


**BOARD OF STUDIES IN BASIC SCIENCES 2016-17**  
**B.E.ELECTRONICS AND COMMUNICATION ENGINEERING**  
**CBCS 2016 REGULATIONS**  
**FIRST SEMESTER**

Sl. No.	Course Code	Course Title	Category	Continuous Assessment Marks	End Sem Marks	Total Marks	Credits			
							L	T	P	C
		<b>THEORY</b>								
1	16LHS1Z1	Communication Skills in English	HS	50	50	100	2	2	0	3
2	16LBS1Z2	Engineering Mathematics I	BS	50	50	100	3	2	0	4
3	16LBS103	Engineering Physics	BS	50	50	100	3	0	0	3
4	16LBS104	Applied Chemistry	BS	50	50	100	3	0	0	3
5	16LES105	Basics of Civil and Mechanical Engineering	ES	50	50	100	3	0	0	3
		<b>PRACTICAL</b>								
6	16LBS106	Chemistry Laboratory	BS	50	50	100	0	0	4	2
7	16LES107	Workshop Practice	ES	50	50	100	0	0	4	2
		<b>TOTAL</b>		350	350	700				20

**SECOND SEMESTER**

Sl. No.	Course Code	Course Title	Category	Continuous Assessment Marks	End Sem Marks	Total Marks	Credits			
							L	T	P	C
		<b>THEORY</b>								
1	16LHS2Z1	Technical English	HS	50	50	100	2	2	0	3
2	16LBS2Z2	Engineering Mathematics II	BS	50	50	100	3	2	0	4
3	16LBS2Z3	Materials Science	BS	50	50	100	3	0	0	3
4	16LHS2Z4	Environmental Science and Engineering	HS	50	50	100	3	0	0	3
5	16LES2Z5	Programming in C	ES	50	50	100	3	0	0	3
6	16LES206	Electron Devices	ES	50	50	100	3	0	0	3
		<b>PRACTICAL</b>								
7	16LBS207	Physics Laboratory	BS	50	50	100	0	0	4	2
8	16LES208	Engineering Graphics	ES	50	50	100	2	0	4	4
9	16LES2Z9	Programming in C Laboratory	ES	50	50	100	0	0	4	2
		<b>TOTAL</b>		450	450	900				27

  
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16LHS1Z1

## COMMUNICATION SKILLS IN ENGLISH

*Common to all branches*

Category : HS -

L T P C

2 2 0 3

**Course Objectives:**

- o To make the learners understand the usage of basic grammar in English.
- o To enhance the learner's speaking skills through appropriate listening practice.
- o To instill reading habits to practice communicative tasks and comprehension
- o To improve the learner's writing skills through various means
- o To enrich the vocabulary of learners for speaking and writing

## UNIT I

6+6 Periods

**Listening** - Listening to practice basic pronunciation at phonemic and word level, Listening to informal conversations of exchanging greetings and introducing oneself/others; **Speaking**- Introducing oneself, one's family / friend, speaking about one's place; **Reading**-Reading to practice stress and pause; **Writing**-Autobiographical writing, Letter to seek permission, Letter to issue certificates; **Grammar**- Use of Auxiliary Verbs, Adjectives and Adverbs; **Vocabulary**-Word formation, Synonyms and Antonyms of High frequency words.

## UNIT II

6+6 Periods

**Listening**-Listening to Telephone Conversations for taking and leaving messages, making enquiries; **Speaking**— Role-play activities based on real life situations, Narrating daily routines; **Reading**— skimming and scanning, Reading for comprehension with exercises; **Writing**-Advertisements and slogan writing, Imperative instructions, Definitions; **Grammar** – Tenses, Prepositions; **Vocabulary**- Commonly confused words

## UNIT III

6+6 Periods

**Listening** -Listening to give instructions, Making requests and responding to requests, Thanking someone and responding to thanks; **Speaking** -Group Discussion on chosen topics, Describing a simple process; **Reading**-Reading and interpreting visual material, Critical reading; **Writing** –Letter to the Editor of a Newspaper, Recommendations; **Grammar**- Impersonal Passive, Subject-verb agreement; **Vocabulary**- Collocation, Word Association

## UNIT IV

6+6 Periods

**Listening**-Listening to accept/refuse invitation, Listening to apologize, Listening to congratulate; **Speaking** – Debates on current social affairs; **Reading** –Reading to make inference, Paraphrasing; **Writing**- Personal letter (Inviting your friend to a function, congratulating someone on his / her success, thanking one's friends / relatives); **Grammar** – 'Wh'-questions, Modal verbs; **Vocabulary** -Single word substitutes -Use of abbreviations & acronyms

## UNIT V

6+6 Periods

**Listening** -Video Listening to different accents, Viewing Speeches, Viewing English songs, Viewing short films; **Speaking** -Giving impromptu talks, Making presentations on given topics; **Reading** –Extensive reading; **Writing** – Writing General Article, Writing Short Stories; **Grammar** - Common Errors in English; **Vocabulary** –Word Pairs with Repetitive meaning.

LECTURE: 30 PERIODS TUTORIAL:30 PERIODS PRACTICAL: 0 PERIODS TOTAL: 60 PERIODS

**TEXT BOOKS****AUTHOR NAME****TITLE OF BOOK****PUBLISHER,  
YEAR OF PUBLICATION**

Department of English,  
Anna University. Mindscapes  
Sadanand, Kamlesh & Punitha,  
Susheela

English for Technologists  
and Engineers.  
Spoken English: A Foundation  
Course (Part 1).

Orient Blackswan, Chennai. 2012  
Orient Blackswan, Hyderabad. 2014

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**REFERENCE BOOKS**

<b>AUTHOR NAME</b>	<b>TITLE OF BOOK</b>	<b>PUBLISHER, YEAR OF PUBLICATION</b>
<i>Raman, Meenakshi &amp; Sangeetha Sharma</i>	<i>Technical Communication: Principles and Practice</i>	<i>Oxford University Press, New Delhi. 2011</i>
<i>Vijay, Anbazhagan.J, &amp; Jaishree.N</i>	<i>Technical English-I</i>	<i>Global Publishers, Chennai, 2016</i>
<i>Rizvi, Ashraf. M.</i>	<i>Effective Technical Communication</i>	<i>Tata McGraw-Hill, New Delhi. 2005</i>
<i>Rutherford, Andrea. J</i>	<i>Basic Communication Skills for Technology</i>	<i>Pearson, New Delhi. 2001</i>
<i>Redston, Chris, Cunningham, Gillie</i>	<i>Face 2 Face: Elementary Student's Book</i>	<i>Cambridge University Press, New Delhi. 2009</i>

**EXTENSIVE READING (Not for Examination)**

*Kalam, Abdul A.P.J*      *Wings of Fire.*      *Universities Press, Hyderabad. 1999.*

**Websites**

1. <http://www.usingenglish.com>
2. <http://www.uefap.com>

**COURSE OUTCOMES:**

On completion of this course, students will be able to

- CO1:** The learner will be able to understand basic grammar and the learner will have sufficient command over language by training his tongue and tuning his ear through apt listening tasks.
- CO2:** Reading tasks will enable the learner practice phonological and linguistic aspect of learning, help comprehend and create interest in extensive reading.
- CO3:** The learner shall be able to write appropriately for a given context and use the right word at the right place.

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16LBS1Z2

**ENGINEERING MATHEMATICS I***Common to all branches*

Category : BS

L T P C

3 2 0 4

**Course Objectives:**

- To familiarize techniques of matrix algebra including properties of eigen values and eigen vectors.
- To gain the knowledge of hyperbolic functions and application problems in differential calculus.
- To familiarize with functions of several variables and Functions of two variables including extremum problems, Jacobian and Leibnitz rule of integration.
- To perform double and triple integration with relevant to surface area and volume of solid.

## UNIT I

**MATRICES****9+6 Periods**

Eigen values and Eigen vectors of a real matrix-Characteristic equation-Properties of Eigen values and eigen vectors-Cayley Hamilton theorem - Diagonalization of matrices-Reduction of a quadratic form to canonical form by orthogonal transformation-Nature of quadratic forms.

## UNIT II

**HYPERBOLIC FUNCTIONS AND DIFFERENTIAL CALCULUS** **9+6 Periods**

Hyperbolic and Inverse Hyperbolic functions-Identities- Real and Imaginary parts-Solving Problems using Hyperbolic functions.

Curvature and radius of curvature-Cartesian and polar coordinates- center of curvature and Evolutes- Envelopes and Evolute as envelope of normal.

## UNIT III

**FUNCTIONS OF SEVERAL VARIABLES** **9+6 Periods**

Functions of two variables- Taylor's theorem (statement only) and expansions-Maxima and Minima-Constrained extremum by Lagrange's multiplier method-Jacobians-Differentiation under integral sign

## UNIT IV

**INTEGRAL CALCULUS** **9+6 Periods**

Definite and Indefinite integrals-Substitution rule-Techniques of Integration-Integration by parts-Trigonometric substitutions-Integration of rational function by partial fractions-Integration of irrational functions-Improper integrals.

## UNIT V

**MULTIPLE INTEGRALS** **9+6 Periods**

Beta and Gamma integrals and properties. Double Integrals-Change of order of integration-Double integrals in polar coordinates-Area enclosed by plane curves-Triple integrals-Volume as a triple integral-Transformation to Polar, Cylindrical and Spherical polar coordinates.

LECTURE: 45 PERIODS TUTORIAL:30 PERIODS PRACTICAL: 0 PERIODS TOTAL: 75 PERIODS

**TEXT BOOKS**

<b>AUTHOR NAME</b>	<b>TITLE OF BOOK</b>	<b>PUBLISHER, YEAR OF PUBLICATION</b>
<i>Veerarajan T</i>	<i>Engineering Mathematics for Semesters I and II</i>	<i>Tata McGraw Hill Publishing Co., New Delhi, 2015.</i>
<i>Kandasamy P, ThilagavathyK and Gunavathy K</i>	<i>Engineering Mathematics for I year B.E/B.Tech.</i>	<i>S.Chand &amp; Co, Ramnagar, New Delhi, Reprint 2013.</i>
<i>S. Narayanan and Manicavachagom Pillai T.K.</i>	<i>Calculus, Vol.I, II and III,</i>	<i>S. Viswanathan, Printers and Publishers Pvt. Ltd, Chennai, 2009.</i>

**REFERENCE BOOKS**

<b>AUTHOR NAME</b>	<b>TITLE OF BOOK</b>	<b>PUBLISHER, YEAR OF PUBLICATION</b>
<i>Erwin Kreyszig</i>	<i>Advanced Engineering Mathematics</i>	<i>Wiley &amp; sons (Asia) Ltd, 10<sup>th</sup> Edition, 2015.</i>
<i>Ray Wylie.C and Louis Barrett</i>	<i>Advanced Engineering Mathematics</i>	<i>Tata McGraw Hill Company, New Delhi, 2004.</i>
<i>Grewal B. S</i>	<i>Higher Engineering Mathematics</i>	<i>Khanna Publishers, New Delhi, 43<sup>rd</sup> Edition, 2014.</i>
<i>Ramana B V</i>	<i>Higher Engineering Mathematics</i>	<i>Tata McGraw Hill Co. Ltd, NewDelhi, 11<sup>th</sup> Print, 2010.</i>
<i>Bali N., Goyal M and Watkins C</i>	<i>Advanced Engineering Mathematics</i>	<i>Firewall Media (An Imprint of Laxmi Publications Pvt Ltd), New Delhi, 7<sup>th</sup> Edition, 2009.</i>
<i>Bali N.P and Goyal M</i>	<i>A text book of Engineering Mathematics</i>	<i>University Science Press (An Imprint of Laxmi Publications Pvt Ltd), New Delhi,2014</i>

**COURSE OUTCOMES:**

On completion of this course, students will be able to

- CO1:** Acquire knowledge of eigen values and eigen vectors including properties through matrix theory.
- CO2:** Understand the hyperbolic functions and applications of differential calculus.
- CO3:** Acquire fluency in partial differentiation and solving problems related to maxima and minima for more independent variables.
- CO4:** Understand the standard types of integration and solution to various integrals.
- CO5:** Understand the multiple integrals and their applications to engineering problems.

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16LBS103

**ENGINEERING PHYSICS**  
Common to EEE, ECE, CSE, EIE & IT branches

**Category : BS**  
L T P C  
3 0 0 3

**Course Objectives:**

To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology. Upon completion of this course the students will be familiar with:

- o Concepts, types of lasers and its applications, fibre optic principles and its applications.
- o Basics of properties of matter & thermal physics
- o Origin of quantum physics, Schrödinger's equation and applications.
- o Principles of acoustics, ultrasonics and their industrial applications.
- o Fundamentals of crystal Physics and its packing factor calculations.

**UNIT I LASERS & FIBRE OPTICS** 9 Periods

Introduction- Principle of laser action - characteristics of laser - Spontaneous emission and Stimulated emission -Einstein's coefficients - population inversion – methods of achieving population inversion –Optical Resonator -Types of Lasers – Principle, construction and working of Nd-YAG, CO<sub>2</sub>, Semiconductor laser - applications of laser-Hologram

Introduction – Basic Principles involved in fiber optics- Total internal reflection – Structure of optical fiber – Propagation of light through optical fiber –Derivation for Numerical Aperture and acceptance angle - fractional index change - Classification of optical fiber based on materials, refractive index profile and Modes - Fiber optical communication links-Fiber optic sensors- displacement.

**UNIT II PROPERTIES OF MATTER & THERMAL PHYSICS** 9 Periods

Elasticity- Hooke's law- stress-strain diagram - Factors affecting elasticity - Bending moment - Depression of a cantilever - Young's modulus by uniform bending - I shaped girders.

Thermal expansion - thermal stress - thermal conductivity - heat conduction in solids - flow of heat through compound media - Forbe's and Lee's disc method: theory and experiment.

**UNIT III QUANTUM PHYSICS AND APPLICATIONS** 9 Periods

Limitations of classical Physics - Introduction to Quantum theory - Dual nature of matter and radiation- de-Broglie wavelength in terms of voltage, energy and temperature –Heisenberg's Uncertainty principle – verification – physical significance of a wave function- Schrödinger's Time independent and Time dependent wave equations — Particle in a one dimensional potential well–Scanning Electron Microscope (SEM)- Transmission Electron Microscope (TEM).

**UNIT IV ACOUSTICS & ULTRASONICS** 9 Periods

Classification of sound - loudness and intensity - Weber-Fechner law - standard intensity and intensity level - decibel - reverberation - reverberation time - sound absorbing materials - Determination of absorption coefficient - factors affecting acoustics of buildings.

Introduction - properties of ultrasonic waves - production of ultrasonic waves; Magnetostriction effect- Magnetostriction generator- Piezoelectric effect- Piezoelectric generator- Acoustic grating - Determination of wavelength and velocity of ultrasonics-cavitation - applications- ultrasonic drilling- ultrasonic welding- ultrasonic soldering and ultrasonic cleaning-Non- destructive Testing- Pulse echo system.

UNIT V **CRYSTAL PHYSICS** 9 Periods  
 Introduction – Crystalline and amorphous materials – Lattice – Unit Cell – Crystal system - Bravais lattices – Miller indices – d spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC, and HCP structures – Crystal defects – Point, line and surface defects.

LECTURE: 45 PERIODS TUTORIAL: 0 PERIODS PRACTICAL: 0 PERIODS TOTAL: 45 PERIODS

**TEXT BOOKS**

AUTHOR NAME	TITLE OF BOOK	PUBLISHER, YEAR OF PUBLICATION
Arumugam M	Engineering Physics	Anuradha Publishers, 2010. (Unit I, Unit III & Unit IV)
P.K.Palanisamy	Engineering Physics	Scitech Publications(India)Pvt.Ltd,2015(UnitII&UnitV)

**REFERENCE BOOKS**

AUTHOR NAME	TITLE OF BOOK	PUBLISHER, YEAR OF PUBLICATION
Avadhanulu MN and Kshirsagar P G	A Textbook of Engineering Physics	S.Chand and Company Ltd, New Delhi, 2010.
Gaur R.K. and Gupta S.L	Engineering Physics	Dhanpat Rai Publishers, 2009.
K.Rajagopal	Engineering Physics	PHI Learning Private Ltd, NewDelhi, 2015.

**COURSE OUTCOMES:**

Upon completion of this course, the students will be able to

- CO1: Analyze the construction and working of Nd-YAG, CO<sub>2</sub>, Semiconductor lasers. Explain fiber optics and classify fibers based on index profiles and modes. [Familiarity]
- CO2: Acquire knowledge in properties of matter and thermal physics [Application]
- CO3: Analyze the dual nature of matter using Heisenberg's Uncertainty principle, Schrodinger's time independent and dependent wave equations.[Assessment]
- CO4: Apply piezoelectric detector method for industrial applications. [Usage and Assessment]
- CO5: Compare crystalline and non-crystalline materials and describe the lattice structure, coordination number and packing factor for crystals.[Usage and Assessment]

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16LBS104

**APPLIED CHEMISTRY***Common to EEE, ECE, EIE, CSE & IT branches***Category : BS**

L T P C

3 0 0 3

**Course Objectives:**

- o The course is aimed at inculcating knowledge of applied chemistry topics which would be useful for students to understand Chemistry relevant to circuitry Engineering subjects.

**UNIT I ELECTROCHEMICAL CELLS** 9 Periods  
Galvanic cells – redox reactions- electrodes - metal and metal ion, hydrogen electrode and calomel electrode – electrode potentials – standard oxidation and reduction potentials - Nernst equation and problems - EMF series and significance – Application of EMF measurements – equilibrium constant, solubility of sparingly soluble salt, potentiometric titration of a redox system ( $\text{Fe}^{2+}$  Vs  $\text{Cr}^{6+}$ ), pH measurement using glass electrode and fluoride measurement by ISE.

**UNIT II BATTERIES** 9 Periods  
Batteries - components, characteristics - voltage, current, current capacity, power density, energy density, cycle life, shelf life and self - discharge. Types of batteries - Primary -  $\text{Zn/MnO}_2$ ,  $\text{Zn/HgO}$ ,  $\text{Zn/Ag}_2\text{O}$ ,  $\text{Li/SOCl}_2$  - construction, function and performance comparison – Secondary- Pb/ acid, Ni/Cd, and Lithium ion battery - construction, function and performance comparison.

**UNIT III CORROSION** 9 Periods  
Corrosion - Spontaneity - Chemical corrosion- mechanism, nature of oxides – Pilling Bedworth rule - electrochemical corrosion – mechanism - types – galvanic and differential aeration – Galvanic series and importance – Prevention methods - design of materials, cathodic protection techniques (sacrificial anode and impressed current cathode), Inhibitors - Protective coatings - Inorganic coating - electroplating – surface preparation and plating method applied to Cr and Ni and galvanising – Organic coating- paints - constituents and functions.

**UNIT IV POLYMER TECHNOLOGY** 9 Periods  
Polymers - definitions of monomer, polymer, functionality, degree of polymerisation – Free radical mechanism - Individual polymers - PVC, PMMA, Teflon, polyamide, poly carbonate, epoxy, polyurethane - preparation, properties and their end users - compounding of plastics - components and functions - fabrication techniques - compression, injection, extrusion and blow moulding - Conducting polymers - structures of polypyrrole, polyaniline and poly acetylene - conduction mechanism of polyacetylene only - Biodegradable polymers – polylactide, starch and cellulose.

**UNIT V SILICON WAFER TECHNOLOGY** 9 Periods  
Silicon for IC chips - single crystal – preparation by Czochralsky and float zone processes - wafer preparation, P-N junction formation – Ion implantation, Diffusion and epitaxial growth techniques - Insulator layer by oxidation - Printing of circuits by photolithography – masking and electron beam methods - etching by chemical and electrochemical methods - metal coatings.

LECTURE: 45 PERIODS TUTORIAL: 0 PERIODS PRACTICAL: 0 PERIODS TOTAL: 45 PERIODS

**TEXT BOOKS****AUTHOR NAME****TITLE OF BOOK****PUBLISHER,****YEAR OF PUBLICATION***Vairam S, Subha Ramesh**Engineering Chemistry**Wiley India, 2015.*

*Jain. P.C. and Monica Jain*      *Engineering Chemistry*      *Dhanpat Rai Publications Pvt Ltd, New Delhi, 16<sup>th</sup> Edition, 2004.*

#### REFERENCE BOOKS

AUTHOR NAME	TITLE OF BOOK	PUBLISHER, YEAR OF PUBLICATION
<i>Dara. S.S, Umarae</i>	<i>Text book of Engineering Chemistry</i>	<i>S. Chand Publications, 2004.</i>
<i>M.S.Tyagi</i>	<i>Introduction to semiconductor materials and devices</i>	<i>Wiley India, 2011.</i>
<i>Kuriakose, J.C., and Rajaram J</i>	<i>"Chemistry in Engineering and Technology", Vol.1 &amp;II</i>	<i>Tata Mc Graw Hill Publishing company, Pvt.Ltd, New Delhi, 2001.</i>
<i>P. Aggarwal, Avinash Aggarwal</i>	<i>Engineering Chemistry</i>	<i>Khanna Publishers, 2010.</i>
<i>David Linden and Thomas Reddy</i>	<i>Hand book of batteries and fuel cells", Vol.1 &amp;II</i>	<i>Tata Mc Graw Hill, 2001.</i>

#### COURSE OUTCOMES:

On completion of this course, students will be able to

- CO1:** Understand the principles of electrochemical principles such as EMF measurements, electrode potentials and apply them in experimental techniques useful for electrochemical instrumentation.
- CO2:** Know the knowledge about different types of batteries with the functions which find use in their society including engineering fields.
- CO3:** Be familiar with corrosion of the instruments and equipment they use in their field and also to learn the mechanisms and the preventive measures by various techniques.
- CO4:** Know about the different types of polymeric materials, properties and fabrication which match the specific applications.
- CO5:** Gain the knowledge about the silicon chips and their fabrication methods and to apply in preparation of in electrical and electronic instruments.

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16LES105

**BASICS OF CIVIL AND MECHANICAL ENGINEERING***Common to EEE, ECE, EIE branches*

Category : ES

L T P C

3 0 0 3

**Course Objectives:**

- To learn the manufacturing process, types, applications and testing procedures for materials used for construction
- To impart knowledge about basis of recent paradigms, and new materials
- To make the students aware of the basic fields in Civil Engineering and about the construction.
- To impart knowledge to the students in the basics of mechanical sciences.
- To impart basic knowledge on manufacturing and machining processes.

**PART A : CIVIL ENGINEERING****50 Marks**

UNIT I

**BUILDING MATERIALS AND CONSTRUCTION****8 Periods**

**Stone** - Properties and uses, **Bricks** - Properties and uses , **Cement** - composition, types and uses , Properties and uses of **Steel, Timber, Concrete** and its Properties.

**Masonry** - Brick masonry and Stone masonry.

**Flooring** - Various types of floor finishing for Residential, Industrial and Office buildings.

**Roofing** - RCC roof and Steel trusses.

UNIT II

**WATER SUPPLY AND SANITARY ENGINEERING****8 Periods**

**Water Supply Engineering** – Objectives of water supply projects – necessity – sources of water – distribution of water.

**Sanitary Engineering** – Objectives of sanitary projects – systems of sewerage – natural methods of sewage disposal.

UNIT III

**IRRIGATION ENGINEERING AND TRANSPORTATION ENGINEERING****8 Periods**

**Irrigation Engineering** – Needs of irrigation – purpose and functions of storage structures – Dams – parts of the dam and their functions.

**Transportation Engineering** - Roads – types- purposes - uses. Railways – gauges – components – usefulness.

**PART B : MECHANICAL ENGINEERING****50 Marks**

UNIT IV

**ENERGY ENGINEERING****8 Periods**

Working principles of impulse and reaction turbines -working principles of IC engines (CI and SI engines) – power plants – steam power plant.

UNIT V

**MANUFACTURING PROCESS****8 Periods**

Basic principles of moulding- melting of metals and casting-crucible furnace and cupola-Basic principles of hand forging-mechanical power hammers-hot and cold forging process –basics of extrusion process - Basic principle of welding – manual metal arc welding -gas welding and gas cutting-brazing and soldering.

UNIT VI

**METAL CUTTING PROCESS****8 Periods**

Lathe: Main components and their functions- basic operations of turning, facing, taper turning, and thread cutting - introduction to CNC lathe - Drilling Machine: types of drilling machines -bench, upright - main parts and their functions-reaming operations

LECTURE: 48 PERIODS

TUTORIAL: 0 PERIODS

PRACTICAL: 0 PERIODS

TOTAL: 48 PERIODS

**TEXT BOOKS**

<b>AUTHOR NAME</b>	<b>TITLE OF BOOK</b>	<b>PUBLISHER, YEAR OF PUBLICATION</b>
<i>S.C. Rangawala</i>	<i>Engineering materials</i>	<i>Charotar Publishing House, New Delhi, 2014.</i>
<i>S.K. Duggal</i>	<i>Building Materials</i>	<i>New Age International, 2012.</i>
<i>M.S.Palanichamy</i>	<i>Basic Civil Engineering, Third Edition</i>	<i>Tata McGraw Hill Company Limited, New Delhi, 2000</i>
<i>Venugopal. K Ramesh babu</i>	<i>Basic Mechanical Engineering Basic Mechanical Engineering</i>	<i>Anuradha Publications, 3<sup>rd</sup> Edition, 2010. VRB Publishers Pvt. Ltd, 2007.</i>

**REFERENCE BOOKS**

<b>AUTHOR NAME</b>	<b>TITLE OF BOOK</b>	<b>PUBLISHER, YEAR OF PUBLICATION</b>
<i>R.C.Smith</i>	<i>Materials of Construction</i>	<i>Mc Graw Hill Publications, 1973.</i>
<i>Janardhana Jha</i>	<i>Engineering materials</i>	<i>Khanna Publishers, New Delhi, 1981.</i>
<i>P.C.Varghese</i>	<i>Building Materials</i>	<i>PHI Learning pvt. Ltd, New Delhi, 2015</i>
<i>K.S.Jagadish, B.V.</i>	<i>Alternative Building</i>	<i>New Age International (P) Ltd. Publishers, New Delhi.</i>
<i>Venkataraman Reddy and K.S. Nanjunda Rao</i>	<i>Materials and Technologies</i>	
<i>NPTEL Resource material</i>	<i>Building Materials and Construction</i>	
<i>Nagpal G.R</i>	<i>Power Plant Engineering</i>	<i>Khanna Publishers, New Delhi, 2002.</i>
<i>Jain R.K</i>	<i>Production Technology</i>	<i>Khanna Publishers, New Delhi, 2004</i>
<i>Shanmugam.G</i>	<i>Basic Mechanical Engineering</i>	<i>McGraw Hill Education (India) Pvt. Ltd, New Delhi, 4<sup>th</sup> Edition, 2013.</i>

**COURSE OUTCOMES:**

On completion of this course, students will be able to

- CO1:** Understand the types, basic properties, uses of basic building materials.
- CO2:** Understand the importance of water supply systems and disposal of sewages.
- CO3:** Understand the basics of irrigation and transportation engineering.
- CO4:** Apply the principles of mechanical engineering in their respective field of specialization.
- CO5:** Appreciate the importance of energy generation.
- CO6:** Apply the concept of manufacturing and metal cutting processes in engineering in their applications.

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16LBS106

**CHEMISTRY LABORATORY**  
*Common to EEE, ECE, EIE, CSE & IT branches*

**Category : BS**  
L T P C  
0 0 4 2

**Course Objectives:**

- o The course is aimed at imparting knowledge of experimental techniques which would be useful for students to apply the practical principles relevant conventional engineering field.

**LIST OF EXPERIMENTS**

1. Estimation of hardness by EDTA method
2. Estimation of chloride by Argentometric method
3. Determination of dissolved oxygen by Winkler's method
4. Conductometric titration of mixture of strong acid and weak acid using strong base
5. Potentiometric titration of ferrous iron by dichromate
6. Estimation of copper in brass by EDTA method
7. Estimation of Iron by Spectrophotometry
8. Estimation of HCl by pH titration.

LECTURE: 0 PERIODS    TUTORIAL: 0 PERIODS    PRACTICAL: 60 PERIODS    TOTAL: 60 PERIODS

**REFERENCE BOOKS**

<b>AUTHOR NAME</b>	<b>TITLE OF BOOK</b>	<b>PUBLISHER, YEAR OF PUBLICATION</b>
A.O. Thomas	Practical Chemistry	Scientific Book Centre, Cannanore, 2003.
Jeffery G H, Basset J. Menthom J, Denney R.C.	Vogel's Text book of quantitative analysis, 5 <sup>th</sup> Edition	EBS, 1988.

**COURSE OUTCOMES:**

Upon completion of this practical classes, the students will be able to

- CO1:** Understand the nature of hardness, chloride level, pollution level using dissolved oxygen content, iron present in water and analyse them in water.
- CO2:** Apply the EMF and conductometric measurements in quantitative analysis of substances.

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16LES107

**WORKSHOP PRACTICE***Common to EEE, ECE, EIE, CSE & IT branches***Category : ES**

L T P C

0 0 4 2

**Course Objectives:**

- To make various basic prototypes in the carpentry trade such as Lap joint, Lap Tee joint, Dove tail joint, Mortise & Tenon joint and Cross-Lap joint.
- To make various welding joints such as Lap joint, Lap Tee joint, Edge joint, Butt joint and Corner joint.

**LIST OF EXPERIMENTS**

1. Introduction to use of tools and equipments in Carpentry, Welding, Foundry and Sheet metal
2. Safety aspects in Welding, Carpentry and Foundry
3. Half lap Joint and Dovetail Joint in Carpentry
4. Welding of Lap joint, Butt joint and T-joint
5. Preparation of Sand mould for cube, conical bush, pipes and V pulley
6. Fabrication of parts like tray, frustum of cone and square box in sheet metal
7. Electrical wiring – simple house wiring
8. Plumbing

LECTURE: 0 PERIODS    TUTORIAL: 0 PERIODS    PRACTICAL: 60 PERIODS    TOTAL: 60 PERIODS

**COURSE OUTCOMES:**

Upon completion of this practical classes, the students will be able to

- CO 1:** Use tools and equipments used in Carpentry, Welding, Foundry and Sheet metal.
- CO 2:** Make half lap joint and dovetail joint in carpentry.
- CO 3:** Make welded lap joint, butt joint and T-joint.
- CO 4:** Prepare sand mould for cube, conical bush, pipes and V pulley.
- CO 5:** Fabricate parts like tray, frustum of cone and square box in sheet metal
- CO 6:** Carry out minor works/repair related to electrical wiring and plumbing.

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16LHS2Z1

**TECHNICAL ENGLISH**  
Common to all branches

**Category : HS**  
L T P C  
2 2 0 3

**Course Objectives:**

- To make learners acquire guided listening and speaking skills in both formal and informal contexts.
- To help them develop reading skills by familiarizing them with different types of reading tasks and strategies
- To make them understand advance level of grammar and equip them with writing skills needed for academic as well as workplace contexts.
- To explore the learner to Technical English and Technical Vocabulary.

## UNIT I

**6+6 Periods**

**Listening** - Listening to ask for/ give opinions, Listening to persuade/dissuade people, Listening to make complaints, Listening to transfer information; **Speaking** –Role play activities on a formal/corporate context, Delivering Welcome Address- **Reading** – Reading to infer lexical and contextual meaning; **Writing** - Effective use of SMS on Whatsapp/ Hike/ Messenger, Writing E-mails on a business context, Technical style; **Grammar** – Use of relative / reflexive pronouns, Discourse Markers; **Vocabulary**- Homonyms and Homophones

## UNIT II

**6+6 Periods**

**Listening** - Listening to express regrets/sympathy/condolences, Listening and Note-taking; **Speaking** – Addressing at an official meeting to deal with problems/ sensitive issues, Discussion on a movie with a poignant social message/ or on a recently read book; **Reading** - Reading a short story or an article from newspaper; **Writing** - Writing a review of a book/movie/music concert/sports event, Graph Description; **Grammar** – Noun/Adjective/Adverbial phrases, Cause and effect expressions; **Vocabulary** - Using phrasal verbs in sentences, Jargon

## UNIT III

**6+6 Periods**

**Listening** - Listening to a talk about using quantities, Listening to describe manner and frequency, Listening to expressions of assumptions/inference, Listening to make comparisons; **Speaking** –Making conversation to practice stress, pause, pronunciation and intonation, Introducing the chief-guest; **Reading** - Speed reading – reading passages with time limit - **Writing** – Notice, Agenda and Minutes of meetings; - Elements of Writing Technical articles –**Grammar** - Numerical expressions, Conditional clauses; **Vocabulary** - Same word used as different parts of speech, Register

## UNIT IV

**6+6 Periods**

**Listening** - Listening to talks about future events/plans, Listening to a talk about making arrangements, Listening to language of reporting, Viewing a model discussion; **Speaking** – Discussion on a formal/corporate context, Proposing vote of thanks; **Reading** - Reading the job advertisements and the profile of the company concerned; **Writing** - Process Description, Applying for a job with résumé; **Grammar** - Direct and indirect speech; **Vocabulary** - Idioms

## UNIT V

**6+6 Periods**

**Listening** – Listening to expressions of possibility, Listening to expressions of obligations, Listening to expressions of ability, Viewing model interviews; **Speaking** - Mock interview; **Reading** - Note making, Intensive reading; **Writing** – Checklist, - Feasibility / Project report; **Grammar** – Time Statements and Contracted Time Statements; **Vocabulary** – Nominal Compounds

LECTURE: 30 PERIODS    TUTORIAL: 30 PERIODS    PRACTICAL: 0 PERIODS    TOTAL: 60 PERIODS

**TEXT BOOKS**

<b>AUTHOR NAME</b>	<b>TITLE OF BOOK</b>	<b>PUBLISHER, YEAR OF PUBLICATION</b>
<i>Department of English, Anna University. Mindscapes</i>	<i>English for Technologists and Engineers.</i>	<i>Orient Blackswan, Chennai. 2012</i>
<i>Sadanand, Kamlesh &amp; Punitha, Susheela</i>	<i>Spoken English: A Foundation Course (Part 2).</i>	<i>Orient Blackswan, Hyderabad. 2014</i>

**REFERENCE BOOKS**

<b>AUTHOR NAME</b>	<b>TITLE OF BOOK</b>	<b>PUBLISHER, YEAR OF PUBLICATION</b>
<i>Raman, Meenakshi &amp; Sangeetha Sharma</i>	<i>Technical Communication: Principles and Practice</i>	<i>Oxford University Press, New Delhi. 2011</i>
<i>Vijay, Anbazhagan.J, &amp; Jaishree.N</i>	<i>Technical English-II</i>	<i>Global Publishers, Chennai, 2016</i>
<i>Rizvi, Ashraf. M. Herbert, A.J</i>	<i>Effective Technical Communication Structure of Technical English</i>	<i>Tata McGraw-Hill, New Delhi. 2005 The English Language Society, London. 1971</i>
<i>Michigan,E.A</i>	<i>Word Power and Speed Reading: English Improvement Series</i>	<i>Infinity Books, New Delhi, 2007</i>
<i>Rajendrapal &amp; Korlahalli. J.S</i>	<i>Essentials of Business Communication</i>	<i>Sultan Chand &amp; Sons</i>

**WEBSITES**

1. <http://www.usingenglish.com>
2. <http://www.uefap.com>

**COURSE OUTCOMES:**

On completion of this course, students will be able to

- CO1:** The learners will be able to speak convincingly at work place and social contexts through guided listening tasks and different genres and strategies of reading.
- CO2:** The learner will understand advance level of grammar and write professionally to a larger extent for workplace and general contexts.
- CO3:** The learners will familiarize themselves with Technical Vocabulary and Technical English.

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16LBS2Z2

**ENGINEERING MATHEMATICS II***Common to all branches***Category : BS**

L T P C

3 2 0 4

**Pre-Requisite:** Basics of - trigonometry- differential and integral formulae.**Course Objectives:**

- To acquire knowledge of techniques of ordinary differential equations leading to engineering problems.
- To acquire knowledge of vector Calculus with engineering applications.
- To gain standard techniques of complex variable applicable to fluid dynamics, heat conduction, and elasticity.
- To develop skill of solving transforms leading to engineering applications.

UNIT I **ORDINARY DIFFERENTIAL EQUATIONS** **9+6 Periods**  
 Second and Higher order Differential Equations, Method of variation of parameters- Method of undetermined coefficients-Homogeneous equations of Euler's and Legendre's type-System of Simultaneous first order Linear equations with constant coefficients - Method of reduction of order.

UNIT II **VECTOR CALCULUS** **9+6 Periods**  
 Gradient and directional derivative, Divergence and Curl – Irrotational and Solenoidal fields- Vector identities - Line, Surface and Volume Integrals – Green's Theorem in a Plane , Gauss Divergence and Stoke's Theorems (Statements only) –Verifications and Applications.

UNIT III **COMPLEX DIFFERENTIATION** **9+6 Periods**  
 Functions of a Complex variable-Analytic functions- Cauchy Riemann equations and sufficient conditions (excluding proof)–Harmonic conjugates–Construction of analytic functions-Conformal mappings:  $w=z+a$ ,  $az$ ,  $1/z$ ,  $z^2$ ,  $e^z$ ,  $\sin z$ ,  $\cos z$  and Bilinear Transformation.

UNIT IV **COMPLEX INTEGRATION** **9+6 Periods**  
 Cauchy's integral theorem, Cauchy's integral formula -Taylor's and Laurent's theorems (Statements only) and expansions – Poles and Residues – Cauchy's Residue theorem – Contour integration – Circular and semi circular contours with no pole on real axis.

UNIT V **LAPLACE TRANSFORMATIONS** **9+6 Periods**  
 Laplace transforms- Properties and standard transforms-Transforms of unit step, unit Impulse and error functions – Transforms of periodic functions- Inverse Laplace transforms- Initial and Final value theorems- Convolution theorem (Statement only) and applications - Applications to Solution of Linear differential equations of second order with constant coefficients.

LECTURE: 45 PERIODS TUTORIAL:30 PERIODS PRACTICAL: 0 PERIODS TOTAL: 75 PERIODS

**TEXT BOOKS****AUTHOR NAME****TITLE OF BOOK****PUBLISHER,****YEAR OF PUBLICATION**

Veerarajan T

*Engineering Mathematics" for  
Semesters I and II**Tata McGraw Hill Publishing Co., New Delhi,  
2015.*

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<i>Kandasamy P, Thilagavathy K and Gunavathy K</i>	<i>Engineering Mathematics" for I year B.E/B.Tech</i>	<i>S.Chand&amp; Co, Ramnagar, New Delhi,Reprint2013.</i>
<i>S. Narayanan and Manicavachagom Pillai T.K.</i>	<i>Calculus-Vol.III</i>	<i>S. Viswanathan, Printers and Publishers Pvt. Ltd, Chennai, 2009.</i>

**REFERENCE BOOKS**

<b>AUTHOR NAME</b>	<b>TITLE OF BOOK</b>	<b>PUBLISHER, YEAR OF PUBLICATION</b>
<i>Erwin Kreyszig</i>	<i>Advanced Engineering Mathematics</i>	<i>Wiley &amp; sons(Asia) Ltd, 10<sup>th</sup> Edition, 2015.</i>
<i>Ray Wylie.C and Louis Barrett</i>	<i>Advanced Engineering Mathematics</i>	<i>Tata McGraw Hill Company, New Delhi, 2004.</i>
<i>Grewal B. S</i>	<i>Higher Engineering Mathematics</i>	<i>Khanna Publishers, New Delhi, 43<sup>rd</sup> Edition, 2014.</i>
<i>Ramana B V</i>	<i>Higher Engineering Mathematics</i>	<i>Tata McGraw Hill Co. Ltd, NewDelhi, 11<sup>th</sup> Print, 2010.</i>
<i>Bali N., Goyal M and Watkins C</i>	<i>Advanced Engineering Mathematics</i>	<i>Firewall Media (An Imprint of Laxmi Publications Pvt Ltd), New Delhi, 7<sup>th</sup> Edition,2009.</i>
<i>Bali N.P and Goyal M</i>	<i>A text book of Engineering Mathematics</i>	<i>University Science Press (An Imprint of Laxmi Publications Pvt Ltd), New Delhi,2014.</i>

**COURSE OUTCOMES:**

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

- CO1:** Understand the kinds of differential equations and their solutions in the field of engineering.
- CO2:** Evaluate gradient, divergence and curl and also line, surface and volume integrals in cartesian form and simple coordinate systems and calculate integrals applying Greens, stokes and Gauss theorems.
- CO3:** Understand the concepts of analytic functions and conformal mappings.
- CO4:** Evaluate contour integrals using calculus of residues.
- CO5:** Apply Laplace transform methods to solve differential equations.

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16LBS2Z3

**MATERIALS SCIENCE**  
Common to all branches

**Category : BS**  
L T P C  
3 0 0 3

**Course Objectives:**

To enhance the fundamental knowledge in Physics and its application relevant to various streams of Engineering and Technology. Upon completion of this course the students will be familiar with :

- o The properties of conducting materials.
- o The application of magnetic and super conducting materials.
- o Application and properties of dielectric and ferro electric materials.
- o Applications and properties of Modern engineering materials.
- o Nano materials and its properties.

**UNIT I CONDUCTING MATERIALS 9 Periods**  
Introduction to Conductors – classical free electron theory of metals – Draw backs of classical theory – quantum theory -Electrical and Thermal conductivity of Metals – Derivation for Wiedeman – Franz law – Lorentz number – Fermi distribution function - effect of temperature – density of energy states – calculation of Fermi energy-carrier concentration in metals.

**UNIT II SEMICONDUCTING MATERIALS AND DEVICES 9 Periods**  
Introduction – Properties – elemental and compound semiconductors - Intrinsic and extrinsic semiconductors – properties - Carrier concentration in intrinsic Semiconductor - variation of Fermi level with temperature and carrier concentration - Electrical Conductivity – band gap determination - extrinsic semiconductors - Carrier concentration in P- type and N-type semiconductors – variation of Fermi level with temperature and impurity concentration – Hall effect- Determination of Hall Co-efficient in N type and P type Semiconductor - Applications.

**UNIT III MAGNETIC AND SUPER CONDUCTING MATERIALS 9 Periods**  
Introduction - Origin of magnetic moment - Bohr magneton - Dia, Para, and Ferro magnetic materials - Domain theory of ferromagnetism - Hysteresis - Hard and Soft magnetic materials. Ferrites - structure and applications. - Magneto optical recording, and readout – Superconductivity - Types of superconductors - BCS theory of superconductivity (qualitative) - properties- High Tc superconductors, Applications of superconductors- SQUID, Cryotron, Magnetic levitation.

**UNIT IV DIELECTRICS AND FERROELECTRICS 9 Periods**  
Introduction to dielectric materials – Electric polarization and Dipole moment - Electrical susceptibility – dielectric constant – Various polarization mechanisms in dielectrics - electronic, ionic, orientational and space charge polarization– frequency and temperature dependence of polarization – internal field – Claussius – Mosotti relation (derivation) – dielectric loss – dielectric breakdown – Applications of dielectric materials - Ferro electricity –Ferro electric materials -BaTiO<sub>3</sub> – Applications- Ferro electric energy converter.

**UNIT V MODERN ENGINEERING MATERIALS 9 Periods**  
Metallic glasses- preparation of metallic glasses - properties – applications of the metallic glasses - Shape Memory Alloys (SMA) - Characteristics, properties of NiTi alloy - applications of the Shape memory alloys - advantages and disadvantages of SMA - Nanomaterials-synthesis –chemical vapour deposition – Sol Gel – ball Milling – properties of nanoparticles and applications of nanoparticles – Carbon Nanotubes (CNT) – structure – properties – applications of CNTs.

LECTURE: 45 PERIODS TUTORIAL: 0 PERIODS PRACTICAL: 0 PERIODS TOTAL: 45 PERIODS

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Government College of Technology  
COIMBATORE - 641 013

**TEXT BOOKS**

<b>AUTHOR NAME</b>	<b>TITLE OF BOOK</b>	<b>PUBLISHER, YEAR OF PUBLICATION</b>
<i>P.K.Palanisamy</i>	<i>Engineering Physics–II</i>	<i>Scitech Publications (India ) Pvt. Ltd 2015 (Unit I, Unit III &amp; Unit IV)</i>
<i>Dr.Jayakumar .S</i>	<i>Materials science</i>	<i>R.K.Publishers,2008.(Unit II &amp; IV)</i>
<i>Dr.V.Rajendran</i>	<i>Material Science</i>	<i>Tata McGraw Hill Publications, NewDelhi, 2011.</i>

**REFERENCE BOOKS**

<b>AUTHOR NAME</b>	<b>TITLE OF BOOK</b>	<b>PUBLISHER, YEAR OF PUBLICATION</b>
<i>Charles P.Poole, Jr; Frank J.Owens</i>	<i>Introduction to Nanotechnology</i>	<i>Wiley India, 2012.</i>
<i>Gaur R.K. and Gupta S.L</i>	<i>Engineering Physics</i>	<i>Dhanpat Rai Publishers, 2009.</i>
<i>K.Rajagopal</i>	<i>Engineering Physics</i>	<i>PHI Learning Private Ltd, New Delhi, 2015.</i>

**COURSE OUTCOMES:**

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

- CO1:** Analyze the properties of conducting materials. [Familiarity]
- CO2:** List and analyze the properties of Semiconducting materials and Devices. [Familiarity]
- CO3:** Identify, analyze the properties and applications of magnetic & super conducting materials. [Familiarity]
- CO4:** List and analyze the properties of dielectric Ferro electric materials. [Familiarity & Application]
- CO5:** List the properties and applications of modern engineering materials. [Familiarity & Application]

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16LHS2Z4

**ENVIRONMENTAL SCIENCE AND ENGINEERING***Common to all branches*

Category : HS

L T P C

3 0 0 3

**Course Objectives:**

- o The course is aimed at creating awareness among students and also to inculcate the critical ideas of preserving environment.

**UNIT I ENVIRONMENTAL RESOURCES 9 Periods**

Natural resources -Forest – benefits, over exploitation, deforestation & consequences – Water - unique features, hydrological cycle & over exploitation – Food -effect of modern agriculture, fertilizers, pesticides, eutrophication & biomagnifications - Energy resources - renewable & non-renewable resources - wind, solar and tidal - harnessing methods.

**UNIT II ECO SYSTEM AND BIODIVERSITY 9 Periods**

Ecology - ecosystem, physical and chemical components of ecosystem, biological components of ecosystem - forest ecosystem, desert ecosystem and pond ecosystem, Energy flow in ecosystem, nitrogen cycle and carbon dioxide cycle, food pyramid, ecological succession, Biodiversity - types, values of biodiversity, hot spots of biodiversity, endangered and endemic species, conservation of biodiversity – in situ – ex situ conservation.

**UNIT III ENVIRONMENTAL POLLUTION 9 Periods**

Air pollution, classification of air pollutants – sources, effects and control of gaseous pollutants SO<sub>2</sub>, NO<sub>x</sub>, H<sub>2</sub>S, CO, CO<sub>2</sub> and particulates, control methods - cyclone separator and electrostatic precipitator - Water pollution - classification of water pollutants, organic and inorganic pollutants, sources, effects and control of water pollutants Soil pollution - sources, effects and control - Noise pollution - decibel scale, sources, effects and control.

**UNIT IV ENVIRONMENTAL THREATS 9 Periods**

Acid rain, greenhouse effect, global warming and ozone depletion, disaster management, flood, drought, earthquake and tsunami, Threats to biodiversity - destruction of habitat, habit fragmentation - hunting, over exploitation and man - wildlife conflicts, The IUCN red list categories, status of threatened species.

**UNIT V SOCIAL ISSUES AND ENVIRONMENT 9 Periods**

Sustainable development - sustainable technologies, need for energy and water conservation, rain water harvesting, water shed management, waste land reclamation, Pollution control Act, Wild life protection act, Forest conservation act, population growth - exponential and logistic growth, variation in population among nations, population policy, women and child welfare programs, role of information technology in human and health, HIV/AIDS - effects and preventive measures.

LECTURE: 45 PERIODS TUTORIAL: 0 PERIODS PRACTICAL: 0 PERIODS TOTAL: 45 PERIODS

**TEXT BOOKS**

AUTHOR NAME	TITLE OF BOOK	PUBLISHER, YEAR OF PUBLICATION
Sharma J.P	"Environmental Studies", 3 <sup>rd</sup> Edition	University Science Press, New Delhi 2009.
Anubha Kaushik and C.P. Kaushik	"Environmental Science and Engineering", 3 <sup>rd</sup> Edition	New age International Publishers, New Delhi, 2008.

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**REFERENCE BOOKS**

<b>AUTHOR NAME</b>	<b>TITLE OF BOOK</b>	<b>PUBLISHER, YEAR OF PUBLICATION</b>
<i>R.K. Trivedi</i>	<i>Hand book of Environmental laws, Rules, Guidelines, Compliances and Standards", Vol.I&amp;II,</i>	<i>Environ Media, 2006.</i>
<i>G. Tyler Miller Jr</i>	<i>"Environmental Science", 10<sup>th</sup> Edition</i>	<i>Thomson Brooks/Cole Publishing, 2004.</i>
<i>Gilbert M. Masters</i>	<i>Introduction to Environmental Engineering and Science, 2<sup>nd</sup> Edition</i>	<i>Pearson Education, 2004.</i>

**COURSE OUTCOMES:**

Upon the completion of the course, Students will be able to

- CO1:** To know about the various environmental resources, the effective utility and problems accompanied in over exploitation.
- CO2:** To acquire knowledge about the interaction of biosphere with environment and conservation methods of bio diversity.
- CO3:** To be aware of the source of various types of pollution, their ill effects and preventive methods.
- CO4:** To understand the environmental threats, Acid rain, Green house effect and Ozone depletion and natural disasters.
- CO5:** To create an idea about sustainable development and social issues.

**Controllor of Examinations  
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16LES2Z5

**PROGRAMMING IN C**  
*Common to all branches*

**Category : ES**  
L T P C  
3 0 0 3

**Course Objectives:**

Upon completion of this course, the students will be familiar with,

- o The Computer and Programming fundamentals
- o Data types in C and Flow control statements
- o Functions, Arrays, Pointers And Strings
- o Bitwise Operators, Preprocessor Directives, Structures and Unions
- o Structures, List Processing, Input And Output

UNIT I **COMPUTER AND PROGRAMMING FUNDAMENTALS** **9 Periods**

Computer fundamentals – Evolution, classification, Anatomy of a computer: CPU, Memory, I/O – Introduction to software – Generation and classification of programming languages – Compiling – Linking and loading a program – Translator – loader – linker – develop a program – software development – Introduction to OS –Types of OS – Algorithms – Structured programming concept.

UNIT II **DATA TYPES AND FLOW OF CONTROL** **9 Periods**

An overview of C – Programming and Preparation – Program Output – Variables – Expressions, and Assignment, The use of #include, printf(), scanf() – Lexical elements, operators and the C systems – The fundamental data types – Flow of control

UNIT III **FUNCTIONS, ARRAYS, POINTERS AND STRINGS** **9 Periods**

Functions and storage classes - 1D Arrays – Pointers – Call by reference – Relationship between Arrays and Pointers – Pointer arithmetic and element size – Arrays as function argument – Dynamic memory allocation – Strings – String handing functions – Multidimensional Arrays.

UNIT IV **ARRAY OF POINTERS, BITWISE OPERATORS, PREPROCESSOR DIRECTIVES** **9 Periods**

Arrays of Pointers – Arguments to main () - Ragged Arrays – Functions as Arguments – Arrays of Pointers to Functions - Type qualifiers.-Bitwise operators and expressions – Masks – Software tools – Packing and unpacking – Enumeration types – The preprocessor directives.

UNIT V **STRUCTURES AND UNIONS, I/O AND FILE OPERATIONS** **9 Periods**

Structures and Unions – Operator precedence and associativity – Bit fields – Accessing bits and bytes - Input and Output functions – File Processing Functions – Environment variables – Use of make and touch.

LECTURE: 45 PERIODS TUTORIAL:0 PERIODS PRACTICAL: 0 PERIODS TOTAL: 45 PERIODS

**TEXT BOOKS****AUTHOR NAME****TITLE OF BOOK****PUBLISHER,  
YEAR OF PUBLICATION***Pradip Dey, Manas Ghosh**Computer Fundamentals and  
Programming in C, Second Edition**Oxford University Press, 2013.**Al Kelley, Ira Pohl**A Book on C-Programming in C,  
Fourth Edition**Addison Wesley, 2001.*

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**REFERENCE BOOKS**

<b>AUTHOR NAME</b>	<b>TITLE OF BOOK</b>	<b>PUBLISHER, YEAR OF PUBLICATION</b>
<i>Stephen G. Kochan</i>	<i>Programming in C-A complete introduction to the C programming language, Third Edition</i>	<i>Sams Publication, 2004.</i>
<i>Yashavant P. Kanetkar</i>	<i>Let Us C, 13<sup>th</sup> edition</i>	<i>BPB Publications, 2013.</i>
<i>Brian W. Kernighan and Dennis Ritchie</i>	<i>The C Programming Language”, Second Edition</i>	<i>Prentice Hall Software Series, 1988.</i>
<i>Stephen Prata</i>	<i>C Primer Plus, Fifth Edition</i>	<i>Sams Publishing, 2005.</i>

**COURSE OUTCOMES:**

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

- CO1:** Articulate the programming environment [Familiarity]
- CO2:** Write algorithm for solving the given problem statement [usage]
- CO3:** Use right data types and flow control statement [Assessment]
- CO4:** Write programs using functions, arrays, pointers and strings [Usage]
- CO5:** Use right storage classes, preprocessor directives, bitwise operators in programs [Assessment]
- CO6:** Use structures, unions and files [Usage]

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16LES206

ELECTRON DEVICES

Category : ES

L T P C

3 0 0 3

**Course Objectives:**

- o To gain Knowledge on semiconductor Diodes.
- o To learn the Principles of BJT and FET
- o To study the biasing concepts for BJT and FET
- o To gain knowledge on Special Semiconductor devices.

**UNIT I PN JUNCTION AND SEMICONDUCTOR DIODES 9 Periods**

Energy band structure of conductors, semiconductors and Insulators-Classification of semiconductors-conductivity of semiconductors-Drift and diffusion currents-Continuity Equation-Energy band structure of PN junction diode-Diode current equation-Transition or space charge capacitance-Diffusion capacitance-Effect of temperature on PN junction diodes-Diode switching characteristics -PN diode Applications-Clippers, Clampers -Zener diode characteristics.

**UNIT II BIPOLAR JUNCTION TRANSISTORS 9 Periods**

Construction of PNP and NPN Transistor-Transistor current components-Eber moll's model of transistor-Transistor as an amplifier -CE, CB and CC configurations-Characteristics-current gain -bandwidth modulation- - Transistor switching characteristics-Breakdown of transistor-maximum voltage rating.

**UNIT III FIELD EFFECT TRANSISTORS 9 Periods**

Operation and Characteristics of JFET, FET as a Voltage variable resistor, Metal oxide semiconductor field effect transistor (MOSFET)-Enhancement and Depletion mode MOSFET-Characteristics of n-MOS and p-MOS-CMOS characteristics-Inverted T FET-Operation and Characteristics-Comparison of n Channel and p channel MOSFET-Comparison of MOSEET and JFET.

**UNIT IV BIASING CIRCUITS 9 Periods**

DC operating point and Load line-Q point-Bias Stability, Transistor biasing methods: Fixed bias-Collector to base bias-Self biasing-Bias compensation methods- Thermistor and sensistor compensation techniques-thermal runaway-thermal stability- FET biasing methods: Self bias-Source bias-Voltage divider bias-Biasing enhancement and depletion MOSFET.

**UNIT V SPECIAL SEMICONDUCTOR DEVICES 9 Periods**

Construction and Characteristics of Schottky diode-Tunnel diode and Varactor diode-SCR- TRIAC .Principles of Photo emissivity and photo-conductivity-Construction and characteristics of LCD-LED- Photoconductive cell-photo voltaic cell-photo diode- solar cell- photo transistors-plasma display- numeric displays- optocouplers and LASER diodes.

LECTURE: 45 PERIODS TUTORIAL: 0 PERIODS PRACTICAL: 0 PERIODS TOTAL: 45 PERIODS

**TEXT BOOKS****AUTHOR NAME****TITLE OF BOOK****PUBLISHER,****YEAR OF PUBLICATION**

Jacob Millman, Christos Halkias  
& Satyabrata Jit  
& Sedra and Smith

Millman's Electronic Devices  
and Circuits, 3<sup>rd</sup> Edition  
Microelectronics Circuits

McGraw Hill, 2009.

Oxford, 7<sup>th</sup> Edition, 2009.

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Government College of Technology  
COIMBATORE - 641 013

**REFERENCE BOOKS**

<b>AUTHOR NAME</b>	<b>TITLE OF BOOK</b>	<b>PUBLISHER, YEAR OF PUBLICATION</b>
<i>S.Salivahanan, N.Sureshkumar and A.Vallavaraj</i>	<i>Electronic Devices and Circuits, 2<sup>nd</sup> Edition</i>	<i>Tata McGrawHill, 2008.</i>
<i>Allen Mottershead</i>	<i>Electronic Devices and Circuits</i>	<i>Prentice Hall of India, 2008.</i>
<i>Robert L.Boylestad, Louis Nashelsky</i>	<i>Electronic Devices and Circuit Theory, 9<sup>th</sup> Edition</i>	<i>Pearson Education, 2006.</i>

**COURSE OUTCOMES:**

Upon completion of this course, the students will have

- CO1:** Knowledge on semiconductor Diodes
- CO2:** Knowledge on Principles of BJT and FET
- CO3:** Ability to design biasing circuits for BJT and FET
- CO4:** knowledge on Special Semiconductor devices

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16LBS207

**PHYSICS LABORATORY**  
Common to EEE, ECE, CSE, EIE & IT branches

Category : BS

L T P C  
0 0 4 2

**Course Objectives:**

- To have a practical knowledge about the concepts behind physics and the need to apply in the emerging technology.

**LIST OF EXPERIMENTS**

1. Spectrometer - Diffraction Grating Normal Incidence Method
2. Air Wedge - Determination of thickness of a paper
3. Young's Modulus - Cantilever Bending - Koenig's Method
4. a. Laser - Particle size Determination  
b. Optical fiber - Determination of NA & Acceptance angle
5. Ammeter and Voltmeter Calibration - Low Range
6. Resistance Of The Given Coil Of Wire - Carey Foster's Bridge
7. Determination of Band gap Energy of Semiconductor
8. Ultrasonic Interferometer - Velocity of sound & Compressibility of liquids.
9. Transistor Characteristics
10. Torsional pendulum - Determination of Rigidity Modulus & Moment of Inertia

LECTURE: 0 PERIODS    TUTORIAL: 0 PERIODS    PRACTICAL: 60 PERIODS    TOTAL: 60 PERIODS

**COURSE OUTCOMES:**

Upon completion of this practical classes, the students will be able to

- CO1:** Determinate of all physical properties of any matter, basic idea of calibrating electrical measuring instruments and thereby effectively using it for particular applications.
- CO2:** Experiment intrinsic characteristic features of electronic devices for electrical and electronic applications.

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16LES208

**ENGINEERING GRAPHICS***Common to EEE, ECE, EIE, CSE & IT branches*

Category : ES

L T P C

2 0 4 4

**Course Objectives:**

- Geometrical constructions
- Orthographic projections.
- Performing section of solids and development of the same.
- Interpretation of solids.
- Pictorial view of solids

**UNIT I GEOMETRICAL CONSTRUCTIONS 15 Periods**

Dimensioning-Lettering-Types of Lines-Scaling conventions-Dividing a given straight line in to any number of equal parts- Bisecting a given angle- Drawing a regular polygon given one side-Special methods of constructing a pentagon and hexagon- Construction of curves like ellipse, parabola, cycloid and involute using one method.

**UNIT II ORTHOGRAPHIC PROJECTIONS 25 Periods**

Introduction to Orthographic Projection-Projection of points-Projection of straight lines with traces-Projection of planes-Conversion of pictorial views to orthographic views-Projection of solids - Auxiliary projections.

**UNIT III SECTION OF SOLIDS AND DEVELOPMENT 20 Periods**

Section of solids- Development of surfaces

**UNIT IV INTERPENETRATION OF SOLIDS and PICTORIAL VIEWS 20 Periods**

Cylinder and cylinder, cone and cylinder only Isometric projections - Conversion of orthographic views to pictorial views (simple objects).

**UNIT V INTRODUCTION TO AUTOCAD 10 Periods**

**Object Construction :** Page layout – Layers and Line types – Creating, Editing and selecting the Geometric Objects. Viewing, Annotating, Hatching and Dimensioning the drawing –Creating Blocks and Attributes

LECTURE: 30 PERIODS    TUTORIAL: 0 PERIODS    PRACTICAL: 60 PERIODS    TOTAL: 90 PERIODS

**REFERENCE BOOKS**

AUTHOR NAME	TITLE OF BOOK	PUBLISHER, YEAR OF PUBLICATION
<i>K.Venugopal</i>	<i>Engineering Graphics</i>	<i>New Age International (P) Limited, 2015.</i>
<i>Dhananjay.A.Jolhe</i>	<i>Engineering Drawing</i>	<i>Tata McGraw Hill Publishing Co., 2007.</i>
<i>K.V.Natarajan</i>	<i>A text book of Engineering Graphics</i>	<i>Dhanalakshmi Publishers, Chennai, 2006.</i>
<i>M.B.Shah and B.C. Rana</i>	<i>Engineering Drawing</i>	<i>Pearson Education, 2005.</i>

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*Luzadder and Duff*

*Fundamentals of  
Engineering Drawing*

*Prentice Hall of India Pvt Ltd, XI<sup>th</sup>  
Edition, 2001.*

*K.L.Narayana and P.Kannaiah*

*Text book on Engineering  
Drawing, 2<sup>nd</sup> Edition*

*SciTech Publications (India) Pvt.  
Ltd, Chennai, 2009.*

**COURSE OUTCOMES:**

Upon completion of this practical classes, the students will be able to

- CO1:** Represent planes and solids as per international standards.
- CO2:** Generate and interpret multiple views through development, interpretation and sectional views.
- CO3:** Generate and interrupt orthographic views.
- CO4:** Generate and interrupt pictorial views and interpenetration.
- CO5:** Generate and interrupt perspective views.
- CO6:** Apply the concept of AUTOCAD in engineering graphics.

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16LES2Z9

**PROGRAMMING IN C LABORATORY***Common to all branches*

Category : ES

L T P C

0 0 4 2

**Course Objectives:**

- o Data types in C and Flow control statements
- o Functions, Arrays, Pointers And Strings
- o Dynamic memory allocation and command line arguments
- o Bitwise Operators, Preprocessor Directives, Structures and Unions
- o Structures, List Processing, Input And Output

**PRACTICALS****EXERCISES ILLUSTRATING THE FOLLOWING CONCEPTS:**

1. Operators , Expressions and IO formatting
2. Decision Making and Looping
3. Arrays and Strings
4. Functions and Recursion
5. Pointers
6. Dynamic Memory Allocation
7. Structures
8. Unions
9. Files
10. Command line arguments
11. Mini Project

LECTURE:0 PERIODS    TUTORIAL:0 PERIODS    PRACTICAL: 60 PERIODS    TOTAL: 60 PERIODS

**COURSE OUTCOMES:**

Upon completion of this practical classes, the students will be able to

**CO1:** Use appropriate data types and flow control statements [Usage]

**CO2:** Write programs using functions, arrays, pointers and strings [Usage]

**CO3:** Write programs using dynamic memory allocation [Usage]

**CO4:** Implement programs using right storage classes, preprocessor directives, bitwise operators [Usage]

**CO5:** Work with command line arguments, structures, unions and files [Usage]

**CO6:** Develop applications using C [Usage]

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**COIMBATORE - 641 6 .**

16LOC1Z1

**HUMAN VALUES I**  
Common to all branches

Category : OC  
L T P C  
1 0 0 1

**Course Objectives:**

- Essential complementarily between 'values' and 'skills' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- The development of a Holistic perspective among students towards life, profession and happiness based on a correct understanding of the Human reality and the rest of existence, which forms the basis of Value based living in a natural way.
- The plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behaviour and mutually enriching interaction with nature.

**UNIT I INTRODUCTION TO VALUE EDUCATION 5 Periods**  
Introduction- Need, Basic Guidance, Content and Process for Value Education- Basic human Aspirations – Prosperity and happiness – Methods to fulfill human aspirations - Understanding and living in harmony at various levels.

**UNIT II HARMONY IN THE HUMAN BEING 5 Periods**  
Coexistence – Happiness and convenience – Appraisal of Physical needs – Mental and Physical health – Human relationship – Mutual Trust and Respect.

**UNIT III ETHICS 5 Periods**  
Morals, Values and Ethics - Integrity - Work Ethics - Service Learning - Civic Virtue – Caring – Sharing - honesty- Courage – Empathy – Self Confidence -Ethical Human Conduct- Basis for humanistic Education, Constitution and universal order – Competence in professional ethics – Strategy for transition from the present state to Universal human order.

LECTURE: 15 PERIODS TUTORIAL: 0 PERIODS PRACTICAL: 0 PERIODS TOTAL: 15 PERIODS

**TEXT BOOKS**

<b>AUTHOR NAME</b>	<b>TITLE OF BOOK</b>	<b>PUBLISHER, YEAR OF PUBLICATION</b>
R.R. Gaur, R. Singal, G.P. Bangaria	"Foundation Course in Human Values and Professional Ethics", 2009	Excel Book Private Ltd., New Delhi.

**REFERENCE BOOKS**

<b>AUTHOR NAME</b>	<b>TITLE OF BOOK</b>	<b>PUBLISHER, YEAR OF PUBLICATION</b>
S. K. Chakraborty and Dabangshu Chakraborty	Human Values and Ethics: Achieving Holistic Excellence	ICFAI University Press, 2006.
A.N. Tripathy	Human Values	New Age International publishers, 2003.

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*M. Govindarajan, S. Natarajan and V.S. Senthil kumar*     *Engineering Ethics(including human values)*     *Eastern Economy Edition, Printice Hall of India Ltd., 2004.*  
*E.G. Seebauer and Rober. L. Berry*     *Fundamentals of Ethics for Scientists and Engineers*     *Oxford University Press, 2000.*

**COURSE OUTCOMES:**

Upon completion of this course, the student will be able to

- CO1:** Start exploring themselves, get comfortable to each other and to the teacher and start finding the need and relevance for the course.
- CO2:** See that their practice in living is not in harmony with their natural acceptance most of the time and able to refer to their natural acceptance to remove this disharmony.
- CO3:** Aware of their activities like understanding, desire, thought and selection and start finding their focus of attention at different moments.
- CO4:** Able to see that respect is right evaluation and only right evaluation leads to fulfillment in relationship.
- CO5:** Develop an understanding of the whole existence and interconnectedness in nature.

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16LOC202

**HUMAN VALUES AND PROFESSIONAL ETHICS***Common to all branches*

Category : OC

L T P C

1 0 0 1

**Course Objectives:**

- o Engineering Ethics and Human Values
- o Social responsibility of an Engineer
- o Ethical dilemma while discharging duties in Professional life.

**UNIT I ENGINEERING ETHICS 5 Periods**  
Senses of Engineering Ethics -variety of moral issues – types of inquiry – moral dilemmas – moral autonomy – Kohlberg’s Theory – Gilligen’s Theory – Consensus and controversy – Models of Professional roles – theories about right actions – Self interest – customs and religion – uses of ethical theories – Valuing time-cooperation-commitment.

**UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION 5 Periods**  
Engineering as experimentation – engineers as responsible experimenters – codes of ethics – a balanced outlook on law – the challenger case study - engineers as managers – consulting engineers - Moral leadership .

**UNIT III SAFETY, RESPONSIBILITIES, RIGHTS AND GLOBAL ISSUES 5 Periods**  
Safety and risk – assessment of safety and risk – risk benefit analysis and reducing risk – the three mile island and chernobyl case studies.– Environmental ethics – computer ethics – weapons development- Multinational corporations - engineers as expert witnesses and advisors.

LECTURE :15 PERIODS    TUTORIAL :0 PERIODS    PRACTICAL: 0 PERIODS    TOTAL: 15 PERIODS

**TEXT BOOKS**

AUTHOR NAME	TITLE OF BOOK	PUBLISHER, YEAR OF PUBLICATION
Mike Martin and Roland Schinzinger	<i>Ethics in Engineering</i>	McGraw Hill, New York, 1996.
M. Govindarajan, S. Natarajan and V.S. Senthil kumar	<i>Engineering Ethics (including human values)</i>	Eastern Economy Edition, Printice Hall of India Ltd., 2004.

**REFERENCE BOOKS**

AUTHOR NAME	TITLE OF BOOK	PUBLISHER, YEAR OF PUBLICATION
Charles D. Fleddermann	<i>Engineering Ethics</i>	Pearson Education, 2004.
Edmund G Seebauer and Robert L. Berry	<i>Fundamentals of Ethics for Scientists and Engineers, 2001</i>	Oxford University Press

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Charles E. Harris, Michael S. Protchard and Michael J. Rabins  
*Engineering Ethics – Concepts and Cases* Thomson Learning, 2000.

John R. Boatright  
*Ethics and Conduct of Business* Pearson Education, 2003.

**COURSE OUTCOMES:**

Upon completion of this course the students will be able to

- CO1:** Understand and appreciate Human values, exhibit self confidence and develop good character
- CO2:** Sense engineering ethics, professional roles and valuing time, co-operation and commitment
- CO3:** Understand and practise code of ethics.
- CO4:** Assess safety and risk and capable of doing risk benefit analysis.
- CO5:** Develop and exhibit moral leadership qualities in exercising Engineering Consultations without compromising environmental, legal and ethical issues

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OFFICE OF THE CONTROLLER OF EXAMINATIONS

BRANCH : ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM : III SEMESTER

S. No	Course Code	Course Title	CAT	CA Marks	End Exam Marks	Total Marks	Credits			
							L	T	P	C
		<b>THEORY</b>								
1.	16LBS3Z1	Engineering Mathematics-III	BS	50	50	100	3	2	0	4
2.	16LES302	Circuit Theory	ES	50	50	100	2	2	0	3
3.	16LES303	Data Structures and Algorithms using C	ES	50	50	100	3	0	0	3
4.	16LES304	Digital System Design	ES	50	50	100	3	0	0	3
5.	16LPC305	Electronic Circuit Design	PC	50	50	100	3	0	0	3
6.	16LPC306	Signals and Systems	PC	50	50	100	2	2	0	3
		<b>PRACTICAL</b>								
7.	16LES307	Data Structures Laboratory	ES	50	50	100	0	0	4	2
8.	16LPC308	Electronic Devices and Circuit Laboratory	PC	50	50	100	0	0	4	2
		<b>TOTAL</b>		400	400	800	16	6	8	23



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**Course Objectives:**

- To gain the knowledge of formation of Fourier series.
- To familiarize with Infinite and finite Fourier transforms functions.
- To be familiar with solution of first and second order differential equations.
- To acquire knowledge of techniques to solve one and two dimensional partial differential equations concerning to engineering applications.

**UNIT-I** **FOURIER SERIES** **9+6 Periods**  
Dirichlet's conditions-Full range Expansions- Odd and even functions- Half range sine and cosine series –Parseval's identity on a Fourier series- Harmonic analysis.

**UNIT-II** **FOURIER TRANSFORMS** **9+6 Periods**  
Fourier integral theorem (statement only)-Infinite Fourier transform pair-Fourier sine and cosine transform pair- Properties-Transforms of simple functions- Parseval's identity on a Fourier transform-Finite Fourier transforms.

**UNIT-III** **PARTIAL DIFFERENTIAL EQUATIONS** **9+6 Periods**  
Formation of partial differential equations-First order PDE -Standard types and Lagrange's type-Linear partial differential second and higher order with constant coefficients-Homogeneous and Nonhomogeneous types.

**UNIT-IV** **BOUNDARY VALUE PROBLEMS** **9+6 Periods**  
Method of separation of variables and Fourier series solution: One dimensional wave equation, one and two dimensional heat flow.

**UNIT-V** **Z TRANSFORMS** **9+6 Periods**  
Z transforms-properties-Inverse Z transforms-Initial and final value theorems- Convolution theorem- Formation of difference equations- Solution to difference equations of second order difference equations with constant coefficients with Z transform.

LECTURE: 45 PERIODS TUTORIAL:30 PERIODS PRACTICAL: 0 PERIODS TOTAL: 75 PERIODS

**TEXT BOOKS**

- 1.Veerarajan T, *Transforms and Partial Differential Equations*, Tata McGraw Hill Publishing Co., New Delhi, 2015.
- 2.Kandasamy, Thilagavathy and Gunavathy, *Engineering Mathematics for III Semester B.E/B.Tec*, S.Chand & Co, Rammagar, New Delhi, 2013.

**REFERENCE BOOKS**

- 1.Grewal B .S, *Higher Engineering Mathematics*, Khanna Publishers, New Delhi, 43<sup>rd</sup> Edition,2014.
2. Ramana B. V, *Higher Engineering Mathematics*, Tata McGraw Hill Co. Ltd., New Delhi, 11<sup>th</sup> Edition, Reprint, 2010.
3. Bali N., Goyal M, *Transforms and Partial differential equations*, University Science Press, New Delhi, 2010.
4. Ray Wylie C and Louis C Barrett, *Advanced Engineering Mathematics*, McGraw Hill Education(India) Pvt Ltd, New Delhi, 6<sup>th</sup> Edition, Reprint, 2014.
5. Donald.A. McQuarrie, *Mathematical Methods for Scientists and Engineers*, Viva Books Pvt Ltd, New Delhi, 1<sup>st</sup> Edition, Reprint 2015.

**COURSE OUTCOMES:**

**CO1:** Understand the concepts of Fourier series and its construction when discrete and continuous form is known

**CO2:** Acquire fluency in Fourier transforms in order to solve improper integrals.

**CO3:** Understand the standard and special types of partial differential equations.

**CO4:** Gain fluency in solving boundary value problems.

**CO5:** Understand the Z transform methods to find solutions of difference equations.

**Course Articulation Matrix for 16LBS3Z1 ENGINEERING MATHEMATICS III**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3....
CO1	H	H	H							H			H	M	
CO2	M	H	M							M			H	M	
CO3	H	M								L			H	M	
CO4	H	H	M			M				M	M		H	M	
CO5	M	M	M										H	M	
16LBS3Z1	H	H	M			L				M	L		H	M	<i>N. Akhbar</i>

*N. Akhbar*

R. Sat 4/17/17

16LES302 ✓

CIRCUIT THEORY ✓

CATEGORY: ES ✓

L	T	P	C
2 ✓	2 ✓	0 ✓	3 ✓

**PREREQUISITES:** 16LBS1Z1 ENGINEERING MATHEMATICS- I  
16LBS2Z2 ENGINEERING MATHEMATICS- II

**COURSE OBJECTIVES:**

- \* To get an insight into the basic concepts of DC and AC circuit analysis.
- \*To get an insight into the transient response of the circuits
- \*To understand the concepts of resonance and coupled circuit

**UNIT I: DC CIRCUIT ANALYSIS**

**(6+6) Periods**

Basic Components of electric Circuits- Charge, current, Voltage and Power, Voltage and Current Sources- Ohms Law-Kirchhoff's Current Law- Kirchhoff's voltage law-The single Node – Pair Circuit, series and Parallel Connected Independent Sources- Resistors in Series and Parallel- voltage and Current division- Nodal analysis-Mesh analysis.

**UNIT II: SINUSOIDAL STEADY STATE ANALYSIS**

**(6+6) Periods**

Sinusoidal Steady – State analysis - Characteristics of Sinusoids-The Complex Forcing Function-The Phasor-Phasor relationship for R, L, and C, impedance and Admittance-Nodal and Mesh Analysis- Phasor Diagrams-AC Circuit Power Analysis- Instantaneous Power- Average Power-apparent Power and Power Factor- Complex Power

**UNIT III: NETWORK THEOREMS AND DUALITY**

**(6+6) Periods**

Useful Circuit Analysis techniques(AC and DC) - superposition theorem , Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Compensation theorem, Reciprocity theorem, Delta-Star Conversion-Duality-Dual circuits.

**UNIT IV: TRANSIENTS AND RESONANCE IN RLC CIRCUITS**

**(6+6) Periods**

Transient concepts- transient response of simple RL and RC (series and parallel) circuits- transient response of RLC(series & parallel) circuits-solution of RL,RC and RLC(series and parallel)Circuits for step input – Parallel Resonance-Series Resonance- bandwidth -Quality Factor.

**UNIT V: COUPLED CIRCUITS AND TOPOLOGY**

**(6+6) Periods**

Magnetically Coupled Circuits- mutual Inductance - Linear Transformer - Ideal Transformer- Introduction to Network Topology - Trees and General Nodal analysis - Links and Loop analysis.

**TOTAL NUMBER OF PERIODS**

**(60) Periods** ✓

**CONTACT PERIODS:**

Lecture: 30 periods Tutorial: 30 periods Practical: 0 periods Total: 60 periods

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**Text Books:**

1. William H. Hayt, Jr. Jack E. Kemmerly, Steven M. Durbin, "Engineering Circuit Analysis", Sixth Edition, Tata McGraw-Hill Edition, 2012

2. Sudhakar.A, Shyammoan.S.P, "Circuits and Networks: Analysis and Synthesis", Tata McGraw Hill, New Delhi, Fourth Edition, 2010.

**Reference Books:**

1. Charles K. Alexander & Mathew N.O. Sadiku, "Fundamentals of Electric Circuits", Sixth revised Edition, McGraw- Hill 2016.

2. D.R. Cunningham, J.A. Stuller, "Basic Circuit Analysis", Jaico Publishing House, 2005

3. David A Bell, "Electric Circuits", Oxford University Press, 2009

**COURSE OUTCOMES:**

Upon completion of the course, the students will have:

CO1 : Exposure to components and parameters in electrical circuits

CO2: The skills to analyze electrical circuit behavior

CO3 : Ability to analyze electrical circuits using Network theorems

CO4: Understanding of the transient concepts in electrical circuits

CO5: Knowledge on the concepts of resonance and coupled circuits

CO6 : Knowledge on graph theory and its applications in circuit analysis

**COURSE ARTICULATION MATRIX:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO															
CO1	3												3	2	
CO2	2	3	3	1									3	2	
CO3	2	3	3	1									3	2	
CO4	2	3	3	1									3	2	
CO5	2	3	3	1									3	2	
CO6	2	3	3	1									3	2	



16LES303 DATA STRUCTURES AND ALGORITHMS USING C CATEGORY: ES

L T P C  
3 0 0 3

PREREQUISITES: 16LES2Z5 Programming in C

**COURSE OBJECTIVES:**

- \* To Acquire and apply knowledge of linear and non-linear data structures to Engineering Problems
- \*To formulate algorithms for sorting and searching problems
- \*To develop algorithmic design techniques for Optimization problems

**UNIT I: ALGORITHM ANALYSIS (9) Periods**

Algorithm analysis - Mathematical background - Run time calculations - Logarithms in running time – List ADT - Link lists– Single, Double, Circular – Operations – Applications.

**UNIT II: STACK AND QUEUES (9) Periods**

Stack ADT – Implementations – Applications – Queues ADT – Array implementation of Stack and Queue – Priority Queues – Applications – Binomial queue structure - Binomial queue operations.

**UNIT III: TREES (9) Periods**

Binary trees – Representations - Binary tree transversal - Basic operations – Expression Trees - Balanced Trees - AVL trees - B trees – Splay – Hashing and Rehashing.

**UNIT IV: SORTING AND SEARCHING (9) Periods**

Sorting - Exchange sorts: Bubble sort - Quick sort - Selection and Tree sorting: Straight selection sort - Binary tree sorts – Heap sort - Insertion sorts - Merge sorts - Radix sorts - Efficiency analysis. Searching - Basic search techniques - Sequential searching - Indexed sequential search - Binary search - Tree searching.

**UNIT V: GRAPHS AND ALGORITHM DESIGN TECHNIQUES (9) Periods**

Graphs - Definitions and properties – Representation - Graph search methods - Applications of Depth-First search - Shortest path algorithm (Dijkstra) - Minimum spanning tree (Prim's and Kruskal's algorithms). Algorithm Design Techniques: Greedy Algorithm – Divide and Conquer – Dynamic Programming – Backtracking.

**TOTAL NUMBER OF PERIODS (45) Periods**

**CONTACT PERIODS:**

Lecture: 45 periods    Tutorial: 0 periods    Practical: 0 periods    Total: 45 periods

**Text Books:**

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 2009.
2. Yedidyah Langsam Aaron, Moshe.J.Augenstein, M.Tenenbaum, "Data Structures using C and C++", 2nd Edition, PHI Learning Pvt.Ltd, 2011.

**Reference Books:**

1. Jean Paul Tremblay, Paul G. Sorenson, "An Introduction to Data structures With Applications", Tata McGraw Hill Publishing Company Ltd, 2008.
2. T.H.Cormen, C.E. Leiserson, R.L. Rivest, C.Stein, "Introduction to Algorithms", 3rd Edition, PHI Learning Pvt. Ltd, 2009.

3. Narasimha Karumanchi, "Data Structures and Algorithms Made Easy: Data Structures and Algorithmic Puzzles, Fifth Edition, CareerMonk Publications, International Edition, 2016.

**COURSE OUTCOMES:**

Upon completion of the course, the students will have:

- CO1 : Ability to analyze the time and space complexities and efficiency of an algorithm.
- CO2: Basic knowledge of linear and non-linear data structures
- CO3: Ability to apply the knowledge of linear data structures to Practical problems
- CO4: Ability to apply the knowledge non-linear data structures to Practical problems
- CO5: Ability to formulate algorithms for sorting and searching problems
- CO6: Ability to apply the knowledge of Algorithmic design techniques for optimization problems

**COURSE ARTICULATION MATRIX:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2		3	1										
CO2	1	2		2											
CO3	1	2		3	1	2									
CO4	1	2		2	1										
CO5	2	2		2	1										
CO6	1	2		1	1										

16LES304 ✓

DIGITAL SYSTEM DESIGN ✓

CATEGORY: ES

L	T	P	C
3	0	0	3

PRE-REQUISITES: NIL

**COURSE OBJECTIVES:**

- \*To Acquire knowledge on Boolean algebra and logic circuits
- \*To realize combinational and sequential logic circuits using Verilog HDL
- \*To design and analyze Synchronous and Asynchronous digital circuits

**UNIT I: BINARY CODES AND BOOLEAN ALGEBRA**

(9) Periods

Binary, BCD, Grey Codes - ASCII and Error Detecting Codes - Boolean Algebra - Boolean functions - Canonical and Standard Forms - Minimization of Boolean expressions - Karnaugh map minimization - Don't care conditions - Tabulation Method - Implementation of logic functions using Gates - NAND and NOR implementation- Variable entered k- map.

**UNIT II: COMBINATIONAL LOGIC CIRCUITS**

(9) Periods

Binary Adder - Binary Subtractor - BCD Adder - Binary Multiplier - Magnitude Comparator - Multiplexer/Demultiplexer - Decoder/Encoder - Code converters - Implementation of combinational logic using MUX/Decoder - Introduction to Verilog HDL - Verilog code for Full Adder, MUX/DeMUX and Code Converters.

**UNIT III: SYNCHRONOUS SEQUENTIAL LOGIC CIRCUITS**

(9) Periods

Latches - Flip flops - Analysis and Design of Clocked Sequential Circuits – State Reduction and State Assignment - Ripple Counters: Binary, BCD, Modulo n, Up/Down counters - Shift registers:- Universal Shift Register–Synchronous counters - Ring counter – Johnson counter - Verilog code for Flip Flops, Registers and Counters.

**UNIT IV: ASYNCHRONOUS SEQUENTIAL CIRCUITS**

(9) Periods

Block Diagram - Modes of Operation – Analysis of Asynchronous Sequential Circuits - Design of Asynchronous Sequential Circuits - Reduction of Flow Tables - Races – Hazards- Clock skews.

**UNIT V: MEMORY AND PROGRAMMING LOGIC**

(9) Periods

Classification of Memories - RAM organization - Memory decoding - Memory expansion - Static RAM cell - Dynamic RAM cell - ROM organization - Types of ROM - Programmable Logic Array - Programmable Array Logic - Field Programmable Gate Arrays- Flash cache.

**TOTAL NUMBER OF PERIODS**

(45) Periods ✓

**CONTACT PERIODS:**

Lecture: 45 periods Tutorial: 0 periods Practical: 0 periods Total: 45 periods

**Text Books:**

1. M. Morris R. Mano and Michael D. Ciletti, "Digital Design" 4th Edition, Pearson Education, 2011.
2. M. Morris R. Mano and Michael D. Ciletti, "Digital Design: With an Introduction to the Verilog HDL" 5th Edition, Pearson Education, 2013.

**Reference Books:**

1. Stephen Brown, Zvonko Vranesic, "Fundamentals of Digital Logic with Verilog Design", 2nd Edition, Tata McGraw Hill Education Pvt.Ltd., 2010.

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2. A.Anand Kumar, "Fundamentals of Digital Circuits", 2nd Edition, PHI Learning Pvt.Ltd, New Delhi, 2011.
3. Charles H.Roth, Jr, "Fundamentals of Logic Design", 4th Edition, Jaico Publishing House, 2006.
4. Donald D.Givone," Digital Principles and Design", Tata Mc-Graw-Hill Publishing Company Ltd., 2003.
5. Samir Palnitkar, "Verilog HDL", Pearson Education, 2009.

**COURSE OUTCOMES:**

Upon completion of the course, the students will have:

- CO1: In-depth knowledge on Binary Codes and Boolean algebra
- CO2: Detailed Knowledge and implementation of Combinational logic circuits
- CO3: Ability to analyze and design Synchronous digital circuits
- CO4: Ability to realize combinational and sequential logic circuits using Verilog HDL
- CO5: Ability to analyze and design Asynchronous sequential circuits
- CO6: Knowledge on different memory and programmable logic devices

**COURSE ARTICULATION MATRIX:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2		3	1								1		
CO2	1	2		2											
CO3	1	2		3	1	2									
CO4	1	2		2	1									3	
CO5	2	2		2	1										
CO6	1	2		1	1										

16LPC305 ✓

ELECTRONIC CIRCUIT DESIGN

CATEGORY: PC

L	T	P	C
3	0	0	3 ✓

PREREQUISITES: 16LES206 ELECTRONIC DEVICES ✓

**COURSE OBJECTIVES:**

- \*To have knowledge on rectifiers and power supplies.
- \*To understand the frequency response of amplifiers.
- \*To have knowledge on feedback amplifiers, oscillators, Power amplifiers and Tuned amplifiers.

**UNIT I: RECTIFIERS AND POWER SUPPLIES**

(9) Periods

Rectifiers-Half wave, full-wave and bridge rectifiers- Rectifiers with filters-C,L,LC and CLC filter- Voltage regulators- Classifications of Power Supplies-Over voltage protection, Switched mode power supply-Power control using SCR-Uninterrupted Power Supplies.

**UNIT II: LOW FREQUENCY AND HIGH FREQUENCY RESPONSE OF AMPLIFIERS**

(9) Periods

Frequency response of amplifiers-BJT AC Analysis – hybrid and  $\pi$  equivalent models – Low frequency analysis of BJT and FET- High frequency analysis of BJT and FET - Miller effects -Midband analysis of amplifiers – Multistage frequency effects.

**UNIT III: FEEDBACK AMPLIFIERS AND OSCILLATORS**

(9) Periods

Introduction– Basic feedback concepts – Analysis of voltage and current feedback amplifiers – Loop gain – Stability of feedback circuit – Nyquist stability criterion – Phase and gain margins – Barkhausen criterion- Design of Oscillators –RC Phase Shift, Wein bridge, Colpitts, Hartley and Crystal oscillators.

**UNIT IV: LARGE SIGNAL AND TUNED AMPLIFIERS**

(9) Periods

Classification of large signal amplifiers-Class A, B, C, D, and AB amplifiers operation-efficiency-harmonic distortion, class- B push-pull amplifier, crossover distortion, complementary-symmetry amplifier-Unloaded and loaded Q of tank circuits, single tuned amplifiers – double tuned amplifier - effect of cascading single tuned and double tuned amplifiers on bandwidth – Stagger tuned amplifiers.

**UNIT V: MULTIVIBRATORS AND SWEEP CIRCUITS**

(9) Periods

Design of Astable, Monostable, Bistable multivibrators –Schmitt trigger –Blocking Oscillators- UJT saw tooth generator-Sweep circuits- time base generator.

**TOTAL NUMBER OF PERIODS**

(45) Periods ✓

**CONTACT PERIODS:**

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

**Text Books:**

1. Robert L. Boylestad and Louis Nasheresky, "Electronic Devices and Circuit Theory", 10th Edition Pearson Education / PHI, 2008
2. S.Salivahanan, N.Suresh Kumar and A. Vallavaraj. "Electronic Devices and Circuits", 2<sup>nd</sup> edition TMH,2007.

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**Reference Books:**

1. Adel .S. Sedra, Kenneth C. Smith, "Micro Electronic Circuits", 6th Edition, Oxford University Press, 2010.
2. David A. Bell, "Electronic Devices and Circuits", Fifth Edition, Oxford University Press, 2008.
3. Millman J. and Taub H., "Pulse Digital and Switching Waveforms", 2nd edition, 2007.
4. Donald .A. Neamen," Electronic Circuit Analysis and Design "-2nd Edition, Tata Mc GrawHill, 2009.

**COURSE OUTCOMES:**

Upon completion of the course, the students will have:

- CO 1: Ability to understand and analyze Power supplies.
- CO 2: Ability to understand the frequency response of amplifiers.
- CO 3: Ability to analyze Feedback amplifiers and oscillators.
- CO 4: Ability to analyze Power amplifiers and Tuned amplifiers.
- CO 5: Ability to Design Multivibrator circuits.
- CO 6: Ability to analyze Sweep circuits.

**COURSE ARTICULATION MATRIX:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2	1	2	-	-	-	-	-	-	1	3	2	1
CO2	2	3	1	2	2	-	1	1	-	-	-	1	1	2	1
CO3	2	1	1	3	2	-	1	1	-	-	-	1	2	2	1
CO4	2	2	1	3	2	1	1	-	-	-	-	1	2	2	1
CO5	3	2	1	2	2	2	1	1	-	-	-	1	3	2	1
CO6	2	2	3	2	2	1	-	1	-	-	-	-	3	3	1

16LPC306 ✓

SIGNALS AND SYSTEMS ✓

CATEGORY: PC ✓

L	T	P	C
2	2	0	3 ✓

PREREQUISITES: ~~16LBS3Z1 ENGINEERING MATHEMATICS III~~ NIL ✓

**COURSE OBJECTIVES:**

- \* To analyze the Continuous Time and Discrete Time signals and systems
- \* To gain knowledge of Fourier and Laplace Transforms and its application in the analysis of Continuous Time Systems
- \* To gain knowledge of Discrete Time Fourier Transforms and Z-Transforms and its application in the analysis of Discrete Time Systems
- \* To analyze state variable equations of linear time invariant Continuous and Discrete Time Systems and its matrix representation

**UNIT I: INTRODUCTION TO SIGNALS AND SYSTEMS (6+6) Periods ✓**

Introduction to Continuous Time (CT) signals and Discrete Time (DT) signals - step, ramp, impulse, exponential, sinusoidal signals, Representation of DT signals by impulses- signal operations- classification of CT and DT signals –periodic and aperiodic signals, random signals, energy and power signals, even and odd signals- linear time invariant CT systems and DT systems- basic system properties: linear time invariant, causality, BIBO stability

**UNIT II: ANALYSIS OF CONTINUOUS TIME SIGNALS (6+6) Periods ✓**

Fourier series analysis- spectrum of Continuous Time signals- properties of continuous time Fourier series, Fourier transform of continuous time aperiodic signals and periodic signals, properties of continuous time Fourier transform. Fourier and Laplace Transforms in signal Analysis

**UNIT III: LINEAR TIME INVARIANT-CONTINUOUS TIME SYSTEMS (6+6) Periods ✓**

Differential Equation- CT system representations by differential equations -Block diagram representation- impulse response, convolution integrals- Frequency response of systems characterized by Differential Equations- Fourier and Laplace transforms in Analysis- state space representation

**UNIT IV: ANALYSIS OF DISCRETE TIME SIGNALS (6+6) Periods ✓**

Baseband Sampling of CT signals- Aliasing, Reconstruction of CT signal from DT signal, Discrete Time Fourier series representation of DT periodic signals – Properties – Representation of DT aperiodic signals by Discrete Time Fourier Transform (DTFT) – Properties – Z Transforms- properties.

**UNIT V: LINEAR TIME INVARIANT –DISCRETE TIME SYSTEMS (6+6) Periods ✓**

Difference Equations-Block diagram representation-Impulse response-Convolution sum -DTFT and Z Transform analysis of Recursive & Non-Recursive systems. – Frequency response of systems characterized by Difference –Equations-state space representation.

**TOTAL NUMBER OF PERIODS (60) Periods ✓**

**CONTACT PERIODS:**

Lecture: 30 Periods Tutorial: 30 Periods Practical: 0 Periods Total: 60 Periods

**Text Books:**

1. Alan V. Oppenheim, Alan S. Willsky and S. Hamid Nawab, "Signals & Systems", Prentice-Hall of India, Second Edition, 2011
2. Simon Haykin and Barry Van Veen, "Signals and Systems", Wiley India, New Delhi, 2010

**Reference Books:**

1. H P Hsu, Rakesh Ranjan, "Signals and Systems", Tata McGraw Hill, 7th Reprint, 2010
2. Edward W. Kamen, Bonnie S. Heck, "Fundamentals of Signals and Systems Using the Web and MATLAB", Pearson Prentice Hall, 2007.
3. John Alan Stuller, "An Introduction to Signals and Systems", Thomson, 2008
4. M.J. Roberts, "Signals and Systems, Analysis Using Transform Methods and MATLAB", Tata McGraw Hill (India), 2nd Edition, 2011.

**COURSE OUTCOMES:**

Upon completion of the course, the students will have:

- CO1: Represent basic continuous time and discrete time signals and systems.
- CO2: Analyze signal properties such as periodicity, even or odd, energy or power and system properties such as causality, linearity and time invariance
- CO3: Analyze and characterize continuous time signals in the Fourier transform and Laplace Transform domain.
- CO4: Analyze the properties of a discrete time- signal in the Fourier transform and Z transform domain.
- CO5: Characterize a continuous time system in the time domain, Fourier Transform domain and Laplace Transform domain.
- CO6: Characterize a discrete time system in the time domain, Fourier Transform domain and Z transform domain

**COURSE ARTICULATION MATRIX:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	2									3	1	
CO2	3	2	1	2									3	2	
CO3	3	2	2	2	2				2			2	3	1	
CO4	3	2	2		2				2			2	3	2	
CO5	3	2	2		2				2			2	3	1	
CO6	3	3	3		2				2			2	3	2	



16LES307

DATA STRUCTURES LABORATORY

CATEGORY: ES ✓

L T P C  
0 0 4 2 ✓

PREREQUISITES: ~~16LES303 Data Structures and Algorithms using C~~ NIL ✓

**COURSE OBJECTIVES:**

- \* To Acquire and apply the knowledge of linear and non-linear data structures to Engineering problems
- \*To identify suitable data structure for real time applications
- \*To develop algorithmic design techniques for Optimization problems

PRACTICALS	<p>List of Experiments</p> <p>I implementation of Data Structures</p> <ol style="list-style-type: none"><li>1.List Array</li><li>2.Linkd list implementation</li><li>3.Stack implementation</li><li>4.Queue implementation•</li><li>5.Linkd list implementation of Stack and Queue</li><li>6.Applications of Data structures</li></ol> <p>II implementation of Searching and Sorting Algorithms</p> <ol style="list-style-type: none"><li>7. Binary Search tree</li><li>8. Linear search</li><li>9. Selection sort</li><li>10.Quick sort</li><li>11.Merge sort</li><li>12. Heap sort</li></ol>
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**CONTACT PERIODS:**

Lecture: 0 Periods Tutorial: 0 Periods Practical: 60 Periods Total: 60 Periods ✓

**Reference books:**

1.Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 2009.

2.Yedidyah Langsam Aaron, Moshe.J.Augenstein, M.Tenenbaum, "Data Structures using C and C++", 2nd Edition, PHI Learning Pvt.Ltd, 2011

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**COURSE OUTCOMES:**

Upon completion of the course, the students will have:

CO1 : Ability to implement and demonstrate different data structures using C

CO2: Ability to implement and demonstrate different data structures using other data structures

CO3: Ability to apply the different data structures for various practical problems

CO4: Ability to implement and demonstrate searching algorithms

CO5: Ability to implement and demonstrate sorting algorithms

CO6: Ability to analyze the time and space complexities and efficiency of various algorithms

**COURSE ARTICULATION MATRIX:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2		3	1									1	
CO2	1	2		2											
CO3	1	2		3	1	2								1	
CO4	1	2		2	1										
CO5	2	2		2	1										
CO6	1	2		1	1									2	

16LPC308 ELECTRONIC DEVICES AND CIRCUIT LABORATORY CATEGORY: PC ✓

L T P C  
0 0 4 2 ✓

PREREQUISITES:NIL

COURSE OBJECTIVES:

- \* To study the operation of diodes and applications.
- \* To study the characteristics of transistors and their parameters.
- \* To study the characteristics of Class A, Class B and Class AB amplifier and Wave shaping circuits.
- \* To study the characteristics of SCR and Oscillators.

PRACTICALS	<ol style="list-style-type: none"><li>1. Study the characteristics of diode and its applications.</li><li>2. Study the characteristics of BJT and its parameters.</li><li>3. Study the characteristics of JFET, MOSFET and their parameters.</li><li>4. Study the characteristics of SCR.</li><li>5. Study the characteristics of Opto Electronic Devices.</li><li>6. Study of series and parallel resonance circuits.</li><li>7. Study the characteristics of Class A, Class B and Class AB amplifier.</li><li>8. Design Wein-Bridge and RC phase shift Oscillators and determine their frequency of Oscillations.</li><li>9. Design of Wave shaping Circuits.</li><li>10. Design of Power Supplies.</li></ol> <p>* <b>The design experiments are simulated using Pspice and Multisim tools.</b></p>
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CONTACT PERIODS:

Lecture: 0 Periods Tutorial: 0 Periods Practical: 60 Periods Total: 60 Periods ✓

Reference Books:

1. Ben G Streetman, "Solid state devices", 7th edition, Pearson Education 2014.
2. Donald A Neaman, "Semiconductor physics and devices", 4th edition. McGraw Hill, 2011.
3. Millman & Halkias : "Integrated Electronics", MGH. 2009.

COURSE OUTCOMES:

Upon completion of the course, the students will have:

- CO 1: Ability to study the characteristics of diodes and its applications.
- CO 2: Ability to study the characteristics of BJT and FET.
- CO 3: Ability to study the efficiency of power amplifiers.
- CO 4: Ability to study the functions of push pull and complementary amplifier circuits.
- CO 5: Ability to design Oscillators and wave shaping circuits.
- CO 6: Ability to design Power Supplies.

**COURSE ARTICULATION MATRIX:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	2	-	-	-	1	-	-	-	2	2	-
CO2	1	2	1	-	1	-	-	-	1	-	-	-	1	1	-
CO3	1	2	-	-	3	-	-	-	1	-	-	-	2	2	-
CO4	2	2	3	2	3	1	1	1	1	1	1	1	2	2	-
CO5	1	3	-	1	3	-	-	-	1	-	-	-	2	2	-
CO6	1	2	1	-	1	-	-	-	1	-	-	-	1	1	-