M	-	-	-	-	M	M	S	S	M
CO4	S	S	S	S	M	-	-	-	-	-	S	M	M	S	L
CO5	S	S	S	S	S	-	-	-	-	-	M	M	S	S	M

UNIT-I	INTRODUCTION	9Hours
Minimization Techniques: Boolean postulates and laws – De-Morgan's Theorem - Principle of Duality - Boolean expression - Minimization of Boolean expressions — Minterm – Maxterm -Sum of Products (SOP) – Product of Sums (POS) – Karnaugh map Minimization – Don't care conditions –Quine-McCluskey method of minimization. Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive–OR and Exclusive–NOR Implementations of Logic Functions using gates,NAND –NOR implementations – Multi level gate implementations-Multi output gate implementations and CMOS Logic and their characteristics–Tristate gates.		
UNIT-II	**COMBINATIONAL CIRCUITS**	**9Hours**
Design procedure–Half adder–Full Adder–Half subtractor–Full subtractor– Parallel binary adder, parallel binary Subtractor – Fast Adder - Carry Look Ahead adder – Serial Adder/Subtractor - BCD adder – Binary Multiplier – Binary Divider - Multiplexer/ Demultiplexer-decoder-encoder–parity checker–parity generators–code converters- Magnitude Comparator.		
UNIT-III	**SEQUENTIAL CIRCUITS**	**9Hours**
Latches, Flip-flops - SR, JK, D, T, and Master-Slave – Characteristic table and equation – Application table – Edge triggering – Level Triggering – Realization of one flip flop using other flip flops – serial adder/subtractor Asynchronous Ripple or serial counter – Asynchronous Up/Down counter - Synchronous counters – Synchronous Up/Down counters – Programmable counters – Design of Synchronous counters: state diagram- State table –State minimization –State assignment -Excitation table and maps-Circuit implementation - Modulo–n counter, Registers – shift registers - Universal shift registers – Shift register counters – Ring counter – Shift counters - Sequence generators.		
UNIT-IV	**SYNCHRONOUS AND ASYNCHRONOUS SEQUENTIAL CIRCUITS**	**9Hours**
Synchronous Sequential Circuits: General Model – Classification – Design – Use of Algorithmic State Machine – Analysis of Synchronous Sequential Circuits Asynchronous Sequential Circuits: Design of fundamental mode and pulse mode circuits – Incompletely specified State Machines – Problems in Asynchronous Circuits – Design of Hazard Free Switching circuits. Design of Combinational and Sequential circuits using VERILOG		
UNIT-V	**MEMORY DEVICES**	**9Hours**
Classification of memories – ROM - ROM organization - PROM – EPROM – EEPROM – EAPROM, RAM – RAM organization – Write operation – Read operation – Memory cycle - Timing wave forms – Memory decoding – memory expansion – Static RAM Cell- Bipolar RAM cell – MOSFET RAM cell – Dynamic RAM cell–Programmable Logic Devices– Programmable Logic Array (PLA)-Programmable Array Logic (PAL) – Field Programmable Gate Arrays(FPGA)-Implementation of combinational logic circuits using ROM,PLA,PAL		
	Total Hours	**45Hours**

Text Book(s)	
1.	M.Morris Mano,"Digital Design",4e, Prentice Hall of India Pvt.Ltd., 2008/ Pearson Education (Singapore) Pvt.Ltd. NewDelhi, 2003.
2.	Donald P.Leach and Albert Paul Malvino, "Digital Principles and Applications",6th Edition,TMH, 2006.
Reference Book(s)	
1.	John F.Wakerly, "Digital Design", Fourth Edition, Pearson / PHI, 2008.
2.	John Yarbrough, "Digital Logic Applications and Design", Thomson Learning, 2006.
3.	Charles H.Roth. "Fundamentals of Logic Design", 6th Edition, Thomson Learning, 2013.
4.	Thomas L.Floyd, "Digital Fundamentals", 10th Edition, Pearson Education Inc, 2011.
5.	Donald D.Givone, "Digital Principles and Design", TMH, 2003.
6.	A.AnandaKumar,Fundamentals of digital circuits,second edition,PHI learning private Limited, 2009.

Course Code		L	T	P	C	IA	EA	TM
Course Name	SIGNALS AND SYSTEMS	3	0	0	3	40	60	100
Course Category	PROGRAMME CORE COURSE	Syllabus Revision						
Pre-requisite	Mathematics–I & II							

Course Objectives:

The course should enable the students-

1. To understand the properties and representation of discrete and continuous signals.
2. To analyze continuous time signals and system in the Fourier and Laplace domain.
3. To analyze discrete time signals and system in the Fourier and Z transform domain.
4. To development of the mathematical skills to solve problems involving convolution, filtering, modulation and sampling.

Course Outcomes:

On completion of the course, the student will be able to

Course outcomes	Description	Highest Bloom's Taxonomy
CO1	Understand and classify systems based on the impulse response behavior of both continuous-time and discrete-time systems.	K2
CO2	Analyze and evaluate the mathematical modeling of various signals and systems.	K4
CO3	Analyze the Continuous time signals using Fourier series and Fourier Transforms.	K3
CO4	Examine the Continuous time LTI systems using Fourier series and Fourier Transforms.	K5
CO5	Analyze sampling process and sampling of discrete time signals.	K3

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	S	S	-	M		-	-	-	-	-	-	L	M	-	S
CO2	S	S	M	S	-	-	-	-	-	-	-	L	M	-	S
CO3	S	S	M	M	-	-	-	-	-	-	-	L	L	-	S
CO4	S	S	S	-	-	-	-	-	-	-	-	L	L	-	S
CO5	S	S	M	M	-	-	-	-	-	-	-	L	M	M	S

UNIT-I	CLASSIFICATION OF SIGNALS AND SYSTEMS	9Hours
Continuous Time Signals (CT signals), Discrete time signals (DT signals) step, ramp, pulse, impulse, exponential, Classification of CT and DT signals-periodic, aperiodic, random signals-CT systems And DT systems, Basic properties of systems- Linear Time invariant systems and properties.		
UNIT-II	**ANALYSIS OF CONTINUOUS TIME SIGNALS**	**9Hours**
Fourier Series Analysis- Representation of periodic signals in trigonometric and exponential form, Spectrum of CT signals-Fourier Transform and Laplace Transform in signal analysis.		
UNIT-III	**LINEAR TIME INVARIANT–CONTINUOUS TIME SYSTEMS**	**9Hours**
Differential Equation - Block diagram Representation, Impulse response, Convolution Integral Frequency response, Fourier and Laplace Transforms in analysis, State variable equations and Matrix representation of systems.		
UNIT-IV	**ANALYSIS OF DISCRETE TIME SYSTEMS**	**9Hours**
Sampling of CT signals and aliasing, DTFT and properties, Z-transform and properties of Z transform		
UNIT-V	**LINEAR TIME INVARIANT– DISCRETE TIME SYSTEMS**	**9Hours**
Difference equations, Block Diagram representation, Impulse response, Convolution sum, LTI systems analysis using DTFT and Z-transforms, State variable equations and matrix representation of systems.		
	Total Hours	**45Hours**

Text Book(s)

1.	P.Ramesh Babu & R.Ananda Natarajan, signals and systems,4th edition, Scitech Publication Private limited, 2009.
2.	Allam V.Oppenheim, S.Wilsky and S.H.Nawab, Signals and systems, Pearson Education, 2007.

Reference Book(s)

1.	Robert A.Gabel and Richard A.Roberts, Signals & Linear Systems, John Wiley & Sons 2004.
2.	Simon Haykins and Barry VanVeen, Signals and Systems, John Wiley & Sons, 2004.

Course Code		L	T	P	C	IA	EA	TM
Course Name	NETWORK THEORY	3	0	0	3	40	60	100
Course Category	PROGRAMME CORE COURSE	Syllabus Revision						
Pre-requisite								

Course Objectives:

The course should enable the students-

1. To introduce electric circuits and its analysis
2. To impart knowledge on solving circuits using network theorems
3. To introduce the phenomenon of resonance in coupled circuits.

Course Outcomes:

On completion of the course, the student will be able to

- Ability to analyze electric circuits
- Ability to apply circuit theorems
- Ability to analyze AC and DC Circuits

Course Outcomees	Description	Highest Bloom's Taxonomy
CO1	Concepts, Nodal, Mesh methods	K2
CO2	Sinusoidal Analysis, Resonance, three phase circuits	K3
CO3	Network Theorem and Application	K3
CO4	Circuit Response RLC, DC & AC Excitation	K2
CO5	Two Port Networks, synthesis Networks.	K3

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	P O6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PSO2	PSO3
CO1	S	S	S	S	M	L	-	-	M	L	-	S			
CO2	S	S	S	S	M	-	-	-	M	L	-	M			
CO3	S	S	M	M	M	M	-	-	M	L	-	S			
CO4	S	M	S	M	M	M	-	-	L	L	-	M			
CO5	S	S	S	S	M	L	-	-	L	L	-	S			

UNIT-I	CIRCUIT CONCEPTS AND MESH & NODAL METHODS	9 Hours
Lumped circuits – Kirchhoff's Laws – Voltage - Current relationships of R, L and C – Independent sources Dependent sources –Simple resistive circuits – Network reduction – Voltage division – Current division –Source transformation. Formation of matrixequations and analysis of AC and DC circuits using mesh-current and nodal-voltage. Methods – Mutual inductance – Coefficient of Coupling – Ideal transformer.		
UNIT-II	SINUSOIDAL STEADY STATE ANALYSIS	9 Hours
Phasor – Sinusoidal steady state response – concepts of impedance and admittance- analysis of simple circuits – Power and Powerfactor – series resonance and parallel resonance – Bandwidth and Q factor Solution of three-phase balanced and unbalancedcircuits.		
UNIT-III	NETWORK THEOREMS AND APPLICATIONS:	9 Hours
Superposition theorem – Reciprocity theorem – Compensation theorem – Substitution theorem – Maximum Power transfer theorem– Thevenin's theorem – Norton's theorem and Millman's theorem with applications.		
UNIT-IV	TRANSIENT ANALYSIS	9 Hours
Forced and free response of RL, RC and RLC circuits with D.C. and sinusoidal excitations.		
UNIT-V	TWO PORT NETWORKS AND SYNTHESIS	9 Hours
Characterization of two port networks in terms of Z,Y,H and T parameters – networks equivalents – relations between networkparameters – Analysis of T, Ladder ,Bridged – T and lattice networks – Characteristics Ideal filter - low pass and high pass filter.Reliability of one port network – Hurwitz polynomials and properties – P. R. functions and properties – synthesis of RL, RC and RLC one port networks.		
	Total Hours	45 Hours

Text Books:

1. Hyatt W.H. and Kemmerly, "Engineering Circuits Analysis", McGraw- Hill International 8th Edition 2011.

2. Kuo F.F., "Network Analysis and Synthesis", Wiley International Edition, 2nd Edition 2006.

3. Paranjothi S.R.,"Electric Circuit Analysis", New Age International Ltd., Delhi, 2nd Edition. 2008.

References

1. Edminister J.A., "Theory and Problems of Electric Circuits", Schaum's outline series McGraw Hill Book Company, 4th Edition 2003.

2. Sudhakar A and Shyam Mohan S.P., "Circuits and Network Analysis and Synthesis", Tata McGraw – Hill Publishing Ltd., New Delhi 5th Edition 2015.

3. Van Valkenburg M.E., "Network Analysis", Prentice – Hall of India Private Ltd., New Delhi, Third Edition, 1974.

Course Code		L	T	P	C	IA	EA	TM
Course Name	OBJECT ORIENTED PROGRAMMING USING C++ (Theory and Practice)	2	0	1	3	40	60	100
Course Category	ENGINEERING SCIENCE COURSE (ESC)	Syllabus Revision						
Pre-Requisites	Basic Knowledge in Programming							

Course Objectives:

The course should enable the students

1. Introduce standard tools and techniques for software development
2. Automated build process, and an appropriate framework for automated unit.
3. To understand the concept of OOP as well as the purpose and usage principles of Inheritance, polymorphism, encapsulation and method overloading
4. To identify classes, objects, members of a class and the relationships among them needed for a specific problem.

Course Outcomes

On completion of the course,the student will be able to

Course Out comees	Description	Highest Bloom's Taxonomy
CO1	Articulate the principles of object-oriented simple abstract data types, control flow and design implementations, using abstraction functions to document them	K3
CO2	Outline the essential features of object-oriented programming such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity using class and object.	K3
CO3	Apply the object using constructors and destructors and using the concept of polymorphism to implement compile time polymorphism in programs by using overloading methods and operators.	K4
CO4	Use the concept of inheritance to reduce the length of code and evaluate the usefulness.	K4
CO5	Apply the concept of run time polymorphism by using virtual functions, overriding functions and abstract class in programs.	K4

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO01	S	S											M	L	L
CO02	L	M		S								M	M		
CO03		M	S										L		
CO04			M	S							S		L		
CO05				M	S								L		

UNIT-I	INTRODUCTION	6 Hours
Introduction to object oriented programming, Concepts of object oriented programming. C++ programming basics- Data types, Manipulators, Cin, Cout, Type conversion, arithmetic operators, Loops and decisions.		
UNIT-II	CLASS, OBJECT, CONSTRUCTORS & DESTRUCTORS	6 Hours
Class and objects: Basics of class and objects, access specifiers, member functions defined inside and outside the class. Constructors and its types, destructors, object as function arguments, Returning objects from Functions, inline functions, static data and member function.		
UNIT-III	ARRAYS & INHERITANCE	6 Hours
Arrays: Defining &accessing Array elements, arrays as class member data, array of Objects. Derived class and base class, Types of inheritance, derived class constructors, overriding member functions, Public and private inheritance, Class Hierarchies.		
UNIT-IV	POLYMORPHISM, FRIEND FUNCTION & FRIEND CLASS	6 Hours
Operator Overloading: Overloading Unary Operators, Operator Arguments, Return Values, Overloading Binary Operators–Arithmetic operators Friend functions, Friend Classes. Memory management -new and delete operator, string class using new.		
UNIT-V	VIRTUAL FUNCTION, TEMPLATES AND FEW ADVANCED TOPICS	6 Hours
Pointers- Pointers to Objects Referring to Members, Array of pointers to objects. Virtual Functions, Pure virtual functions, Late Binding, Abstract Classes, Abstract base class, Virtual base classes, the this pointer. Templates- function templates, class template.		
	Total Hours	30 Hours

TEXT BOOKS	
1.	Object Oriented Programming in C++-Robert Lafore, Galgotia Publication PvtLtd, Third Edition.
2.	The Compete Reference C++, Herbert Schlitz, Fifth Edition, 2015.
REFERENCES	
1.	Let us C++-Yaswant Kanitkar (for templates), BPB Publication
2.	C++ and Object Oriented Programming Paradigm, PHI
3.	C++: How to Program,9th Edition,Deitel and Deitel,PHI
4.	Object Oriented Programming in C++- ,E.Balaguruswamy, Tata Mcgraw Hill, 2013
WEB SOURCE REFERENCES	
1.	https://www.cse.iitb.ac.in/~cs101/2011.1/
2.	https://onlinecourses.nptel.ac.in/noc21_cs02/preview

LIST OF PROGRAMS (15 Hrs.)
1. Programs to implement control statements and loops
2. To demonstrate the use of Functions with default arguments and inline functions
3. Implement member function defined inside and outside the class with different access specifiers
4. To demonstrate the use of constructor with its types and destructor
5. Illustrate the use of Friend functions and static members
6. Illustrate the use of Arrays of objects and object as function argument
7. To implement the use of Single and multiple inheritance
8. To Implement the use of unary operator overloading
9. To Implement the use of Binary operator overloading
10. To implement the PureVirtual functions and runtime polymorphism
11. To implement the use of function Template
12. To implement the use of class Template

Course Code		L	T	P	C	IA	EA	TM
Course Name	ELECTRONIC DEVICES LABORATORY	0	0	3	2	40	60	100
Course Category	PROGRAMME CORE COURSE	Syllabus Revision						
Pre-requisite								

Course Objectives:

The course should enable the students

1. To understand various tools used for designing circuits.
2. To analyze the characteristics of Semiconductor devices.
3. To construct semiconductor devices for practical applications.
4. To design of amplifiers and analyze their characteristics.
5. To analyze the frequency response characteristics of small signal amplifier.
6. To enable to students to work in a team and build applications.

Course Outcomes:

On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Construct and evaluate the Performance characteristics of various semiconductor devices.	K2
CO2	Integrate the semiconductor devices for Practical Application.	K3
CO3	Design amplifier circuit and analyze the design of frequency response of the small Signal Amplifier.	K3
CO4	Design various circuits using software tools and integrate and compare the findings in hardware implementation.	K4
CO5	Demonstrate capability to work in a team and to build circuits for various applications.	K4

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PSO2	PSO3
CO1	S	S	S	S	S	L	-	-	-	-	-	M	S	M	M
CO2	S	S	S	S	S	L	-	-	-	-	-	M	S	M	M
CO3	S	S	S	S	S	L	-	-	-	-	-	M	S	M	M
CO4	S	S	S	S	S	L	-	-	-	-	-	M	S	M	M

CO5	S	S	S	S	S	L	-	-	-	-	-	M	S	M	M

LIST OF EXPERIMENTS

1. Study of Labview/Multisim/PSPICE/ELVIS
2. CRO Operation and its Measurements.
3. P-N Junction Diode Characteristics (Forward bias & Reverse bias)
4. Zener Diode Characteristics
   i. PartA: V-I Characteristics
   ii. PartB: Zener Diode act as a Voltage Regulator
5. BJT Characteristics (CE Configuration)
   iii. PartA: Input Characteristics
   iv. PartB: Output Characteristics
6. FET Characteristics (CS Configuration)
   v. PartA: Drain (Output) Characteristics
   vi. PartB: Transfer Characteristics
7. LED and PHOTO DIODE Characteristics
8. SCR Characteristics
9. UJT Characteristics
10. Clipper and Clamper Circuits
11. Design and Simulate basic Common Source / Common Gate / Common Drain Amplifier
12. BJT- CE Amplifier
13. FET- CS Amplifier

Total Hours	**45 Hours**

Text Book(s)

1.	Donald .A. Neamen, Electronic Circuit Analysis and Design –2 nd Edition, Tata Mc Graw Hill, 2009.
2.	R.S.Sedha, “Text book of Applied Electronics”, Second edition, S Chand publishing, 2008.

Reference Book(s)

1.	R. A. Gayakwad, “Op-Amps And Linear Integrated Circuits”, PHI, 2010.
2.	Schilling & Belove, “Electronic Circuits, Discrete & Integrated”, TMH.2011.
3.	Boylestad & Neshelsky, “Electronic Devices & Circuits”, PHI.2012.

Course Code		L	T	P	C	IA	EA	TM
Course Name	DIGITAL SYSTEM DESIGN LABORATORY	0	0	3	2	40	60	100
Course Category	PROGRAMME CORE COURSE	Syllabus Revision						
Pre-requisite								

Course Objectives:

The course should enable the students

1. To understand, the logical behaviors of digital circuits.
2. To design combinational circuit.
3. To analyze the operation of logic gates and flip-flops.
4. To Design and Construct Hazard Free digital circuits.
5. To enable to students to work in a team and build applications.

Course Outcomes:

On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Verify the truth table for logic gates and Flip-flops.	K2
CO2	Design and test of combinational Circuits	K3
CO3	Design and test of Sequential Circuits.	K3
CO4	Design of Hazard Free Switching Devices and integrate high configuration digital circuits.	K3
CO5	Demonstrate capability to work in a team and to build circuits for various applications.	K4

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2	PSO3
CO1	S	S	S	S	S	L	-	-	-	-	-	M	S	M	M
CO2	S	S	S	S	S	L	-	-	-	-	-	M	S	M	M
CO3	S	S	S	S	S	L	-	-	-	-	-	M	S	M	M
CO4	S	S	S	S	S	L	-	-	-	-	-	M	S	M	M
CO5	S	S	S	S	S	L	-	-	-	-	-	M	S	M	M

	LIST OF EXPERIMENTS	

1. Study of Multisim and LT spice.
2. Study of Gates & Flip-flops.
3. Half Adder and Full Adder.
4. Encoders and Decoders.
5. Multiplexer and De-multiplexer.
6. Magnitude Comparator (2-Bit) and Code Converter.
7. Synchronous Counters.
8. Ripple Counter and Mod–N Counter.
9. Shift Register–SISO/SIPO/PIPO/PISO
10. Design of Memory Devices
11. Design of Hazard Free Switching circuits.
12. Design of Mealy and Moore Circuits.

Total Hours	**45 Hours**

Text Book(s)

1	M.Morris Mano, “Digital Design”, 4th edition, Prentice Hall of IndiaPvt.Ltd., 2008.
2	Thomas L.Floyd, “Digital Fundamentals”, 10th Edition, Pearson Education Inc, 2011.

Reference Book(s)

1	JohnYarbrough, “Digital Logic Applications and Design”, Thomson Learning, 2006.
2	CharlesH.Roth. “Fundamentals of Logic Design”, 6thEdition, Thomson Learning, 2013.

SEMESTER - IV

Course Code		L	T	P	C	IA	EA	TM
Course Name	MATHEMATICS - IV (CALCULUS, SPECIAL FUNCTIONSANDDESIGN OF EXPERIMENTS)	3	1	0	4	40	60	100
Course Category	BASIC SCIENCE COURSES (BSC)	Syllabus Revision						
Pre-requisite	Knowledge of Mathematics–Iand Mathematics–II							

Course Objectives:

The course should enable the students

1. To understand the homogeneous functions for two variables and its total derivatives.
2. To understand the applications of vector products.
3. To analyze the solutions of a differential equation in terms of series.
4. To know about the special functions and its properties.
5. To investigate the experiments which are in terms of one, two and three factors.

Course Outcomes:

On completion of the course,the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Calculate the maximum and minimum values for functions of two variables and aware about the Lagrange multipliers.	K3
CO2	Identify the relation between the line integral, surface integral and volume integral.	K3
CO3	Find the series solution for Bessel function.	K3
CO4	Find the solutions for various problems by using recurrence relations	K3
CO5	Analyze the various factors and capable to conclude about the decisions.	K4

Correlation between Course Outcomes(COs) and Program Outcomes(POs):

COs	ProgramOutcomes(POs)												Program Specific Outcomes(PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	S	M	M	-	-	-	-	-	-	-	-	L	M	S	-
CO2	M	S	L	-	-	-	-	-	-	-	-	L	L	M	S
CO3	S	S	M	-	-	-	-	-	-	-	-	L	M	-	S
CO4	M	L	S	-	-	-	-	-	-	-	-	L	M	S	S
CO5	L	L	L	S	-	-	-	-	-	-	-	L	S	-	S

UNIT-I	CALCULUS	9Hours
Homogeneous Functions-Total derivative-Change of variables-Jacobian-Taylor's theorem for function of two variables-Maxima and Minima of functions of two variables-Lagranges method of undermined multipliers.		
UNIT-II	MULTIVARIABLE CALCULUS	9Hours
Directional derivatives-Gradient-curl and divergence-Problems on Green-Gauss and Stokes theorems- orthogonal curvilinear coordinates-Simple applications involving cubes, sphere and rectangular parallelepipeds.		
UNIT-III	SPECIAL FUNCTIONS-I	9Hours
Validity of series solution - Series solution when x=0 is an ordinary point - Frobenius method (Series solution when x=0 is a regular singularity) - Bessel's equation (Bessel's functions ofthe first and second kind) - Recurrence formulae for Jn(x) - Expansions for J0 and J1: Value of J1/2 - Generating function for Jn(x) - Equations reducible to Bessel's equation – Orthogonality of Bessel functions.		
UNIT-IV	SPECIAL FUNCTION-II	9Hours
Legendre's Equation –Rodrigue's Formula – Legendre Polynomials – Generating Function for Pn(x)-Recurrence formula for Pn(x)-Orthogonality of Legendre Polynomials–Hermite Polynomials Recurrence formulae-Rodrigue's formula-Orthogonality of Hermite polynomials.		
UNIT-V	DESIGN OF EXPERIMENT	9Hours
Design of experiments – Completely randomized design: Analysis of variance for one factor of classification – Randomized block design: Analysis of variance for two factors ofclassification – Latin square design.		
	Total Hours	45Hours

Text Book(s)

1.	Grewal B.S, "Higher Engineering Mathematics", 41st Edition, Khanna Publishers, New Delhi, 2011.
2.	Gupta S.P, "Statistical Methods", 28th Edition, Sultan Chand and Sons., New Delhi, 1997

Reference Book(s)

1.	Alan Jeffrey, "Advanced Engineering Mathematics", First Edition, Academic Press, 2001.
2.	Gerald C.F and Wheatley P.O, "Applied Numerical Analysis", Seventh Edition, Addison Wesley Publishing Company, 2004.
3.	Erwin Kreyszig, "Advanced Engineering Mathematics", Tenth Edition, John Wiley & Sons, 2011.

Course Code		L	T	P	C	IA	EA	TM
Course Name	ANALOG ELECTRONICS	3	0	0	3	40	60	100
Course Category	PROGRAMME CORE COURSE	Syllabus Revision						
Pre-requisite	Electronic Devices							

Course Objectives:

The course should enable the students

1. To develop fundamental knowledge about biasing and its various methods.
2. To analyze small signal equivalent circuits using BJT and JFET.
3. To understand methods of constructing feedback amplifiers, oscillators & tuned amplifiers.
4. To understand basic concepts of operational amplifier and its various applications.
5. To know about various analog switches, A/D and D/A convertors.

Course Outcomes:

On completion of the course,the student will beable to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Determine the configuration and apply the characteristics of diodes and transistors	K2
CO2	Design and construct various types of amplifier circuits.	K4
CO3	Design and construct sinusoidal and non-sinusoidal oscillators	K4
CO4	Characterize the functioning of OP-AMP and design application based circuits	K3
CO5	Design and construct ADC and DAC circuits	K4

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	ProgramOutcomes(POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	S	S	M	-	-	-	-	-	-	-	-	L	S	-	M
CO2	S	S	S	M	-	-	-	-	-	-	-	M	S	-	S
CO3	S	S	M	L	-	-	-	-	-	-	-	L	M	-	S
CO4	S	M	S	-	-	-	-	-	-	-	-	M	S	L	S
CO5	S	M	S	L	-	-	-	-	-	-	-	L	M	-	S

UNIT-I	AMPLIFIER MODELS	9Hours
Voltage amplifier, Current amplifier, Trans-conductance amplifier and Trans-resistance amplifier. Biasing schemes for BJT and FET amplifiers, Bias stability, Various configurations (CE/CS, CB/CG, CC/CD) and their features, small signal analysis, Estimation of voltage gain, input resistance, output resistance etc., Low frequency and High frequency transistor models, Design Procedure for particular specifications, Low frequency analysis of multistage amplifiers.		
UNIT-II	POWER & FEEDBACK AMPLIFIERS	9Hours
Frequency response of single stage and multistage amplifiers, Cascode amplifier. Various classes of operation (Class A, B, AB, C), their power efficiency and linearity issues - Feedback Topologies: Voltage series, Current series, Voltage shunt, Current shunt, Effect of feedback on gain and bandwidth, Calculation with practical circuits, Concept of stability, gain margin and phase margin.		
UNIT-III	OSCILLATORS & DIFFERENTIAL AMPLIFIERS	9Hours
Review of Basic Concept, Barkhausen criterion, RC oscillators (Phase shift, Wien Bridge), LC oscillators (Hartley, Colpitts, Clapp), Non- sinusoidal oscillators. Current mirror: Basic topology and its variants, V-I characteristics, output resistance, minimum sustainable voltage and maximum usable load. Differential amplifier: Basic structure and principle of operation, calculation of differential gain, common mode gain, CMRR and ICMR. OP-AMP design: Design of differential amplifier for a given specification, Designof gain and output stages, compensation.		
UNIT-IV	OP-AMP APPLICATIONS	9Hours
Review of Inverting and Non-inverting amplifiers, Integrator and differentiator, Summing amplifier, Precision rectifier, Schmitt trigger and its applications- Active filters: Low pass, high pass, band pass and band stop, design guidelines.		
UNIT-V	DAC & ADC	9Hours
Digital-to-analog converters (DAC): Weighted resistor, R-2R ladder, Resistor string. Analog todigital converters (ADC): Single slope, Dual slope, Successive approximation, Flash type - Switched capacitor circuits: Basic concept, practical configurations, Application in amplifier, integrator, ADC etc.		
	Total Hours	45Hours

Text Book(s)

1.	Paul R.Gray and Robert G.Meyer, "Analysis and Design of Analog Integrated Circuits", John Wiley, 3rdEdition, 1992.
2	J.V.Wait,L.P.Huelsman and GA Korn, "Introduction to Operational Amplifier theory and applications",Mc Graw Hill,1992

Reference Book(s)

1	A.S.Sedra and K.C.Smith,"Microelectronic Circuits",Oxford University Press,5thEdition, 2004.
2.	P.Horowitz and W.Hill,"The Art of Electronics",Cambridge University Press,2ndEdition, 1989.
3	J.Millman and A.Grabel,"Microelectronics",Mc Graw Hill,Second Edition,1988.

Course Code		L	T	P	C	IA	EA	TM
Course Name	ANALOG AND DIGITAL COMMUNICATION	3	0	0	3	40	60	100
Course Category	PROGRAMME CORE COURSE	Syllabus Revision						
Pre-requisite	Electronic Devices, Digital System Design, Signals &Systems							

Course Objectives:

The course should enable the students:

1. To analyze and compare different analog modulation schemes.
2. To analyze the behavior of communication systems in the presence of noise.
3. To investigate pulse modulation systems and analyze their system performance.
4. To analyze different modulation schemes and compute bit error performance.
5. To study demodulation of digital signals.

Course Outcomes:

On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Compare different analog modulation schemes for their efficiency and bandwidth.	K2
CO2	Analyze the behavior of communication systems in the presence of noise.	K4
CO3	Investigate pulse modulation systems and analyze their system performance	K4
CO4	Compute bit error performance of various modulation schemes.	K3
CO5	Gain knowledge on demodulation of digital signals.	K2

Correlation between Course Outcomes(COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	S	S	S	M	M	-	-	-	-	-	-	L	S	S	M
CO2	S	S	S	M	M	-	-	-	-	-	-	L	S	S	M
CO3	S	S	S	M	M	-	-	-	-	-	-	L	S	S	M
CO4	S	S	S	L	M	-	-	-	-	-	-	L	S	S	M
CO5	S	S	M	L	L	-	-	-	-	-	-	L	S	S	M

UNIT-I	AMPLITUDE AND ANGLE MODULATION	9 Hours
Review of signals and systems-Frequency domain representation of signals - Amplitude modulation systems-DSB-SC, SSB and VSB modulation - Superheterodyne Receiver - Angle modulation Representation of FM and PM signals-Relationship between FM and PM-Narrow band and wideband FM-Transmission bandwidth of FM wave- Generation and detection of FM wave.		
UNIT-II	INFORMATION THEORYAND NOISE	9 Hours
Entropy – Discrete memory less channels – Channel capacity – Hartley Shannon Law – Source Coding theorem – Huffman & Shannon- Fano codes - Noise in amplitude and frequency modulation systems- Pre-emphasis and De-emphasis-White noise – Narrowband noise -Threshold effect in angle modulation.		
UNIT-III	PULSE MODULATION	9 Hours
Sampling process -Pulse Amplitude Modulation (PAM)-Pulse Position Modulation (PPM) - Quantization Process-Pulse Code Modulation (PCM) - Delta Modulation - Differential Pulse Code Modulation-Line codes-Noise consideration in PCM-Time Division Multiplexing-Digital Multiplexers.		
UNIT-IV	BASEBAND MODULATION TECHNIQUES	9 Hours
Baseband transmission of digital data-Inter Symbol interference(ISI) problem - Nyquist channel Binary Amplitude shift keying(ASK)-Phase-Shift Keying(PSK) - Frequency Shift Keying(FSK)-Quadrature Amplitude Modulation(QAM)-Continuous phase modulation and Minimum shift keyingElements of detection theory-optimum detection of signals in noise-coherent communication with waveform-Probability of error calculation.		
UNIT-V	DEMODULATION OF DIGITAL SIGNALS	9 Hours
Digital Modulation tradeoffs-optimum demodulation of digital signal over band limited channelsMaximum likelihood sequence detection (Viterbi receiver)-Equalization techniques-Synchronization and carrier recovery of digital modulation.		
	Total Hours	45 Hours

Text / Reference Book(s)

1.	Dr.Sanjay Sharma,“Analog and Digital Communication”,SK Kataria & Son’s publication, Seventh Edition,2017.
2.	Haykin.S and Michel Moher,”Introduction to Analog and Digital Communication”, John Wiley, Second Edition, 2012.
3.	Taub Hand Schilling D.L.,“Principles of Communication Systems”,Tata McGraw Hill, 4TH Edition 2017.
4.	Prokis. J.G.,”Digital Communications”, Tata McGraw Hill, Fourth Edition, 2017.

Course Code		L	T	P	C	IA	EA	TM
Course Name	MICROPROCESSOR AND MICROCONTROLLERS	3	0	0	3	40	60	100
Course Category	PROGRAMME CORE COURSE	Syllabus Revision						
Pre-requisite	Electronic Devices, Digital System Design							

Course Objectives:

The course should enable the students

1. To study architecture of 8085 Microprocessor and its instruction set.
2. To study architecture of 8086 Microprocessor and its instruction set.
3. To learn design aspects of I/O and Memory interfacing circuits.
4. To study architecture of 8051 microcontroller and its applications.
5. To know about RSIC processors and design ARM processor-based systems.

Course Outcomes:

On completion of the course,the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Execute programs using assembly language of 8085 Microprocessor.	K3
CO2	Execute programs using assembly language of 8086 Microprocessor.	K3
CO3	Design interfacing circuits using I/O and Memory devices.	K3
CO4	Develop systems using different microcontrollers.	K4
CO5	Design ARM microcontroller based systems.	K3

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes(POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	S	S	S	M	-	-	-	-	-	-	-	L	M	M	-
CO2	S	S	S	M	-	-	-	-	-	-	-	L	M	M	-
CO3	S	S	S	M	-	-	-	-	-	-	-	L	M	L	S
CO4	S	S	S	M	M	-	-	-	-	-	-	L	M	S	S
CO5	S	S	S	M	M	-	-	-	-	-	-	L	-	M	M

UNIT-I	8085 MICROPROCESSOR	9Hours
Microprocessor architecture and its operation, memory, I/O devices, 8085 microprocessor – Core architecture - Various registers- Bus Timings, Multiplexing and De-multiplexing of Address Bus, Decoding and Execution, Instruction set – Classification, Instruction Format, Addressing Modes, 8085 Interrupt Process, Hardware and Software Interrupts.		
UNIT-II	8086 MICROPROCESSOR	9Hours
Core Architecture of the 8086 - Memory Segmentation, Minimum mode Operation and Maximum Mode Operation, Instruction Set of the 8086 processor- Classification - Instruction Format Addressing modes, Simple Assembly Language Programs - Arithmetic operations, Data transfer, String Manipulation, Searching and Sorting.		
UNIT-III	I/O INTERFACING	9Hours
Memory Interfacing and I/O interfacing - Parallel communication interface – Serial Communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: TrafficLight control, LED display , LCD display, Keyboard display interface and Alarm Controller.		
UNIT-IV	MICROCONTROLLER	9Hours
Architecture of 8051 – Special Function Registers (SFRs) - I/O Pins Ports and Circuits – Instruction set- Addressing modes - Assembly language programming - Programming 8051Timers, Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation.		
UNIT-V	ADVANCED MICROPROCESSOR & MICROCONTROLLER	9Hours
Advanced Microprocessor Architectures- 286, 486, Pentium - RISC Processors- RISC Vs CISC, RISC properties and evolution- ARM Processor – CPU: programming input and output supervisor mode, exceptions and traps – Co-processors- Memory system mechanisms – CPU performance- CPU power consumption.		
	Total Hours	45Hours

Text Book(s)	
1	R.S.Gaonkar,“Microprocessor Architecture: Programming and Applications with the 8085/8080A”, Penram International Publishing, Third Edition, 1996.
2	D A Patterson and J H Hennessy,“Computer Organization and Design of hard ware and Software interface”Morgan Kaufman Publishers, Fourth Edition, 2011.
Reference Book(s)	
1	Douglas Hall,“The Microprocessors and its Interfacing”,Tata McGraw Hill,Third Edition, 2012.
2	Kenneth J.Ayala,“The 8051 Microcontroller: Architecture Programming & Applications”, Penram International Publishing, Second Edition, 1996.

Course Code		L	T	P	C	IA	EA	TM
Course Name	DATA STRUCTURES AND ALGORITHMS	3	0	0	3	40	60	100
Course Category	PROGRAMME CORE COURSE	Syllabus Revision						
Pre-requisite								

Course Objectives:

The course should enable the students

1. Learn linear data structures – list, stack, and queue.
2. Learn Nonlinear data Structures-Trees and Graphs.
3. Be exposed to sorting, searching and hashing algorithms.

Course Outcomes:

On completion of the course, thes tudent will beable to

- Implement application of linear and nonlinear data structures.
- Apply the different linear data structures to solve problems.
- Implement the various algorithms.

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Select appropriate data structures as applied to specified Problem definition.	K2
CO2	Implement operations like searching, insertion, and deletion, Traversing mechanism etc. on various data structures.	K5
CO3	Students will be able to implement Linear and Non-Linear data Structures.	K5
CO4	Implement appropriate sorting/searching technique for given Problem.	K6
CO5	Determine and analyse the complexity of given Algorithms	K6

Correlation between Course Outcomes(COs) and Program Outcomes (POs):

COs	Program Outcomes(POs)												Program Specific Outcomes (PSOs)		
	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O2	PSO3
CO1	S	S	S	S	S	M	-	-	S	M	L	S			
CO2	M	S	M	S	S	M	-	-	S	M	L	S			
CO3	M	M	M	M	S	M	-	-	S	M	L	S			
CO4	M	S	M	S	S	M			S	M	M	M			
CO5	M	S	M	S	S	M	-	-	S	M	M	M			

UNIT-I	INTRODUCTION	9 Hours
Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, time-Space trade off. Searching: LinearSearch and Binary Search Techniques and their complexity analysis		
UNIT-II	**STACKS AND QUEUES**	**9 Hours**
ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation–corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each Type of Queues: Algorithms and their analysis.		
UNIT-III	**LINKED LISTS**	**9 Hours**
Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doublylinked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithmsand the complexity analysis.		
UNIT-IV	**TREES & GRAPH**	**9 Hours**
Trees - Basic Tree Terminologies, Different types of Trees: Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of BinaryTrees. B Tree: definitions, algorithms and analysis. Graph - Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.		
UNIT-V	**SORTING AND HASHING**	**9 Hours**
Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, QuickSort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.		
	Total Hours	**45 Hours**

Text Books:

1. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press
2. Seymour Lipschutz – "Theory and Problems of Data Structures". (AVL Trees, B-Trees), Edition 2006, Tata mcgraw Hill, 12th Edition 2011.
3. Ellis Horowitz & Sartaj Sahani – "Fundamentals of Data Structures in C" – W.H. Freeman and Co., 2nd Edition, 2007.

References:

1. Hand book of Data Structures and Applications, Dinesh P Mehta, Sartaj Sahni, CRC Press, 2018

DATA STRUCTURES LAB
LIST OF PROGRAMS

1. Write simple program to implement Array data structure with all possible manipulation such asinsertion, deletion, find & replace, accepting array values from command line arguments
2. Write simple programs to implement structures with all possible manipulations such as passingstructures and returning from functions, pointer to the structure, members as pointers in thestructure and self-referential structure.
3. Write simple programs to implement pointers with all manipulations such as pointer to arrays, pointer arithmetic, pointer to pointer, passing pointers to functions and returning from functions.
4. Implementation of Single Linked List
5. Implementation of Stack
6. Implementation of Queue
7. Sort the Given Numbers using
    i) Bubble sort
    ii) Selection Sort.
    iii) Insertion Sort

8.Implement linear and Binary Search algorithm

Course Code		L	T	P	C	IA	EA	TM
Course Name	ELECTRO MAGNETIC FIELDS AND WAVE GUIDES	3	0	0	3	40	60	100
Course Category	PROGRAMME CORE COURSE	Syllabus Revision						
Pre-requisite	Physics and Mathematics							

Course Objectives:

The course should enable the students

1. To study the basics of Electromagnetic.
2. To understand the propagation and polarization of Electromagnetic waves.
3. To analyze wave propagation in Transmission Lines and its applications.
4. To analyze wave propagation in metallic wave guides.
5. To know the radiation characteristics of an antenna.

Course Outcomes:

On completion of the course,the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Gain knowledge on basics of Electro- magnetic.	K1
CO2	Understand the propagation of Electromagnetic Waves.	K2
CO3	Determine the characteristics and wave propagation on transmission lines.	K3
CO4	Analyze wave propagation on metallic wave guides.	K4
CO5	Determine the radiation and radiation characteristics of an antenna.	K2

Correlation between Course Outcomes(COs) and Program Outcomes(POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	S	-	-	-	-	-	-	-	-	L	S	-	-
CO2	S	S	S	-	-	-	-	-	-	-	-	L	-	-	S
CO3	S	S	S	-	-	-	-	-	-	-	-	L	M	-	S
CO4	S	S	S	-	-	-	-	-	-	-	-	L	M	S	S
CO5	S	S	S	-	-	-	-	-	-	-	-	L	M	S	-

UNIT-I	BASICS OF ELECTRO MAGNETICS	9Hours

Vector algebra-Coordinate Systems-Vector differential operator-Gradient-Divergence-Curl-Divergence Theorem-Stokes theorem-Coulombs law-Electric field intensity-Electric flux density- Gauss lawand its applications-Biot Savart Law-Ampere's law-Faradays law- Maxwell's Equations In Integral and differential form-Electric and magnetic boundary conditions at the media interface.

UNIT-II	ELECTRO MAGNETIC WAVES	9Hours
Uniform Plane Waves-Uniform plane wave propagation-Wave propagation in conducting medium- Wave Polarization-Reflection by perfect conductor (normal and oblique incidence)-Reflection by perfect insulator(normal and oblique incidence)-plane waves in arbitrary direction-Brewster angles- Total internal reflection-poynting vector and power flow-Power loss inplane conductor.		
UNIT-III	TRANSMISSION LINES	9Hours
Equations of Voltage and Current on TX line- Propagation constant-characteristic impedance-reflection phenomenon-standing waves-Input impedance of dissipation less transmission line-open and short circuited line- power and impedance measurement on TXline-λ/8,λ/4&λ/2line-λ/4 Impedance transformer-Smith chart and its applications-single and double stub matching		
UNIT-IV	GUIDED WAVES AND WAVE GUIDES	9Hours
Waves between parallel planes-TE waves-TM waves-Characteristic of TE and TM waves-TEM waves-Velocities of propagation-Attenuation in parallel plane Guides-Rectangular wave guide-TE and TM wave sin rectangular wave guide-Impossibility of TEM wave in rectangular wave guide.		
UNIT-V	RADIATION	9Hours
Solution for potential functions-Radiation from oscillating dipole-Power radiated by oscillating dipole-antenna parameters-Gain-directivity-Effective aperture-Radiation Resistance-Band width- Beam width-Input impedance-Matching Baluns-Mono pole and dipole antenna.		
	Total Hours	45 Hours

Text Book(s) and Reference Books

1	Sadiku MH,"Principles of Electromagnetics", Oxford University Press Inc, New Delhi, 2009. Second Edition, Prentice Hall of India, 1968.
2	E.C.Jordan & K.G.Balmain,"Electromagnetic Waves & Radiating Systems",
3	John D Ryder,"Network lines and fields", Prentice Hall of India, NewDelhi, 2005.
4	David K.Cheng, "Field and Wave Electro magnetics", Second Edition, Prentice Hall of India, 1989.
5	Sandeep Wali,"Electromagnetic theory", first edition, Macmillan Publishers Private limited, 2011.

Course Code		L	T	P	C	IA	EA	TM
Course Name	ANALOG ELECTRONICS LABORATORY	0	0	3	2	40	60	100
Course Category	PROGRAMME CORE COURSE	Syllabus Revision						
Pre-requisite								

Course Objectives:

The course should enable the students

1. To understand the basics of linear integrated circuits and available ICs
2. To understand characteristics of operational amplifier.
3. To apply operational amplifiers in linear and nonlinear applications.
4. To analyze the frequency response characteristics of Amplifiers.
5. To enable to students to work in a team and build applications.

Course Outcomes:

On completion of the course,the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Design oscillators and amplifiers using operational amplifiers.	K2
CO2	Design filters using Op-amp and perform experiment on frequency response.	K2
CO3	Analyze the working of PLL and use PLL as frequency multiplier	K3
CO4	Analyze the performance of oscillators and Multi-vibrators.	K3
CO5	Demonstrate capability to work in a team and to build circuits for various applications.	K4

Correlation between Course Outcomes(COs) and Program Outcomes(POs):

COs	Program Outcomes(POs)												Program Specific Out comes(PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	S	S	S	L	-	-	-	-	-	-	-	L	L	-	M
CO2	S	S	S	M	-	-	-	-	-	-	-	M	S	-	S
CO3	S	S	S	S	-	-	-	-	-	-	-	L	M	-	S
CO4	S	M	S	M	-	-	-	-	-	-	-	M	S	-	L
CO5	S	M	S	S	-	-	-	-	-	-	-	L	M	-	S

	LIST OF EXPERIMENTS	

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1. Characteristics of Opamp–IC741.
2. Inverting and Non-inverting amplifier using IC741.
3. Measurement of op-amp characteristics.
4. Instrumentation amplifier and Differential Amplifier using IC741.
5. Integrator and Differentiator using IC741.
6. Schmitt Trigger using IC741.
7. ADC/DAC using IC741.
8. Astable & Monostable Multi-vibrator using IC555.
9. RC Phase shift oscillator and Wien bridge oscillator using BJT.
10. Hartley & Colpitts oscillator using BJT.
11. Frequency Response of Class B Push Pull Amplifier using BJT.
12. Frequency Response of Voltage Series Feedback Amplifier using BJT.
13. Phase Locked Loop (PLL)

Total Hours	**45 Hours**

Text Book(s)

1. J.V. Wait, L.P. Huelsman & GA Korn, “Introduction to Operational Amplifier theory and applications”, McGraw Hill, 1992
2. J. Millman and A. Grabel, “Microelectronics”, 2nd edition, McGraw Hill, 1988
3. P. Horowitz and W. Hill, “The Art of Electronics”, 2nd edition, Cambridge University Press, 1989.

Reference Book(s)

1. A.S. Sedra and K.C. Smith, “Microelectronic Circuits”, Oxford University Press, V Edition, 2004.
2. Paul R. Gray and Robert G.Meyer, “Analysis and Design of Analog Integrated Circuits”, John Wiley, 3rd Edition, 1992.

Course Code		L	T	P	C	IA	EA	TM
Course Name	ANALOG AND DIGITAL COMMUNICATION LABORATORY	0	0	3	2	40	60	100
Course Category	PROGRAMME CORE COURSE	Syllabus Revision						
Pre-requisite								

Course Objectives:

The course should enable the students

1. To construct basic circuits of Analog communication system.
2. To construct basic circuits of Digital communication system.
3. To Design and construct experiments for performing modulation and sampling.
4. To analyze the Performance characteristics of analog and Digital Communication Systems.
5. To enable to students to work in a team and build applications.

Course Outcomes:

On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Apply the practical knowledge to construct Analog communication circuits.	K3
CO2	Apply the practical knowledge to construct Digital communication circuits	K3
CO3	Evaluate Analog and Digital modulated wave form in time /frequency domain.	K3
CO4	Analyze and evaluate the performance of Analog and Digital communication systems.	K5
CO5	Demonstrate capability to work in a team and to build circuits for various applications.	K4

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	S	S	S	S	S	-	-	-	M	-	-	-	S	S	-
CO2	S	S	S	S	S	-	-	-	M	-	-	-	S	S	-
CO3	S	S	S	S	S	-	-	-	M	-	-	-	S	S	-
CO4	S	S	S	S	S	-	-	-	M	-	-	-	S	S	-
CO5	S	S	S	S	S	-	-	-	M	-	-	-	S	S	-

LISTOF EXPERIMENTS
1. Study of Multisim, VisSim and MATLAB.
2. AM modulator and Demodulator.
3. DSB-SC modulator and Demodulator.
4. SSB modulator and Demodulator.
5. FM modulator and Demodulator.
6. PAM modulator and Demodulator.
7. PPM & PWM Modulator.
8. Pre-emphasis and De-emphasis in FM.
9. Signal Sampling and Reconstruction (Sampling Theorem).
10. Pulse Code Modulation and Demodulation.
11. Delta modulation and Adaptive Delta modulation.
12. Amplitude Shift Keying (ASK) and Frequency Shift Keying (FSK) modulator and Demodulator.
13. Phase Shift keying (PSK) and Binary Phase Shift Keying (BPSK) Modulator and Demodulator

Total Hours	**45Hours**

Text Book(s)

1.	Haykin.S and Michel Moher," Introduction to Analog and Digital communication", Second edition, John Wiley and sons Inc, 2012.
2.	Prokis J.G.," Digital communications", 4th edition, Tata McGraw Hill, 2000.

Reference Book(s)

1.	Taub H and Schilling D.L., "Principles of Communication systems", Tata McGraw Hill, 2001
2.	Dr.Sanjay Sharma, "Analog and Digital communication", seventh edition, K KATARIA & amp; SON'S publication, 2017.

Course Code		L	T	P	C	IA	EA	TM
Course Name	MICROPROCESSOR AND MICROCONTROLLER LABORATORY	0	0	3	2	40	60	100
Course Category	PROGRAMME CORE COURSE	Syllabus Revision						
Pre-requisite								

Course Objectives:

The course should enable the students

1. To study architecture of 8086 microprocessor and perform various arithmetic &logical operations.
2. To learn the design aspects of I/O and Memory Interfacing circuits.
3. To analyze the communication between Peripherals and bus interfacing.
4. To Execute Programs using 8051 Microcontroller.
5. To enable to students to working a team and build applications.

Course Outcomes:

On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Design and implement programs on 8086Microprocessor.	K3
CO2	Design I/O circuits and analyze the performance.	K3
CO3	Design Memory Interfacing circuits.	K3
CO4	Integrate Microprocessor and Microcontroller and Peripherals for Various Applications.	K5
CO5	Demonstrate capability to working a team and to build circuits for various applications.	K4

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	S	S	S	S	S	M			M			L	S	S	L
CO2	S	S	S	S	S	M			M			L	S	S	L
CO3	S	S	S	S	S	M			M			L	S	S	S
CO4	S	S	S	S	S	M			M			L	S	S	S
CO5	S	S	S	S	S	M			M			L	S	S	S

LISTOF EXPERIMENTS	
8086 Microprocessor Experiments 1. Basic Arithmetic and Logical operations using 8086. 2. Code conversion, decimal arithmetic and Matrix operations. 3. Floating-point operations, string manipulations, sorting and searching. 4. Counters and Time delay. 5. Password Checking, Print RAM size and System Date. **8086 Microprocessor-Peripherals and Interfacing Experiments** 6. Traffic Light Control and Stepper Motor Control. 7. Digital Clock. 8. Keyboard and Display. 9. Serial and Parallel Interface. 10. A/D and D/A Interface and Waveform Generation. **8051 Microcontroller Experiments - Hardware / Simulation** 11. Basic Arithmetic and Logical Operations. 12. Square program, Cube program and Finding 2's complement of a number. 13. Unpacked BCD to ASCII. 14. A/D and D/A Interface and Waveform Generation. 15. Interfacing LCD to 8051	
Total Hours	**45Hours**

Text Book(s)	
1.	R. S. Gaonkar, "Microprocessor Architecture: Programming and Applications with the 8085/8080A", Penram International Publishing, Third Edition, 1996.
2.	D A Patterson and J H Hennessy, "Computer Organization and Design The hardware and software interface" Morgan Kaufman Publishers, Fourth Edition, 2011.
Reference Book(s)	
1.	Douglas Hall, "The Microprocessors and its Interfacing", Tata McGraw Hill, Third Edition, 2012.
2.	Kenneth J. Ayala, "The 8051 Microcontroller: Architecture Programming & Applications", Penram International Publishing, Second Edition, 1996.