E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai

Accredited by NAAC with „A" Grade | Accredited by NBA (CSE, EEE, MECH)

NAGAPATTINAM – 611 002

B.E. Electronics and Communication Engineering

Full Time Curriculum and Syllabus

First Year – First Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1701MA101	Engineering Mathematics-I	3	2	0	4	40	60	100
1701PH101	Applied Physics for Engineers	3	0	0	3	40	60	100
1701EN101	Technical English	3	0	0	3	100	0	100
1701CH104	Applied Chemistry	3	0	0	3	40	60	100
1701GE101	Basic Electrical and Instrumentation Engineering	3	0	0	3	40	60	100
1701GEX02	Engineering Graphics	2	2	0	3	50	50	100
1701GEX03	Programming in C	3	0	0	3	40	60	100
Laboratory Course								
1701HS151	Physics and Chemistry Lab –I	0	0	2	1	50	50	100
1701GEX51	Programming in C Lab	0	0	2	1	50	50	100

L – Lecture | T – Tutorial | P – Practical | C – Credit | CA – Continuous Assessment | ES – End Semester

1701MA101 **ENGINEERING MATHEMATICS I** (Common to all B.E / B.Tech Degree Programmes)

L	T	P	C
3	2	0	4

COURSE OBJECTIVES:

1. To educate Matrix Algebra Technique and curvature Theory
2. To impart knowledge of Techniques in solving Ordinary Differential Equations and to apply in solving Modern Engineering Problems
3. To acquaint the students about functions of several variables and also to familiarize the students in infinite series and their convergence

UNIT I EIGEN VALUE PROBLEMS **9 Hours**

Characteristic equation - Eigen values and Eigen vectors of a real matrix – Properties - Cayley– Hamilton theorem- Diagonalization of Matrices - Reduction of a quadratic form to a canonical form by orthogonal transformation – Application of Matrices in Structural Engineering and image processing

UNIT II ORDINARY DIFFERENTIAL EQUATIONS **9 Hours**

Higher order linear differential equations with constant coefficients – Cauchy"s and Legendre"s linear equations – Method of variation of parameters in solution of ordinary differential equations.

UNIT III DIFFERENTIATION AND GEOMETRICAL APPLICATIONS **9 Hours**

Derivative of special functions (Trigonometry, Exponential, Logarithmic), Derivative by rule (Product, Quotient, Chain rule), Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature- Evolutes and involutes.

UNIT IV MULTIVARIABLE CALCULUS **9 Hours**

Functions of two variables and solutions(Partial derivatives and Euler"s theorem)– Taylor"s series - Maxima and Minima – Application of Partial Derivatives to find the optimum requirement using Lagrangian multipliers.

UNIT V SEQUENCES AND SERIES **9 Hours**

Sequences: Definition and examples – Series: Types and Convergence – Series of positive terms – Tests of convergence: Comparison test, Integral test and D"Alembert"s ratio test – Alternating series – Leibnitz"s test – Application of Sequences in real life.

TOTAL: 45 + 15 HOURS

FURTHER READING:

1. Modeling and solutions using Newton"s Law of Cooling of Bodies
2. Differentiation of implicit Functions, Jacobians and Properties

COURSE OUTCOMES:

On the Successful completion of the course, Students will be able to

CO1: Analyze the characteristics of a linear system with Eigen value and Eigen Vectors
CO2: Recognize and solve Higher order Ordinary Differential Equations
CO3: Solve Derivative of special functions and apply it in solving Geometrical problems
CO4: Apply Partial Derivatives in finding Maxima and Minima of a function
CO5: Test the convergence of any series

REFERENCES:

1. Veerarajan R., "Engineering Mathematics", updated second edition for semester I and II,(2017)
2. Grewal. B.S, "Higher Engineering Mathematics", 44th Edition, Khanna Publications, Delhi, (2014).
3. Bali N. P and Manish Goyal, "Text book of Engineering Mathematics", Sixth edition, Laxmi Publications(p) Ltd.,(2014).
4. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, (2012).
5. P.Kandasamy, K. Gunavathy and K. Thilagavathy, Engineering Mathematics ,Volume II, S. Chand & Co ., New Delhi, (2009)
6. Erwin Kreyszig, Advanced Engineering Mathematics,9th Edition, Wiley International edition, (2006)
7. Ramana B.V, "Higher Engineering Mathematics",Tata McGrawHill Publishing, New Delhi, (2007).
8. M K Venkataraman, Engineering mathematics, Volume I, 2nd ed., National Publishing Co.(2003)
9. nptel.ac.in/courses/111105035, www.nptelvideos.in/2012/11/Mathematics.html
10. www.learnerstv.com/Free-maths-video lectures - ltv348-page1.htm

1701PH101 **APPLIED PHYSICS FOR ENGINEERS** (Common to all B.E. / B.Tech Degree Programmes)

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. To impart knowledge in properties of matter, crystallography and ultrasonics.
2. To understand the applications of lasers and fiber optics.
3. To implement the principles of quantum physics in the respective engineering fields.

UNIT I PROPERTIES OF MATTER **9 Hours**

Elasticity: elastic and plastic materials – Hooke"s law – elastic behavior of a material – stress – strain diagram – factors affecting elasticity. Three moduli of elasticity – Poisson"s ratio – torsional pendulum – twisting couple on a cylinder. Young"s modulus – uniform bending – non-uniform bending. Viscosity: coefficient of viscosity – streamline and turbulent flow – experimental determination of viscosity of a liquid – Poiseuille"s method.

UNIT II APPLIED OPTICS **9 Hours**

Interference: air wedge – theory – uses – testing of flat surfaces – thickness of a thin wire. Laser: introduction – principle of laser – characteristics of laser light– types: CO2 laser – semiconductor laser (homojunction). Fiber optics: principle of light transmission through fiber – expression for acceptance angle and numerical aperture – types of optical fibers (refractive index profile and modes) – fiber optic communication system (block diagram & description).

UNIT III ULTRASONICS **9 Hours**

Ultrasonics: introduction – properties of ultrasonic waves – generation of ultrasonic waves – magnetostriction - piezo electric methods – detection of ultrasonic waves – Determination of velocity of ultrasonic waves (acoustic grating). Applications of ultrasonic waves: pulse echo method, SONAR – measurement of velocity of blood flow – modes of operation (A scan, B Scan & C Scan).

UNIT IV SOLID STATE PHYSICS **9 Hours**

Crystal Physics: lattice – unit cell – crystal systems – Bravais lattices – Miller indices – „d" spacing in cubic lattice – calculation of number of atoms per unit cell, atomic radius, coordination number and determination of packing density for SC, BCC, FCC and HCP structures – X-ray diffraction: Laue"s method – powder crystal method.

UNIT V QUANTUM MECHANICS **9 Hours**

Quantum Physics: development of quantum theory – de Broglie wavelength – Schrodinger"s wave equation – time dependent and time independent wave equations – physical significance. Application: particle in a box (1D) – degenerate and non-degenerate states. Electron Microscopy-SEM, TEM - principle and working – problem solving.

TOTAL: 45 HOURS

FURTHER READING:

Neutrino"s – expanding universe

COURSE OUTCOMES: Employability

On the successful completion of the course, students will be able to

CO1: Realize the concept of properties of matter and apply the same for practical applications.
CO2: Identify the suitable laser source for fiber optic communication applications.
CO3: Determine the velocity of ultrasonic waves and apply the same for day today applications.
CO4: Classify the different types of crystal structures and analyze their properties.
CO5: Comprehend the efficacy of quantum equations in modern areas.

REFERENCES:

1. D.S.Mathur, Elements of Properties of matter, 5th edition, S.Chand & Company Ltd., New Delhi,2012.
2. Charles Kittel, Introduction to Solid State Physics, 8th edition, Wiley India Pvt. Ltd., New Delhi, 2012
3. Arthur Beiser, Shobhit Mahajan and S. Rai Choudhury, Concepts of Modern Physics, 6th edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2010.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, 1st edition, Cengage Learning India Pvt. Ltd., New Delhi, 2012.
5. Halliday and Resnick, Fundamentals of Physics, John Wiley and Sons, Inc, 2011.
6. Ian Morison, Introduction to Astronomy and Cosmology, John Wiley and Sons, Ltd, 2013.
7. http://nptel.ac.in/

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1701EN101 **TECHNICAL ENGLISH** (Common to all B.E / B.Tech Degree Programmes)

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. To develop the ability to read and comprehend technical texts in the field of Engineering
2. To develop vocabulary building through the study of word construction
3. To develop ability to write formal definitions of technical terms and expression.
4. To recognize various grammatical structures that will aid the student improve his/her theoretical knowledge.

UNIT I **9 Hours**

Articles-Preposition-Subject-Verb-Object-Adjective-Adverb-Conjunction-Nouns- Usages of Have, has, had-Simple Present-Simple Past-Simple Future-Self introduction-Framing Questions

UNIT II **9 Hours**

Present Continuous-Past Continuous-Future Continuous-Describing a place, person or thing-Framing negative questions-Gerund-Listening to Articles, speeches and audios

UNIT III **9 Hours**

Present perfect-past perfect-future perfect-writing short paragraph-sentence pattern- Infinitive-Tag questions-Reading newspaper cutting

UNIT IV **9 Hours**

Present perfect continuous –Past perfect continuous-Future perfect continuous-writing an Essay in 100 words-Types of sentences-Prefix-suffix-word formation-Dialogue writing.

UNIT V **9 Hours**

Active voice-passive voice-impersonal passive voice –Synonyms and Antonyms-phrasal verbs- Punctuation-Common Errors-Letter writing.

TOTAL: 45 HOURS

FURTHER READING:

Letters from a Father to His Daughter- Jawaharlal Nehru

COURSE OUTCOMES:

Entrepreneurship

On the successful completion of the course, Students will be able to

CO1: Read and comprehend technical texts in the field of Engineering

CO2: Acquire vocabulary building and write effectively in technical writing

CO3: Write formal definitions of technical terms and expression in both verbal and written form.

CO4: Understand grammatical structures and use flawless English in the professional documents

REFERENCES:

1. Meenakshi Raman, Sangeetha Sharma, "***Technical Communication : English Skills for Engineers***" Oxford University Press: New Delhi, 2016.
2. Rizvi Ashrav.M, "***Effective Technical Communication***" Tata McGraw Hill: New Delhi, 2017
3. Herbert, A.J, "***Structure of Technical English***", London English Language Society. https://archive.org/details/in.ernet.dli.2015.136456
4. J.D. O'Connor, Better ***English Pronunciation*** Paperback, 2nd edition, 162 pages, Published September 16th 2013 by Cambridge University Press,October 23rd 1967
5. Nehru, Jawaharlal. ***Letters from a Father to His Daughter***, Puffin Books, 2004
6. ***Technical English*** by faculty of English –published by EGS Pillay press 2017

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1701CH104	APPLIED CHEMISTRY	L	T	P	C
	(Common to B.E. – ECE & EEE Programmes)	3	0	0	3

COURSE OBJECTIVES:

1. Recall the terminologies of electrochemistry and explain the function of batteries and fuel cells
2. Choose appropriate instrumentation technique for interpreting analytical data.
3. Understand the fundamentals of corrosion, its types and polymers with its applications with its electrochemical reactions

UNIT I ELECTROCHEMISTRY **9 Hours**

Cell terminology-Electrochemical cells- Electrolytic cells- Cell reactions- Daniel cell-Difference between electrolytic cells and electrochemical cells. Reversible cells and irreversible cells -types- EMF series and its applications - Nernst equation (derivation and problems).Single electrode potential - Hydrogen electrode - Calomel electrode - Glass electrode - pH measurement using glass electrode.

UNIT II CORROSION AND ITS CONTROL **9 Hours**

Corrosion - types-chemical, electrochemical corrosion (galvanic, differential aeration) - Factors influencing corrosion -corrosion control – material selection and design aspects - electrochemical protection – sacrificial anode method and impressed current cathodic method. Protective coatings: Electroplating of gold and electroless plating of nickel. Paints - Constituents and Functions.

UNIT III NONCONVENTIONAL ENERGY RESOURCES AND STORAGE DEVICES **9 Hours**

Introduction- nuclear energy- nuclear fission, nuclear fusion- nuclear chain reactions- breeder reactor- Nuclear Reactor-solar energy conversion- solar cells- wind energy. Batteries and fuel cells: Types of batteries- alkaline battery- lead storage battery nickel- cadmium battery- lithium battery- fuel cell H2 -O2 fuel cell- applications

UNIT IV POLYMER AND ITS APPLICATION **9 Hours**

Introduction: Classification of polymers – Natural and synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerization. Addition (Free Radical Mechanism) condensation and copolymerization. Fabrication of Plastics. Application –Conducting polymer.

UNIT V INSTRUMENTAL TECHNIQUES OF CHEMICAL ANALYSIS **9 Hours**

Laws of photochemistry - Grothus–Draper law, Stark–Einstein law and Lambert-Beer Law. Electromagnetic spectrum - UV-visible and IR spectroscopy – principles, instrumentation (Block diagram only) - Applications. Colorimetry- principles, instrumentation (Block diagram only) estimation of iron. Flame photometry – principles, instrumentation (Block diagram only) estimation of sodium.

TOTAL: 45 HOURS

FURTHER READING:

1. Alloys-ferrous and nonferrous alloys
2. Cambridge structural database (protein data bank)-noting data bank
3. Unique properties of nano material- introduction to quantum materials, quantum dots, supramolecular materials and molecular crystal engineering – molecular machines and devices-Logic gate using electronics material for molecular electronic.

COURSE OUTCOMES:

Employability

On the successful completion of the course, students will be able to

CO1: Construct an electrochemical cell and measure its potential
CO2: Identify the components and processes in batteries and infer the selection criteria for commercial battery systems with respect to different applications
CO3: Utilize electrochemical data to formulate an electrochemical half-cell and cell reactions for corrosion control processes
CO4: Differentiate the polymers used in day to day life based on its source, properties and applications
CO5: Identify the applications of analytical methods for the estimation of elements in aqueous media

REFERENCES:

1. Ashima Srivastava and Janhavi N N., "Concepts of Engineering Chemistry", ACME Learning Private Limited., New Delhi, 2010.
2. Ravikrishnan A., "Engineering Chemistry", Sri Krishna Hi-tech Publishing Company Pvt. Ltd. Chennai, 2016.
3. RenuBapna and Renu Gupta., "Engineering Chemistry", Macmillan India Publisher Pvt Ltd, 2010.
4. Willard Merritt and Dean Settle, Instrumental methods of analysis, CBS publishers, Seventh edition, 2012.
5. DaraS.S, Umare S.S."Engineering Chemistry", S. Chand & Company Ltd., New Delhi., 2010.
6. https://www.ccdc.cam.ac.uk/solutions/csd-system/components/csd/
7. https://link.springer.com/chapter/10.1007/978-3-642-28030-6_2
8. www.santarosa.edu/~yataiiya/4D/QuantumDotsMk2.ppt
9. onlinelibrary.wiley.com/doi/10.1002/9780470661345.smc107/pods

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10.https://en.wikipedia.org/wiki/Molecular_electronics.
11.Jain and Jain, "Engineering Chemistry", Sixteenth edition, Dhanpatrai publications, 2012.

1701GE101 **BASIC ELECTRICAL AND INSTRUMENTATION ENGINEERING** (B.E. Electronics & Communication Engineering)

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. To acquire the basic concepts of electric circuits.
2. To understand the construction and operation of various AC & DC machines and transformer.
3. To learn the behavior of measurement systems and different sensors.

UNIT I ELECTRICAL CIRCUITS AND AC MACHINES **11 Hours**

Definition of voltage, current, power & energy - Ohms law - Kirchhoff's law & its applications simple problems - Series & parallel circuits - Generation of alternating EMF, RMS value, average value, peak factor and form factor - Construction of single phase induction motor -Types – Applications - Principle and operation of three phase induction motor – Construction – Types - Equivalent circuit - Principle of alternator - Construction details – Types - Equation of induced EMF- Voltage regulation.

UNIT II DC MACHINES AND APPLICATIONS **8 Hours**

Constructional details of DC machines- Principle and operation of D.C. generator - EMF and torque equations - Characteristic of DC generators - Applications - Principle and operation of D.C. motor -Types of DC motors and their characteristics – Simple problems.

UNIT III SINGLE PHASE AND POLY-PHASE TRANSFORMERS **11 Hours**

Introduction to transformers types, core, winding, insulation, induced voltage, transformer on open circuit, ideal transformer, dot convention, equivalent circuit of practical transformer, regulation and efficiency from approximate equivalent circuit - Losses in a transformer: calculation of eddy current and hysteresis losses, open circuit and short circuit tests - Parallel operation of single phase transformers - Two and three phase transformations, transformer connection for three phase circuits using three identical transformers.

UNIT IV INSTRUMENTATION SYSTEMS **9 Hours**

Measurement systems and architecture, Errors in measurements, standards - Used in measurements - Charge amplifiers - Used with piezoelectric transducers - Integrating coulomb meter – DC and AC null measurements - DC voltage and current measurements - AC voltage and current measurements - Magnetic field and phase measurements - Measurement of force, torque and pressure.

UNIT V SENSORS AND APPLICATIONS **8 Hours**

Survey of sensor input mechanisms - Resistive sensors - Voltage generating sensors - Sensors based on variable magnetic coupling - Variable capacitance sensors - Fiber optic sensors - Ionizing radiation sensors – Electro - Chemical Sensors – Mechano - Optical sensors.

TOTAL: 45 HOURS

FURTHER READING:

1. Magnetic Circuits, Synchronous motors, Speed control of DC motor, Autotransformer.
2. Applications of various sensors and electrical apparatus to engineering industries.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1: Understand the basic concepts of electric circuits.
CO2: Explain the working of AC & DC machines and its applications.
CO3: Describe the principles of operation of Transformers
CO4: Identify the types of measurements for instrumentation systems
CO5: Select suitable sensors used for various applications

Employability

REFERENCES:

1. B.L.Theraja, A.K.Theraja," Electrical Technology" Volume-II , S.Chand & Company Ltd 2014.
2. Robert B. Northrop "Introduction To Instrumentation And Measurements" 2nd Edition, Taylor & FrancisGroup, 2005.
3. T. K. Nagsarkar and M. S. Sukhija, Basic of Electrical Engineering, Oxford Press, 2011.
4. J. A. Edminister, Electric Circuits, Schaum's Series, 4th edition, McGraw-Hill, 2003
5. Doebelin E.O. and Manik D.N., "Measurement Systems", 6th Edition, TMH Education Pvt. Ltd., 2011.
6. Renganathan, S.," Transducer Engineering", Allied Publishers, New Delhi, 2003
7. Patranabis, D., "Sensors and Transducers", 2nd Edition, Prentice Hall of India 2010.
8. http://nptel.ac.in/

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1701GEX02 **ENGINEERING GRAPHICS** **L T P C**
(Common to all B.E. / B.Tech Degree Programmes) **2 2 0 3**

COURSE OBJECTIVES:

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

CONCEPTS AND CONVENTIONS (Not for Examination) **2 Hours**

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

UNIT I PLANE CURVES AND FREE HAND SKETCHING **10 Hours**

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves, Scales: Construction of Diagonal and Vernier scales.

Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of Objects

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES **10 Hours**

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS **10 Hours**

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method and auxiliary plane method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES **10 Hours**

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS **10 Hours**

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

COMPUTER AIDED DRAFTING (Demonstration Only) **8 Hours**

Basics commands of AutoCAD- two dimensional drawing, editing, layering and dimensioning - coordinate Systems-Drawing practice - orthographic views of simple solids using AutoCAD.

FURTHER READING:

Applications of engineering graphics in students" discipline

TOTAL: 60 HOURS

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1: Perform free hand sketching of basic geometrical constructions and multiple views of objects.
CO2: Do orthographic projection of lines and plane surfaces.
CO3: Draw projections and solids and development of surfaces.
CO4: Prepare isometric and perspective sections of simple solids.
CO5: Demonstrate computer aided drafting.

Entrepreneurship

REFERENCES:

1. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore,2007.
2. Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
3. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson, 2nd Edition, 2009.
4. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.
5. Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.
6. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
7. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2010.

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PUBLICATION OF BUREAU OF INDIAN STANDARDS:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

SPECIAL POINTS APPLICABLE TO UNIVERSITY EXAMINATIONS ON ENGINEERING GRAPHICS:

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.

1701GEX03	PROGRAMMING IN C (Common to all B.E. / B.Tech Degree Programmes)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

1. To prepare students to comprehend the fundamental concepts
2. To demonstrate fine grained operations in number system
3. To gain exposure in programming language using C
4. To develop programming skills using the fundamentals and basics of C Language

UNIT I BASIC CONCEPTS **8 Hours**

Organization and Classifications of Computer- Generations of Computers- Number System- Problem Solving Techniques – Algorithm Design– Flowchart–Pseudocode

UNIT II INTRODUCTION TO C LANGUAGE **10 Hours**

Overview of C - Constants, Variables and Data Types- Compilation and Linking - Operators and Expressions- Decision Making and Branching – Looping statements

UNIT III ARRAYS AND STRINGS **9 Hours**

Arrays-One Dimensional Array- Declaration and Initialization-Two Dimensional Array-Declaration and Initialization- Programs using Arrays- Strings- String Handling Functions, Programs using Strings- Managing I/O Operations

UNIT IV FUNCTIONS & STRUCTURES **10 Hours**

Functions-Function Prototypes-Declaring, Defining and Calling Functions-Call by value and Call by Reference-Recursive Functions-Structures- Declaration and Definition -Accessing Structure Members-Arrays of Structures-Unions- Programs using Structures and Unions

UNIT V POINTERS & FILES **8 Hours**

Pointers-Dynamic Memory Allocation-Arithmetic Operations using Pointers, Files – File Manipulation-I/O Operations, Preprocessor Directives, Storage Classes

TOTAL: 45 HOURS

FURTHER READING:

Object Oriented Programming Approach.

Employability / Entrepreneurship

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1: Describe basic concepts of computers
CO2: Paraphrase the operations of number system
CO3: Describe about basic concepts of C-Language
CO4: Understand the code reusability with the help of user defined functions
CO5: Analyze the structure concept, union, file management and preprocessor in C language

REFERENCES:

1. E. Balagurusamy,"Programming in ANSI C", McGraw Hill Education India Private Limited; Seventh Edition, 2017.
2. Pradip Dey, Manas Ghosh , "Computer Fundamentals and Programming in C", Second Edition, Oxford University Press, 2013.
3. Ashok N. Kamthane, "Programming in C", Pearson Education India, 3rd Edition, 2015.
4. Yashavant P. Kanetkar, "Let Us C", BPB Publications, 15th Revised and Updated Edition, 2016.
5. http://nptel.ac.in/

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1701HS151	PHYSICS AND CHEMISTRY LABORATORY-I (Common to all B.E. / B.Tech Degree Programmes)	L 0	T 0	P 2	C 1

COURSE OBJECTIVES:

1. The Objective of this course is to make the students gain practical knowledge to co-relate with the theoretical studies
2. To achieve perfectness in experimental skills
3. To bring confidence and ability to develop and fabricate engineering and technical equipments.
4. To train the students to analyses the water sample
5. To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis

PHYSICS

LIST OF EXPERIMENTS:

1. Determine the moment of inertia of the disc and calculate the rigidity modulus of a given wire using torsion pendulum (symmetrical masses method).
2. Find the elevation of the given wooden beam at the midpoint by loading at the ends and hence calculate the Young"s modulus of the material by uniform bending
3. Determine the coefficient of viscosity of the given liquid by Poiseulle"s method.
4. From the interference fringes from the air wedge setup and calculate the thickness of the given wire.
5. By applying the principle of diffraction, determine the wavelength of given laser light and the average particle size of lycopodium powder using laser source.
6. Determine the
   (i) Wavelength of ultrasonic in a liquid medium
   (ii) Velocity of ultrasonic waves in the given liquid
   (iii) Compressibility of the given liquid using ultrasonic interferometer.

CHEMISTRY

Employability/Entrepreneurship

LIST OF EXPERIMENTS:

1. Determination of total, temporary & permanent hardness of water by EDTA method
2. Determination of strength of given hydrochloric acid using pH meter
3. Estimation of iron content of the given solution using potentiometer
4. Estimation of sodium present in water using flame photometer
5. Corrosion experiment – weight loss method
6. Determination of molecular weight of a polymer by viscometry method
7. Conductometric titration of strong acid Vs strong Base

TOTAL: 45 HOURS

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1: Realize the concept of properties of matter and apply the same for practical applications.
CO2: Identify the suitable laser source for fiber optic communication applications.
CO3: Determine the velocity of ultrasonic waves and apply the same for day today applications.
CO4: Classify the different types of crystal structures and analyze their properties.
CO5: Comprehend the efficacy of quantum equations in modern areas.
CO6: Identify the pH of the solution.
CO7: Find the iron content of the water sample using potentiometer.
CO8: Explain and demonstrate the conductance of the solution.
CO9: Interpret the hardness and metal ions present in the water.

REFERENCES:

1. D.S.Mathur, Elements of Properties of matter, 5th edition, S.Chand & Company Ltd., New Delhi,2012.
2. Charles Kittel, Introduction to Solid State Physics, 8th edition, Wiley India Pvt. Ltd., New Delhi, 2012.
3. Arthur Beiser, Shobhit Mahajan and S. Rai Choudhury, Concepts of Modern Physics, 6th edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2010.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, 1st edition, Cengage Learning India Pvt. Ltd., New Delhi, 2012.
5. Halliday and Resnick, Fundamentals of Physics, John Wiley and Sons, Inc, 2011.
6. Ian Morison, Introduction to Astronomy and Cosmology, John Wiley and Sons, Ltd, 2013.
7. Daniel R. Palleros, "Experimental organic chemistry" John Wiley & Sons, Inc., New Yor (2001).
8. Furniss B.S. Hannaford A.J, Smith P.W.G and Tatchel A.R., "Vogel"s Textbook of practical organic chemistry", LBS Singapore (1994).
9. Jeffery G.H., Bassett J., Mendham J.and Denny vogel"s R.C, "Text book of quantitative analysis chemical analysis", ELBS 5th Edn. Longman, Singapore publishers, Singapore, 1996.
10. Kolthoff I.M., Sandell E.B. et al. "Quantitative chemical analysis", Mcmillan, Madras 1980.

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1701GEX51	PROGRAMMING IN C LABORATARY (Common to all B.E. / B.Tech. Degree Programmes)	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES:

1. To prepare students to comprehend the fundamental concepts
2. To demonstrate fine grained operations in number system
3. To gain exposure in programming language using C
4. To develop programming skills using the fundamentals and basics of C Language.

LIST OF EXPERIMENTS:

1. Working with word and style sheets
2. Write a C program to implement basic concepts
3. Write a C program to implement Decision Making and Branching statements
4. Write a C program to implement looping statements
5. Write a C program to implement Arrays
6. Write a C program to implement Strings
7. Write a C program to implement pointers
8. Write a C program to implement Structures
9. Write a C program to work with files in C

TOTAL: 30 HOURS

ADDITIONAL EXPERIMENTS:

1. Write a c program to remove the occurrence of "the" word from entered string.
2. Create two files test1.txt and test2.txt and write a C program to read the file text1.txt character by character on the screen and paste it at the end of test2.txt

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

Employability / Entrepreneurship

CO1: Understand basic concepts of computers
CO2: Implement basic concepts of c-language
CO3: Implement arrays, strings and pointers.
CO4: Implement the basics of structures, unions, file management and preprocessor in C language

REFERENCES:

1. E. Balagurusamy,"Programming in ANSI C", McGraw Hill Education India Private Limited; Seventh Edition, 2017.
2. Pradip Dey, Manas Ghosh , "Computer Fundamentals and Programming in C", Second Edition, Oxford University Press, 2013.
3. Ashok N. Kamthane, "Programming in C", Pearson Education India, 3rd Edition, 2015.
4. Yashavant P. Kanetkar, "Let Us C", BPB Publications, 15th Revised and Updated Edition, 2016.
5. http://nptel.ac.in/

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E.G.S. PILLAY ENGINEERING COLLEGE

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Accredited by NAAC with „A" Grade | Accredited by NBA (CSE, EEE, MECH)

NAGAPATTINAM – 611 002

B.E. Electronics and Communication Engineering

Full Time Curriculum and Syllabus

First Year – Second Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1701MA201	Engineering Mathematics II	3	2	0	4	40	60	100
1701PH202	Semiconductor Physics and Devices	3	0	0	3	40	60	100
1701CH201	Environmental Studies	3	0	0	3	40	60	100
1701GE201	Basic Civil and Mechanical Engineering	3	0	0	3	40	60	100
1701EC201	Circuit Theory	3	2	0	4	40	60	100
	Language Elective	3	0	0	3	100	-	100
Laboratory Course								
1701GEX52	Communication Skills Lab	0	0	2	1	50	50	100
1701GEX53	Workshop Practice	0	0	2	1	50	50	100
1701HS251	Physics and Chemistry Laboratory - II	0	0	2	1	50	50	100

L – Lecture | T – Tutorial | P – Practical | C – Credit | CA – Continuous Assessment | ES – End Semester

1701MA201 **ENGINEERING MATHEMATICS II** (Common to all B.E / B.Tech Degree Programmes)

L	T	P	C
3	2	0	4

COURSE OBJECTIVES:

1. To develop an understanding of the standard techniques of Complex variable theory to apply in areas such as heat conduction, elasticity, fluid Dynamics and flow of electric current
2. To train the students with the concepts of Vector calculus needed for problems in all Engineering Disciplines
3. To make the Students apply Laplace Transform to create a new domain in which it is easier to handle the problem that is being investigated

UNIT I ANALYTIC FUNCTIONS **9 Hours**

Analytic functions – Cauchy Riemann Equations – Properties – Determination of Analytic function using Milne Thomson"s method, Conformal Mappings – Mappings of w= z + a, az, 1/z – Bilinear Transformation – Application of Analytic Functions.

UNIT II COMPLEX INTEGRATION **9 Hours**

Cauchy"s fundamental theorem (statement only) – Application of Cauchy"s Integral formula – Laurent"s series – Classification of singularities – Cauchy"s Residue theorem (statement only) – Contour integration.

UNIT III MULTIPLE INTEGRAL **9 Hours**

Double integration – Cartesian and polar coordinates – Change the order of Integration – Applications: Area of a curved surface using double integral – Triple integration in Cartesian co-ordinates – Volume as triple integral.

UNIT IV VECTOR CALCULUS **9 Hours**

Gradient, Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration: Green"s theorem in a plane, Gauss divergence theorem and Stokes" theorem (excluding proofs) – Applications of the above theorems to find surface area of a closed region and volume of cube and parallel piped.

UNIT V LAPLACE TRANSFORM **9 Hours**

Laplace Transform – Conditions for existence – Transform of Elementary Functions – Basic Properties – Transform of Unit step function and Impulse function – Transform of Periodic function – Inverse Laplace Transform – Convolution Theorem (excluding Proof) – Initial and Final value Theorems – Solution of Linear ODE of Second order with constant coefficient using Laplace Transform techniques.

TOTAL: 45 + 15 HOURS

FURTHER READING:

1. Volume of Cylindrical and spherical polar co ordinates.
2. Application of Integral theorems in finding Volume/Area of Hemispheres, cylinders etc.

COURSE OUTCOMES:

On the Successful completion of the course, Students will be able to

CO1: Construct Analytic functions and trace the image of a region using transformation.
CO2: Solve complex integrals.
CO3: Apply multiple integral technique to find area and volume.
CO4: Compute surface and volume integral in vector field.
CO5: Apply Laplace Transform in solving Boundary value problems of second order ODE.

Employability

REFERENCES:

1. Veerarajan R., "Engineering Mathematics", updated second edition for Semester I and II, 2017.
2. Grewal. B.S, "Higher Engineering Mathematics", 44th Edition, Khanna Publications, Delhi, 2014.
3. Bali N. P and Manish Goyal, "Text book of Engineering Mathematics", Sixth edition, Laxmi Publications Pvt. Ltd., 2014.
4. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2012.
5. P.Kandasamy, K. Gunavathy and K. Thilagavathy, Engineering Mathematics, Volume II, S. Chand & Co., New Delhi, 2009.
6. Ramana B.V. "Higher Engineering Mathematics", Tata McGraw Hill Publishing, New Delhi, 2007.
7. Veerarajan R., "Engineering Mathematics", fifth Edition, Tata Mc Graw Hill Publishing Company, New Delhi, 2006.
8. M K Venkataraman, Engineering mathematics, Volume I, 2nd ed., National Publishing Co. 2003.
9. nptel.ac.in/courses/111105035, www.nptelvideos.in/2012/11/Mathematics.html
10. www.learnerstv.com/Free-maths-video lectures - ltv048-Page048

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1701PH202	SEMICONDUCTOR PHYSICS AND DEVICES (Common to B.E. - ECE & EEE Programmes)	L 3	T 0	P 0	C 3

COURSE OBJECTIVES:

1. To explain the properties of conducting, semiconducting and dielectric materials
2. To understand the working mechanism of junction diodes
3. To impart knowledge in optical and magnetic materials

UNIT I QUANTUM THEORY OF SOLIDS **9 Hours**

Emission of electron: types of thermionic emission – principle – Richardson equation – secondary emission – principle – work function – Fermi-Dirac distribution function and its temperature dependence significance of Fermi energy – density of energy states – calculation of density of electrons and Fermi energy at 0K – average energy of electrons at 0K – Problem solving.

UNIT II SEMICONDUCTOR PHYSICS **9 Hours**

Intrinsic semiconductors: the law of mass action – expression for density of electrons and holes – determine of carrier concentration – band gab energy. Extrinsic semiconductors: carrier concentration in p-type and n-type semiconductors. Hall Effect: theory – experimental determination of Hall voltage – applications – Problem solving.

UNIT III JUNCTION DIODE CHARACTERISTICS **9 Hours**

Introduction – pn junction diode – volt-ampere characteristics – diode current equation – static and dynamic resistances – space charge – diffusion capacitance – junction diode switching times. Diode circuit with DC voltage source. Applications: full wave rectifier – capacitor filters – clamper circuits.

UNIT IV DIELECTRICS **9 Hours**

Introduction: fundamental definitions in dielectrics – expressions for electronic and ionic polarizations – orientation polarization (qualitative) – space charge polarization – Langevin Debye equation – frequency and temperature effects on polarization – expression for internal field (cubic structure) – Clausius – Mosotti equation – dielectric loss-applications of dielectrics – problem solving.

UNIT V MAGNETIC MATERIALS **9 Hours**

Magnetic materials: basic definitions – properties of Dia, Para and Ferro magnetic materials – explanation of hysteresis curve based on domain theory – hard and soft magnetic materials, Ferrites , Spinels – applications. Magnetic storage device: principle – working – giant magneto resistance.

TOTAL: 45 HOURS

FURTHER READING:

1. Motion of an electron in uniform and non-uniform magnetic fields-electric and magnetic fields in a crossed configuration.

COURSE OUTCOMES: Employability | Entrepreneurship

On the Successful completion of the course, Students will be able to

CO1: Identify different types of emission of electrons and significance of Fermi function
CO2: Explore the carrier concentration and its variation with temperature of different semiconducting materials
CO3: Analyze the I-V characteristics of a junction diode
CO4: Investigate the various polarization mechanisms in dielectrics
CO5: Select appropriate optical and magnetic materials for data storage devices

REFERENCES:

1. Jacob Millman, Christos C Halkias and Satyabrata Jit, "Electronic Devices and Circuits", McGraw Hill Education (India) Private Limited, New Delhi, 2014.
2. Willam D.Callister, "Materials Science and Engineering an Introduction", John Wiley and Sons, Inc., 2010.
3. Halliday and Resnick, "Fundamentals of Physics", John Wiley and Sons, Inc., 2011.
4. R.S.Sedha, "A textbook of Applied Electronics", S.Chand & Company Ltd., New Delhi, 2010.
5. S.O.Pillai, "Solid State Physics", New Age International Publications, New Delhi, 2010.
6. M.N.Avadhanu and P.G.Kshirsagar, "A Text Book of Engineering Physics", S.Chand & Company Ltd., New Delhi, 2011.

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1701CH201 **ENVIRONMENTAL STUDIES** **L T P C**

(Common to all B.E. / B.Tech Degree Programmes) **3 0 0 3**

COURSE OBJECTIVES:

1. Realize the interdisciplinary and holistic nature of the environment.
2. Understand how natural resources and environment affect the quality of life and stimulate the quest for sustainable development.
3. Recognize the socio-economic, political and ethical issues in environmental science.

UNIT I ECOSYSTEMS AND BIODIVERSITY **10 Hours**

Concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – Oxygen cycle and Nitrogen cycle – energy flow in the ecosystem – ecological succession processes – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – hot – spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man – wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Documentation of the medicinal plants in your native place.

UNIT II NATURAL RESOURCES **10 Hours**

Forest resources: Use and over – exploitation, deforestation, case studies – timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and overutilization of surface and ground water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer – pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources. Energy Conversion processes – Biogas – production and uses, anaerobic digestion; case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Documentation of the effect of modern Agriculture in your nearby Village.

UNIT III ENVIRONMENTAL POLLUTION **9 Hours**

Definition – Source, causes, effects and control measures of: (a) Air pollution – Mitigation procedures – Control of particulate and gaseous emission, Control of SO_X, NO_X, CO and HC) – Technology for capturing CO_2 (metallo- organic frame works) (b) Water pollution – Waste water treatment processes. (c) Soil pollution – soil waste management: causes, effects and control measures of municipal solid wastes – (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – role of an individual in prevention of pollution – pollution case studies. Documentation study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT **8 Hours**

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – environmental ethics: Issues and possible solutions – 12 Principles of green chemistry – consumerism and waste products – environment protection act – Air act – Water act – Wildlife protection act – Forest conservation act – The Biomedical Waste (Management and Handling) Rules; 1998 and amendments – scheme of labeling of environmentally friendly products (Ecomark) central and state pollution control boards – disaster management: floods, earthquake – Public awareness. Analyze the recent steps taken by government of India to prevent pollution (Green India and Clean India).

UNIT V HUMAN POPULATION AND THE ENVIRONMENT **8 Hours**

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – Environmental impact analysis (EIA) – GIS – remote sensing – role of information technology in environment and human health – Case studies. Documentation study of the Human health and the environment in nearby Hospital (Statistical report).

TOTAL: 45 HOURS

FURTHER READING:

Human rights: E – waste and biomedical waste – Identification of adulterants in food materials

COURSE OUTCOMES: Skill Development

On the Successful completion of the course, Students will be able to

CO1: Describe the importance of ecosystem and its conservation.
CO2: Differentiate various natural resources and the urgent need to conserve the natural resources.
CO3: Explain the different types of pollution and its effects.
CO4: Describe the various environmental protection acts.
CO5: Explain the major diseases, women, child development and the impacts of population explosion.

REFERENCES:

1. Trivedi. R.K., "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media, 3rd edition, BPB publications, 2010.
2. Cunningham, W.P.Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico Publishing House, Mumbai, 2001.
3. Dharmendra S. Sengar, "Environmental law", Prentice hall of India PVT LTD, New Delhi, 2007.
4. Rajagopalan. R, "Environmental Studies-From Crisis to Cure", Oxford University Press, 2005.
5. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2006.
6. https://en.wikipedia.org/wiki/Carbon_capture_and_storage
7. Ravikrishnan. A., "Environmental Science and Engineering", Sri Krishna Hi-tech Publishing Company Pvt. Ltd.

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1701GE201	BASIC CIVIL AND MECHANICAL ENGINEERING (Common to B.E. / B.Tech. – CSE, ECE & IT)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

1. To impart basic knowledge on Civil and Mechanical Engineering.
2. To explain the materials used for the construction of civilized structures.
3. To understand the fundamentals of construction of structure.
4. To explain the component of power plant units and detailed explanation to IC engines their working principles.
5. To explain the R & AC system.

A – CIVIL ENGINEERING

UNIT I SURVEYING AND CIVIL ENGINEERING MATERIALS **9 Hours**

Surveying: Objects – types – classification – principles.

Civil Engineering Materials: Bricks – stones – sand – cement – concrete – steel sections

UNIT II BUILDING COMPONENTS AND STRUCTURES **9 Hours**

Foundations: Types, Bearing capacity – Requirement of good foundations.

Superstructure: Brick masonry – stone masonry – beams – columns – lintels – roofing – flooring –plastering – Mechanics – Internal and external forces – stress – strain – elasticity.

B – MECHANICAL ENGINEERING

UNIT III POWER PLANT ENGINEERING AND PUMPS **9 Hours**

Introduction – Classification of Power Plants – Working principle of steam, Gas, Diesel, Hydro-electric and Nuclear Power plants – Merits and Demerits – Pumps and turbines – working principle of Reciprocating pumps (single acting and double acting) – Centrifugal Pump.

UNIT IV IC ENGINES **9 Hours**

Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Boiler as a power plant.

UNIT V REFRIGERATION AND AIR CONDITIONING SYSTEM **9 Hours**

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

TOTAL: 45 HOURS

FURTHER READING:

1. Mechanics of solids.
2. Structural Design.
3. Thermal Engineering, Fluid mechanics, Heat and mass transfer.

COURSE OUTCOMES: Skill Development

On the successful completion of the course, students will be able to

CO1: Explain the survey and usage of construction material and proper selection of construction materials.
CO2: Know about the building structures.
CO3: Identify the components of power plant.
CO4: Demonstrate working principles of petrol and diesel engine.
CO5: Explain the components of refrigeration and air conditioning.

REFERENCES:

1. Ramamrutham S., "Basic Civil Engineering", Dhanpat Rai Publishing Co. (P) Ltd., New Delhi, 1999.
2. Seetharaman S., "Basic Civil Engineering", Anuradha Agencies, 2005.
3. Venugopal K. and Prahu Raja V., "Basic Mechanical Engineering", Anuradha Publishers, Kumbakonam, 2000.
4. Shantha Kumar S R J., "Basic Mechanical Engineering", Hi-tech Publications, Mayiladuthurai, 2000.
5. ,Shanmugam G and Palanichamy M S, "Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Co., New Delhi, 1996.

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1701EC201	CIRCUIT THEORY	L	T	P	C
	(B.E. Electronics & Communication Engineering)	3	2	0	4

COURSE OBJECTIVES:

1. To study the basic laws on circuits and calculate the voltage and current in it using basic theorems.
2. To apply the concept of transients and resonance in series and parallel circuit.
3. To explore graph theory techniques applied to network topologies.

UNIT I BASICS OF CIRCUIT ANALYSIS **9 Hours**

Basic components and electric circuits, voltage and current laws, Basic mesh and nodal analysis, source transformation techniques, Star delta transformation techniques, Phase relationship for R, L and C. Impedance, Admittance for R, L and C elements.

UNIT II NETWORK TOPOLOGIES **9 Hours**

Concept of Duality, Dual network, Graphs of a network, Trees, twig, link and branches, Incidence matrix, Tie-set matrix formation and cut-set matrix formation of a graph.

UNIT III NETWORK THEOREMS AND APPLICATIONS **9 Hours**

Linearity – Thevenin's theorem – Norton's theorem – Super position theorem – Maximum power transfer theorem – Reciprocity theorem – Compensation theorem – Tellegen's theorem – Millman's theorem.

UNIT IV TRANSIENTS **9 Hours**

Differential equations – Laplace Transform – teady state and transient response: DC response of RL, RC and RLC circuit – Sinusoidal response of RL, RC and RLC circuits.

UNIT V RESONANCE AND COUPLED CIRCUITS **9 Hours**

Resonance: Natural frequency and Damping Ratio – Series Resonance – Parallel Resonance – Quality Factor. Coupled Circuits: Self – inductance – Mutual inductance, Dot conversion – Coupling Coefficient – Ideal Transformer – Tuned Coupled Circuits.

TOTAL: 45 + 15 HOURS

FURTHER READING:

Simulation of Circuits and Evaluation of its parameters – Basic Concepts and Definitions, Analysis of Simple Circuits, Nodal and Mesh Equations – Circuit Theorems, Natural Response, Forced and Total Response in RL and RC Circuits.

COURSE OUTCOMES:

On the Successful completion of the course, Students will be able to

CO1: Evaluate the voltage, current and power for ac and dc electric circuit using basic laws.
CO2: Evaluate the voltage, current of electric circuit using Graph theory techniques.
CO3: Design simple network for the complex network by exploring circuit theorems.
CO4: Design and test the dc and ac transient circuits using test signals.
CO5: Design and test circuit for a desired cut off frequency using resonant and coupled circuits.

Employability

Employability

Employability

REFERENCES:

1. William Hayt, JV Jack, E Kemmerly and Steven M Durbin, "Engineering Circuits Analysis", Tata McGraw-Hill, 2013.
2. Joseph Edminister and Mahmood Nahri, "Theory and Problems of Electric Circuits", Tata McGraw-Hill, 2008.
3. A Sudhakar, S Shyammohan and Palli, "Circuits and Network (Analysis and synthesis)", Tata McGraw-Hill, 2010.
4. L Robert Boylested, "Experiments in Circuit Analysis to Accompany Introductory Circuit Analysis", PHI, 2002.
5. M .Russell, Mersereau and Joel R. Jackson, "Circuit Analysis - A System Approach", Pearson Education, 2009.
6. Steven T. Karris, "Circuit Analysis I with MATLAB Applications", Orchard Publications, 2004.

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1701GEX52	COMMUNICATION SKILLS LAB (Common to all B.E. / B.Tech Degree Programmes)	L 0	T 0	P 2	C 1

COURSE OBJECTIVES:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

1. To improve the students" fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts
2. Further, they would be required to communicate their ideas relevantly and coherently in writing.
3. To prepare all the students for their placements.

Skill Development

LIST OF EXPERIMENTS: The following course content to conduct the activities is prescribed for the Communication Skills Lab:

1. **Activities on Fundamentals of Inter-personal Communication and Building Vocabulary** - Starting a conversation - responding appropriately and relevantly - using the right body language - Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.
2. **Activities on Reading Comprehension** - General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective googling.
3. **Activities on Writing Skills** - Structure and presentation of different types of writing - letter writing/ Resume writing/ e-correspondence/ Technical report writing/ Portfolio writing - planning for writing - improving one's writing.
4. **Activities on Presentation Skills** - Oral presentations (individual and group) through JAM sessions / seminars / PPTs and written presentations through posters/ projects/ reports/ e-mails/ assignments etc.
5. **Activities on Group Discussion and Interview Skills** - Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conferencing and Mock Interviews.

TOTAL: 30 HOURS

ADDITIONAL EXPERIMENTS:

Phonetics

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1: Accomplishment of sound vocabulary and its proper use contextually.
CO2: Flair in Writing and felicity in written expression
CO3: Enhanced job prospects.
CO4: Effective Speaking Abilities.

REFERENCES:

1. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009
2. Advanced Communication Skills Laboratory Manual by Sudha Rani, D, Pearson Education 2011.
3. Technical Communication by Paul V. Anderson, 2007. Cengage Learning pvt. Ltd. New Delhi
4. English Vocabulary in Use series, Cambridge University Press 2008.
5. Management Shapers Series by Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
6. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw Hill 2009.
7. Books on TOFEL/ GRE/ GMAT/ CAT/ IELTS by Barron's/ DELTA/ Cambridge University Press.

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1701GEX53	**WORKSHOP PRACTICE**	**L**	**T**	**P**	**C**
	(Common to all B.E. / B.Tech Degree Programmes)	**0**	**0**	**2**	**1**

COURSE OBJECTIVES:

1. To provide hands on training for fabrication of components using sheet metal and welding equipment / tools.
2. To develop skill for using carpentry and fitting tools to make simple components and metal joints.
3. To provide hands on training for preparing the green sand mould using foundry tools.
4. To provide training for making simple house hold electrical & pipe line connections using suitable tools.
5. To develop the skill to make / operate/utilize the simple engineering components.

LIST OF EXPERIMENTS

1. Forming of simple object in sheet metal using suitable tools (Example: Dust Pan / Soap Box) (or) making simple object using Metal Spinning Machine. (Example: Aluminum Cup). **4 Hours**
2. Prepare V (or) Half round (or) Square (or) Dovetail joint from the given mild Steel flat. **4 Hours**
3. Fabrication of a simple component using thin and thick plates. (Example: Book rack) **2 Hours**
4. Making a simple component using carpentry power tools. (Example: Electrical switch Box/Tool box/ Letter box. **2 Hours**
5. Construct a household pipe line connections using pipes, Tee joint, Four way joint, elbow, union, bend, Gate way and Taps (or) Construct a pipe connections of house application centrifugal pump using pipes, bend, gate valve, flanges and foot valve. **4 Hours**
6. Prepare a green sand mould using solid pattern/split pattern. **4 Hours**
7. Study of gas welding equipment and its demonstration **2 Hours**
8. Soldering Practice for simple printed circuit board. **4 Hours**
9. Construct a domestic electrical wire connections using indicator, one way switch with calling bell, two way switch with lamp, one way switch with fan regulator and one way switch with socket. **4 Hours**

TOTAL: 30 HOURS

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1: Fabricate simple components using sheet metal & welding equipment/tools.
CO2: Make simple components / joints using carpentry and fitting tools.
CO3: Prepare green sand mould using suitable tools.
CO4: Make simple house hold electrical & pipe line connections using suitable tools.
CO5: Make / operate / utilize the simple engineering components.

1701HS251	PHYSICS AND CHEMISTRY LABORATORY-II (Common to all B.E. / B.Tech Degree Programmes)	L 0	T 0	P 2	C 1

COURSE OBJECTIVES:

1. The Objective of this course is to make the students gain practical knowledge to co-relate with the theoretical studies.
2. To achieve perfectness in experimental skills.
3. To bring confidence and ability to develop and fabricate engineering and technical equipments.
4. To make the student acquire practical skills in the wet chemical and instrumental methods for quantitative estimation of hardness, alkalinity, metal ion content, corrosion in metals and cement analysis.

PHYSICS

LIST OF EXPERIMENTS:

1. Using lees disc apparatus, determine the coefficient of thermal conductivity of a bad conductor.
2. Find the band gap value of the given semiconductor diode. Based on the band gap value, identify the given semiconductor.
3. With the aid of spectrometer, find the angle of Prism and refractive index of the medium.
4. Determine the wavelengths of polychromatic source in the visible region using spectrometer grating.
5. Find the depression at the midpoint of the given wooden beam subjected to non-uniform bending and determines the Young"s modulus of the material of the beam.
6. Find the given unknown resistance using Carey-Foster's Bridge.

CHEMISTRY

LIST OF EXPERIMENTS:

1. Conductometric Precipitation titration of $BaCl_2$ Vs Na_2SO_4
2. Estimation of dissolved oxygen in a water sample/sewage by Winklers method.
3. Estimation of chloride content in water by argentometric method.
4. Conductometric titration of mixture of acids.
5. Comparison of alkalinities of the given water samples.

Employability

Enterpreneurship

Additional Experiments:

1. Estimation of heavy metals in the given solution by EDTA method.
2. Determination of concentration of unknown colored solution using spectrophotometer.

TOTAL: 30 HOURS

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1 : Realize the concept of properties of matter and apply the same for practical applications.
CO2 : Identify the suitable laser source for fiber optic communication applications.
CO3 : Determine the velocity of ultrasonic waves and apply the same for day today applications.
CO4 : Classify the different types of crystal structures and analyze their properties.
CO5 : Comprehend the efficacy of quantum equations in modern areas.
CO6 : Illustrate the EMF of the Redox reaction.
CO7 : Compare the Alkalinity of given water Sample with their standards.
CO8 : Identify the Concentration of metal ion present in water sample.
CO9 : Outline the precipitation titration using Conductivity meter.
CO10: Interpret the dissolved oxygen present in the water.

REFERENCES:

1. D.S.Mathur, Elements of Properties of matter, 5th edition, S.Chand & Company Ltd., New Delhi,2012.
2. Charles Kittel, Introduction to Solid State Physics, 8th edition, Wiley India Pvt. Ltd., New Delhi, 2012.
3. Arthur Beiser, Shobhit Mahajan and S. Rai Choudhury, Concepts of Modern Physics, 6th edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2010.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, 1st edition, Cengage Learning India Pvt. Ltd., New Delhi, 2012.
5. Halliday and Resnick, Fundamentals of Physics, John Wiley and Sons, Inc, 2011.
6. Ian Morison, Introduction to Astronomy and Cosmology, John Wiley and Sons, Ltd, 2013.
7. Laboratory Manual on Engineering Chemistry, S.K. Bhasin, S. Rani, Dhanpat Rai Publishing Company, New Delhi, 2011.
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10. Jeffery G.H., Bassett J., Mendham J.and Denny vogel's R.C. "Text book of quantitative analysis chemical analysis", ELBS 5th Edn. Longman, Singapore Publishers, Singapore, 1996.
11. Kolthoff I.M., Sandell E.B. et al. "Quantitative chemical analysis", Mcmillan, Madras 1980.

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E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi|Affiliated to Anna University, Chennai Accredited by NAAC with „A" Grade|Accredited by NBA (CSE, EEE, MECH)

NAGAPATTINAM–611002

B.E.Electronics and CommunicationEngineering

Full Time Curriculum and Syllabus

Second Year– Third Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1701MA301	Linear Algebra and Partial Differential Equations	3	2	0	4	40	60	100
1702CS304	Data Structures and C++	3	0	0	3	40	60	100
1702EC301	Network Analysis and Synthesis	3	2	0	4	40	60	100
1702EC302	Engineering Electromagnetics	3	0	0	3	40	60	100
1702EC303	Digital Circuits and Systems	3	0	0	3	40	60	100
1702EC304	Electronics Circuits	3	0	0	3	40	60	100
Laboratory Course								
1702EC351	Digital Electronics Laboratory	0	0	4	2	50	50	100
1702EC352	Electronic Circuits Laboratory	0	0	4	2	50	50	100
1702CS351	Data Structures Laboratory	0	0	2	1	50	50	100
1704GE351	Life Skills: Business English	0	0	2	-	100	-	100
	Total	**18**	**4**	**8**	**25**	**500**	**500**	**1000**

L–Lecture |T–Tutorial |P–Practical |C–Credit |CA –Continuous Assessment | ES–End Semester

1701MA301	ENGINEERING MATHEMATICS III	L	T	P	C
		3	2	0	4
	(Common to B.E / B.Tech-All branches)				

Course Objectives:

1. To introduce Fourier series analysis and applications in Engineering, apart from its use in solving boundary value problems.
2. To acquaint the student with Fourier transform techniques used in wide variety of situations.
3. To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

Unit I PARTIAL DIFFERENTIAL EQUATIONS **9+3Hours**

Formation of partial differential equations – Singular integrals — Solutions of standard types of first order partial differential equations – Lagrange's linear equation — Linear partial differential equations of second order with constant coefficients of homogeneous type.

Unit II FOURIER SERIES **9+3 Hours**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval's identity – Harmonic analysis.

Unit III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS **9+3 Hours**

Classification of PDE – Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction.

Unit IV FOURIER TRANSFORMS **9+3 Hours**

Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity

Unit V Z – TRANSFORMS AND DIFFERENCE EQUATIONS **9+3 Hours**

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

Total: 45 + 15 Hours

Further Reading:

1. Linear partial differential equations of higher order
2. Solution of non-homogeneous partial differential equations

Course Outcomes:

Employability

After completion of the course, Student will be able to

1. Compute the solution of partial differential equations (K2)
2. Use Fourier series analysis which is central to many applications in engineering (K2)
3. Solve boundary value problem using partial differential equation.(K3)
4. Apply Fourier transform techniques used in wide variety of situations.(K3)
5. Apply Z transform techniques for discrete time systems. (K3)

References:

1. Veerarajan. T., "Transforms and Partial Differential Equations", Second reprint, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2012.
2. Grewal. B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, Delhi, 2012.
3. Narayanan.S., ManicavachagomPillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students" Vol. II & III, S.Viswanathan Publishers Pvt Ltd. 1998.
4. Bali.N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 7th Edition, Laxmi Publications Pvt Ltd , 2007.
5. Ramana.B.V., "Higher Engineering Mathematics", Tata Mc-GrawHill Publishing Company Limited, New Delhi, 2008.
6. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007.
7. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, Wiley India, 2007.
8. Ray Wylie. C and Barrett.L.C, "Advanced Engineering Mathematics" Tata Mc Graw Hill Education Pvt Ltd, Sixth Edition, New Delhi, 2012.
9. nptel.ac.in/courses/111105035, www.nptelvideos.in/2012/11/Mathematics.html
10. www.learnerstv.com/Free-maths-video lectures - ltv348-page1.html

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1702CS304	Data Structures and C++	L	T	P	C
		3	0	0	3
	(Common to B.E / B.Tech-All branches)				

Course Objectives:

1. To comprehend the fundamentals of object oriented programming, particularly in C++.
2. To use object oriented programming to implement data structures.
3. To introduce linear, non-linear data structures and their applications.

Unit I **DATA ABSTRACTION & OVERLOADING** **9Hours**

Overview of C++ – Structures – Class Scope and Accessing Class Members – Reference Variables – Initialization – Constructors – Destructors – Member Functions and Classes – Friend Function – Dynamic Memory Allocation – Static Class Members – Container Classes and Integrators – Proxy Classes – Overloading: Function overloading and Operator Overloading.

Unit II **INHERITANCE & POLYMORPHISM** **9Hours**

Base Classes and Derived Classes – Protected Members – Casting Class pointers and Member Functions – Overriding – Public, Protected and Private Inheritance – Constructors and Destructors in derived Classes – Implicit Derived – Class Object To Base – Class Object Conversion – Composition Vs. Inheritance – Virtual functions – This Pointer – Abstract Base Classes and Concrete Classes – Virtual Destructors – Dynamic Binding.

Unit III **LINEAR DATA STRUCTURES** **9 Hours**

Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation — singly linked lists –Polynomial Manipulation - Stack ADT – Queue ADT - Evaluating arithmetic expressions

Unit IV **NON-LINEAR DATA STRUCTURES** **9 Hours**

Trees – Binary Tree-Binary search trees -Tree traversal -Expression manipulation -Symbol table construction - AVL trees: Rotation, Insertion, Deletion,–Red black tree – Graph and its representations – Graph Traversals – Representation of Graphs – Breadth-first search – Depth-first search - Connected components.

Unit V **SORTING and SEARCHING** **9 Hours**

Sorting Techniques-Selection, Bubble, Insertion, Merge, Heap, Quick, and Radix sort -Address calculation - Linear search -Binary search -Hash table methods.

Total: **45 Hours**

Further Reading:

B-Trees, Splay trees

Floyd - Warshall algorithm.

Entrepreneurship / Employability

Course Outcomes:

After completion of the course, Student will be able to

1. Identify the model of Abstract Data Type, calculation of algorithm efficiency and designing ofrecursive algorithms.
2. Design algorithms to solve real life problems using data structures.
3. Analyze various sorting and searching algorithms.
4. Recognize the usage of Non-Linear Data structures such as Binary Search tree, AVL search treeand Heap tree in applications.
5. Solve real life problems using minimum spanning tree and shortest path algorithms.

References:

1. Deitel and Deitel, "C++, How To Program", Seventh Edition, Pearson Education, 2013.
2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Fourth Edition, Addison-Wesley, 2013.
3. Bhushan Trivedi, "Programming with ANSI C++, A Step-By-Step approach", Oxford University Press, 2010.
4. Goodrich, Michael T., Roberto Tamassia, David Mount, "Data Structures and Algorithms in C++", 7th Edition, Wiley. 2016.
5. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Third Edition, Mc Graw Hill, 2009.
6. Bjarne Stroustrup, "The C++ Programming Language", 3rd Edition, Pearson Education, 2007.
7. Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, "Fundamentals of Data Structures in C++", Galgotia Publications, 2007.

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1702EC301	Network Analysis and Synthesis	L	T	P	C
		3	1	0	4

Course Objectives:

1: Apply the knowledge of basic circuital law and simplify the network using reduction techniques

2: Analyze the circuit using Kirchhoff's law and Network simplification theorems

3: Infer and evaluate transient response, Steady state response, network functions

4: Obtain the maximum power transfer to the load , and Analyze the series resonant and parallel resonant circuit

5: Evaluate two-port network parameters , design attenuators and equalizer

Unit I **INTRODUCTION TO GRAPH THEORY** **9+3 Hours**

Linear Graphs in Electrical Networks, Basic Definitions, Incidence, Loop and cut-set matrices, Fundamental Loop and Fundamental Cut-Set Matrices, Graph Theoretic version of KCL and KVL, Loop Impedance and Node Admittance Matrices, Duality in Electrical Networks

Unit II **TWO PORT NETWORK** **9+3 Hours**

Network functions - Poles and Zeros of network functions - Complex frequency - Two port parameters Z,Y,H and ABCD - Scaling network functions -T and π equivalent circuits - Bridged networks - Analysis of ladder and lattice networks - Coupled circuits as two port network - Tuned circuits

Unit III **TRANSIENT RESPONSE OF RLC CIRCUITS** **9+3 Hours**

Transient response of RL,RC,RLC, circuit for DC input and AC input with sinusoidal excitation.

Unit IV **TRANSFER FUNCTION SYNTHESIS** **9+3 Hours**

Properties of LC,RL,RC driving point functions, Synthesis of driving point LC,RC and RL functions - Foster and Cauer forms- Synthesis of transfer admittance, transfer impedance with a one ohm termination - Synthesis of constant-resistance network.

Unit V **DESIGN OF FILTER** **9+3 Hours**

Design of filters -Low pass filters, high pass filters, band pass filters, band reject filters, Butterworth filters, m-derived filters, constant k-filters

Total: 45+15 Hours

Further Reading:

Interrelationships between the parameters, Lattice networks - Image parameters, Stability of active networks, Simulation of general and ladder network , Simulation of RL, RC, LC network , Simulation offilters design, Simulation of Attenuators & Equalizers.

Course Outcomes:

After completion of the course, Student will be able to

Employability / Entrepreneurship

1. Analyze the electric circuit using network theorems
2. Understand and Obtain Transient & Forced response
3. Determine Sinusoidal steady state response; understand the real time applications of maximum power transfer theorem and equalizer
4. Understand the two–port network parameters, are able to find out two-port network parameters &DC response for interconnection of two-port networks and RLC circuits.
5. Synthesize of Initial and final value theorem, Heaviside's expansion theorem.

References:

1. Franklin F.Kuo, "Network Analysis and Synthesis (5th Edition ,2012)" Wiley International;2010

2. Andreas Antoniou," Digital filters (Analysis, Design and Application)", McGraw-Hill; 2nd edition (May 15, 2000)

3. M.E.Van Valkenberg, "Introduction to Modern Network Synthesis", Wiley Eastern.

4. Umesh Sinha "Network Analysis and Synthesis"Satya Prakashan Publishers , 4th Edition 2013

5. David A Bell,"Electric Circuits Oxford Press, ", (7thEdition, 2011).

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1702EC302	ENGINEERING ELECTROMAGNETICS	L	T	P	C
		3	0	0	3

Course Objectives:

1. To impart knowledgeonthebasicsofstaticelectricandmagneticfieldandtheassociated laws.
2. To give insight into the propagation of EM waves and also to introduce the methods in computational electromagnetic.
3. To analyze the time varying fields.

Unit I STATIC ELECTRIC FIELDS **9 Hours**

Co-ordinate system – Rectangular – Cylindrical and spherical co-ordinate system – Line – Surface and volume integrals – Definition of curl – Divergence and gradient – Meaning of stokes theorem and divergence theorem – Coulomb's law in vector form – Definition of electric field intensity – Principle of superposition – Electric field due to discrete charges – Electric field due to continuous charge distribution – Electric field due to charges distributed uniformly on an infinite and finite line – Electric field on the axis of a uniformly charged circular disc – Electric field due to an infinite uniformly charged sheet – Electric scalar potential – Relationship between potential and electric field – Potential due to infinite uniformly charged line – Potential due to electrical dipole – Electric flux Density – Gauss law – Proof of gauss law – Applications.

UNIT II STATIC MAGNETIC FIELDS **9 Hours**

The biot-savart law in vector form – Magnetic field intensity due to a finite and infinite wire carrying a current I – Magnetic field intensity on the axis of a circular and rectangular loop carrying a current I – Ampere's circuital law and simple applications – Magnetic flux density – The Lorentz force equation for a moving charge and applications – Force on a wire carrying a current I placed in a magnetic field – Torque on a loop carrying a current I – Magnetic moment – Magnetic vector potential.

UNIT III ELECTRIC AND MAGNETIC FIELDS IN MATERIALS **9 Hours**

Poisson's and Laplace's equation – Electric polarization – Nature of dielectric materials – Definition of capacitance – Capacitance of various geometries using Laplace's equation – Electrostatic energy and energy density – Boundary conditions for electric fields – Electric current – Current density – Point form of ohm's law – Continuity equation for current – Definition of inductance – Inductance of loops and solenoids – Definition of mutual inductance – Simple examples – Energy density in magnetic fields.

UNIT IV TIME VARYING ELECTRIC AND MAGNETIC FIELDS **9 Hours**

Faraday's law – Maxwell's second equation in integral form from faraday's law – Equation expressed in point form – Displacement current – Ampere's circuital law in integral form – Modified form of ampere's circuital law as Maxwell's first equation in integral form – Equation expressed in point form – Maxwell's four equations in integral form and differential form – Pointing vector and the flow of power – Power flow in a co-axial cable – Instantaneous average and complex pointing vector.

UNIT V ELECTROMAGNETIC WAVES **9 Hours**

Derivation of wave equation – Uniform plane waves – Maxwell's equation in phasor form – Wave equation in phasor form – Plane waves in free space and in a homogenous material – Wave equation for a conducting medium – Plane waves in lossy dielectrics – Propagation in good conductors – Skin effect – Linear elliptical and circular polarization – Reflection of plane wave from a conductor – Normal incidence – Reflection of plane Waves by a perfect dielectric – Normal and oblique incidence – Dependence on polarization – Brewster angle.

Total: 45 Hours

Further Reading:

Vector analysis - Vector Calculus -Principle of Superposition theorem-Nature of magnetic materials – Magnetization and permeability – Magnetic boundary conditions.

Course Outcomes:

Entrepreneurship Employability

After completion of the course, Student will be able to

1. Explain the fundamentals of electromagnetic.
2. Analyze field potentials due to static changes and static magnetic fields.
3. Explain how materials affect electric and magnetic fields.
4. Analyze the relation between the fields under time varying situations.
5. Discuss the principles of propagation of uniform plane waves.

References:

1. Hayt, W H. and Buck, J. A., "Engineering Electromagnetics", 7th Edition, TMH,2007.

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2. Jordan, E. C, and Balmain, K. G., "Electromagnetic Waves and Radiating Systems", 4th Edition, Pearson Education/PHI, 2006.
3.Mathew N. O. Sadiku, "Elements of Engineering Electromagnetics", 4th Edition, Oxford University Press, 2007.
4.Narayana Rao, N., "Elements of Engineering Electromagnetics", 6th Edition, Pearson Education, 2006.
5.Ramo, Whinnery and Van Duzer., "Fields and Waves in Communication Electronics", 3rd Edition, John Wiley and Sons, 2003.

1702EC303	DIGITAL CIRCUITS AND SYSTEMS	L	T	P	C
		3	0	0	3

Course Objectives:

1. To train the students in basics of digital functions
2. To impart the students in the designing ability of combinational and sequential circuits
3. To educate the students about different types of memory and programmable devices
4. To teach the students about software skill in VHDL/Verilog HDL

Unit I **BOOLEAN ALGEBRA AND LOGIC GATES** **9 Hours**

Boolean Algebra: Number systems - Boolean postulates and laws – De-Morgan"s Theorem - Principle of Duality - Boolean expression - Minimization of Boolean expressions — Minterm – Maxterm - Sum of Products (SOP) – Product of Sums (POS) – Karnaugh map Minimization – Quine - Mc Cluskey method of minimization.

Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive–OR and Exclusive–NOR Implementations of Logic Functions using gates, NAND–NOR implementations – Multi level gate implementations - Multi output gate implementations. TTL and CMOS Logic and their characteristics – Tristate gates

Unit II **COMBINATIONAL LOGICS** **9 Hours**

Introduction - Design procedure – Half adder – Full Adder – Half subtractor – Full subtractor – Parallel binary adder, parallel binary Subtractor – Fast Adder - Carry Look Ahead adder – Serial Adder/Subtractor - BCD adder – Binary Multiplier – Binary Divider - Multiplexer/ Demultiplexer – decoder - encoder – parity generators - parity checker – code converters - Magnitude Comparator

Unit III **SYNCHRONOUS SEQUENTIAL LOGICS** **9 Hours**

Latches, Flip-flops - SR, JK, D, T, and Master-Slave – Characteristic table and equation –Application table – Edge triggering – Level Triggering – Realization of one flip flop using other flip flops – serial adder/subtractor- Synchronous counters – Synchronous Up/Down counters – Programmable counters – Design of Synchronous counters: state diagram- State table –State minimization –State assignment - Excitation table and maps-Circuit implementation - Modulo–n counter, Registers – shift registers - Universal shift registers

Unit IV **ASYNCHRONOUS SEQUENTIAL LOGICS** **9 Hours**

Design of fundamental mode and pulse mode circuits – Asynchronous Ripple or serial counter – Asynchronous Up/Down counter - State Machines – Problems in Asynchronous Circuits – Static and Dynamic Hazards - Design of Hazard Free Switching circuits

Unit V **PROGRAMMABLE LOGIC DEVICES AND HDL PROGRAMMING** **9 Hours**

Programmable Logic Devices: Classification of memories – ROM - ROM organization - PROM – EPROM – EEPROM –EAPROM, RAM –Programmable Logic Devices – Programmable Logic Array (PLA) - Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) - Implementation of combinational logic circuits using ROM, PLA, PAL

Verilog HDL Programming: Introduction – Data flow model – behavioral model – structural model – HDL programs for combinational logic – HDL program for sequential logic

Total: 45 Hours

Further Reading:

1. Design of seven segment display using basic logic gates

Course Outcomes:

Employability / Entrepreneurship

After completion of the course, Student will be able to

1. Use different methods which are used to simplify the Boolean functions
2. Demonstrate different types of combinational circuits to satisfy the user requirements
3. Implement various synchronous sequential circuits

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	4. Practice several types of asynchronous counters
	5. Explain the basics of memory and programmable logic devices
	6. Discuss the HDL Program for combinational and sequential circuits

References:

1. Ronald J. Tocci, Neal S. Widmer & Gregory L. Moss, "Digital Systems: Principles and Applications", 10th Edition, Pearson Prentice Hall, 2007
2. M. Morris Mano, "Digital Design", 4th Edition, Prentice Hall of India Pvt. Ltd., 2008 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003
3. Joseph Cavanagh, "Verilog HDL: Digital Design and Modeling", Taylor & Francis, 2007
4. John F.Wakerly, "Digital Design", Fourth Edition, Pearson/PHI, 2008
5. John.M Yarbrough, "Digital Logic Applications and Design", Thomson Learning, 2006
6. Charles H.Roth. "Fundamentals of Logic Design", 6th Edition, Thomson Learning, 2013
7. Donald P.Leach and Albert Paul Malvino, "Digital Principles and Applications", 6th Edition, TMH, 2006
8. Thomas L. Floyd, "Digital Fundamentals", 10th Edition, Pearson Education Inc, 2011
9. Donald D.Givone, "Digital Principles and Design", TMH, 2003
10. Ronald J. Tocci, Neal S. Widmer & Gregory L. Moss, "Digital Systems: Principles and Applications", 10th Edition, Pearson Prentice Hall, 2007

1702EC304		ELECTRONIC CIRCUITS	L	T	P	C
			3	0	0	3

Course Objectives:

1. To familiar with the theory, construction, and operation of Basic electronic devices.
2. To Learn about biasing of BJTs and MOSFETs
3. To Study high frequency response of all amplifiers
4. To understand the analysis and design of Feedback amplifiers, LC and RC oscillators, amplifiers, multivibrators, and time base generators.

Unit I	ELECTRONIC DEVICES	9 Hours

BJT:NPN-PNP-Current Equations-Input and Output characteristics of CE,CB,CC-Hybrid π Model- h parameter model-FET: JFETs – Characteristics-MOSFET- Characteristics – D –MOSFET- E-MOSFET- MESFET- Schottky Barrier Diode – Varactor Diode –Zener Diode – Tunnel Diode – Gunn Diode – LDR- UJT-SCR-LED-LCD- Optocoupler- Solar Cell

Unit II	TRANSISTOR BIASING AND SMALL SIGNAL LOW FREQUENCY MODEL	9 Hours

DC Load line, operating point, Various biasing methods for BJT-Design-Stability-Bias compensation, Thermal stability, Design of biasing for JFET, Design of biasing for MOSFET-BJT: Analysis of transistor amplifier CE,CC&CB Configuration using h parameters, Simplified HybridModel for CB, CE & CC configurations, Comparison of transistor amplifier configurations, Darlington Pair. FET: Voltage Gain, Small Signal Equivalent Circuit model, Transconductance, T Equivalent Circuit Model.

Unit III	HIGH FREQUENCY MODELS	9 Hours

BJT: Behaviour of Transistor at High Frequency, The High Frequency T Model, The Hybrid pi Common Emitter Transistor Model, - CB & CE Short Circuit Current Frequency response, Frequency Response of the CE Amplifier. FET: The Gate Capacitive effect, High Frequency MOSFET Model, Unity Gain Frequency, Frequency Response of CS Amplifier.

Unit IV	FEEDBACK AMPLIFIERS AND OSCILLATORS	9 Hours

Feedback amplifiers - Current Series, Voltage Shunt, Current shunt and Voltage Series-Classification, Barkhausen Criterion - Mechanism for start of oscillation and stabilization of amplitude, General form of an Oscillator, Analysis of LC oscillators - Hartley, Colpitts, Clapp, Franklin, Armstrong, Tuned collector oscillators, RC oscillators - phase shift – Wienbridge - Twin-T Oscillators, Quartz Crystal Construction

Unit V	TUNED AMPLIFIERS AND WAVE SHAPING CIRCUITS	9 Hours

Coil losses, unloaded and loaded Q of tank circuits, small signal tuned amplifiers - Analysis of capacitor coupled single tuned amplifier – double tuned amplifier-Stagger tuned amplifiers – large signal tuned amplifiers – Class C tuned amplifier – Efficiency and applications of Class C tuned amplifier-RC & RL Integrator and Differentiator circuits-Diode clippers, Diode comparator – Clampers-Collector coupled and Emitter coupled Astable multivibrator – Monostable multivibrator – Bistable multivibrators - Schmitt trigger circuit.

Total: 45 Hours

Further Reading:

1. UJT saw tooth waveform generator
2. Blocking Oscillator
3. Time base circuits

Employability / Entrepreneurship

Course Outcomes:

After completion of the course, Student will be able to

1. Explain the theory, construction, and operation of basic electronic devices.
2. Analyze parametric values for different biasing methods of BJT and FET.
3. Analyze the behaviour of Bipolar Junction Transistors and Field Effect Transistors at different frequency conditions.
4. Design and analyze feedback amplifiers and oscillators.
5. Design of tuned amplifiers and Multivibrators

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1. Jacob Millman, C. Halkias and Satyabrata Jit Electronic Devices and Circuits, 3rd Edition, Tata McGraw-Hill, 2011
2. David A. Bell, "Electronic Devices and Circuits", Fifth Edition, Oxford University Press, 2008.
3. Donald A Neaman, "Semiconductor Physics and Devices", Third Edition, Tata Mc GrawHill Inc. 2007.
4. Donald .A. Neamen, Electronic Circuit Analysis and Design –2nd Edition,Tata Mc Graw
5. Hill, 2009.
6. Adel .S. Sedra, Kenneth C. Smith, "Micro Electronic Circuits", 6th Edition, Oxford University Press, 2010
7. Robert L. Boylestad and Louis Nasheresky, "Electronic Devices and Circuit Theory", 10th Edition, Pearson Education / PHI, 2008
8. Jacob Millman, C. Halkias and Satyabrata Jit Electronic Devices and Circuits, 3rd Edition, Tata McGraw-Hill, 2011

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1702EC351	DIGITAL ELECTRONICS LABORATORY	L	T	P	C
		0	0	4	2
	(Common to B.E / B.Tech – CSE, IT & ECE)				

Course Objectives:

1. To impart the students in the designing ability of combinational and sequential circuits
2. To educate the students in the designing ability of synchronous and asynchronous sequential circuits To educate the students about different types of memory and programmable devices
3. To teach the students about software skill in VHDL/Verilog HDL

List of Experiments:

1. Verification of Boolean Theorems using basic gates
2. Design and implementation of code converters using logic gates
3. Design and implementation of 4 bit binary Adder/ Subtractor and BCD adder
4. Design and implementation of Multiplexer and De-multiplexer using logic gates
5. Design and implementation of encoder and decoder using logic gates
6. Design and implementation of parity generator and checker
7. Design and implementation of Magnitude Comparator
8. Construction and verification of 4 bit ripple counter and Mod-10 / Mod-12 Ripple counters
9. Design and implementation of 3-bit synchronous up/down counter
10. Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip- flops
11. Design of combinational circuits using HDL
12. Design of sequential circuits using HDL

		Total:	**45 Hours**
Additional Experiments:			
	1. Design and Implementation of seven segment display using basic logic gates		
	2. One mini project using logic gates		
Course Outcomes:			
	After completion of the course, Student will be able to		
	1. Demonstrate different types of combinational circuits to satisfy the user requirements		
	2. Implement various synchronous sequential circuits		
	3. Design several types of asynchronous counters		
	4. Write the HDL Program for combinational circuits		
	5. Write the HDL Program for sequential circuits		

Entrepreneurship

References:

1. Ronald J. Tocci, Neal S. Widmer & Gregory L. Moss, "Digital Systems: Principles and Applications", 10th Edition, Pearson Prentice Hall, 2007
2. M. Morris Mano, "Digital Design", 4th Edition, Prentice Hall of India Pvt. Ltd., 2008 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003
3. Joseph Cavanagh, "Verilog HDL: Digital Design and Modeling", Taylor & Francis, 2007
4. John F.Wakerly, "Digital Design", Fourth Edition, Pearson/PHI, 2008
5. John.M Yarbrough, "Digital Logic Applications and Design", Thomson Learning, 2006
6. Charles H.Roth. "Fundamentals of Logic Design", 6th Edition, Thomson Learning, 2013
7. Donald P.Leach and Albert Paul Malvino, "Digital Principles and Applications", 6th Edition, TMH, 2006
8. Thomas L. Floyd, "Digital Fundamentals", 10th Edition, Pearson Education Inc, 2011
9. Donald D.Givone, "Digital Principles and Design", TMH, 2003

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1702EC352	**ELECTRONICS CIRCUITS LABORATORY**	**L**	**T**	**P**	**C**
		0	**0**	**4**	**2**
	(Common to B.E / B.Tech – CSE, IT & ECE)				

Course Objectives:

1. To Be exposed to the characteristics of basic electronic devices
2. To Study the characteristic of CE,CB and CS Amplifier
3. To gain hands on experience in designing electronic circuits.
4. To learn simulation software used in circuit design.

List of Experiments:

1. Characteristics of PN Junction diode and Zener Diode, FET,SCR
2. Input and Output Characteristics of CE/CB Configuration
3. Design and analysis of CE/CB/CS, Darlington Amplifier
4. Design of Series and Shunt feedback amplifiers-Frequency response, Input and output impedance calculation.
5. Design of RC Phase shift oscillator and Wien Bridge Oscillator
6. Design of Hartley Oscillator and Colpitts Oscillator
7. Design of Single Tuned Amplifier
8. Design of Clipper, Clamper,RC Integrator, Differentiator and Multivibrator circuits
9. Simulation of CE,CS amplifiers, Twin-T Oscillator and Wein Bridge Oscillator
10. Simulation of Double and Stagger tuned Amplifier
11. Simulation of Monostable Multivibrator

Additional Experiments:

1. Design of Power inverter.
2. Design of Function Generator

Course Outcomes:

Employability

After completion of the course, Student will be able to

1. Able to Learn the characteristicsand frequency response of basic electronic devices
2. Able to Analyze various types of feedback amplifiers
3. Able to Design oscillators, tuned amplifiers, wave shaping circuits and multivibrators.
4. Able to Simulate amplifiers and oscillators using Spice

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References:

1. Donald A Neaman, "Semiconductor Physics and Devices", Third Edition, Tata Mc GrawHill Inc. 2007.
2. Donald .A. Neamen, Electronic Circuit Analysis and Design –2nd Edition,Tata Mc Graw Hill, 2009.
3. Adel .S. Sedra, Kenneth C. Smith, "Micro Electronic Circuits", 6th Edition, Oxford University Press, 2010
4. Jacob Millman, C. Halkias and Satyabrata Jit Electronic Devices and Circuits, 3rd Edition, Tata McGraw-Hill, 2011

1702CS351	DATA STRUCTURES LABORATORY	L	T	P	C
		0	0	4	2

Course Objectives:

1. Learn C++ programming language.
2. Be exposed to the different data structures
3. Be familiar with applications using different data structures

List of Experiments:

1. Basic Programs for C++ Concepts
2. Array implementation of List Abstract Data Type (ADT)
3. Linked list implementation of List ADT
4. Cursor implementation of List ADT
5. Stack ADT - Array and linked list implementations
6. The next two exercises are to be done by implementing the following source files
   - i. Program source files for Stack Application 1
   - ii. Array implementation of Stack ADT
   - iii. Linked list implementation of Stack ADT
   - iv. Program source files for Stack Application 2
   - v. An appropriate header file for the Stack ADT should be included in (i) and (iv)
7. Implement any Stack Application using array implementation of Stack ADT (by implementing files (i) and (ii) given above) and then using linked list
8. Implementation of Stack ADT (by using files (i) and implementing file (iii))
9. Implement another Stack Application using array and linked list implementations of Stack ADT (by implementing files (iv) and using file (ii), and then by using files (iii) and (iv)
10. Queue ADT – Array and linked list implementations
11. Search Tree ADT - Binary Search Tree
12. Implement an interesting application as separate source files and using any of the searchable ADT files developed earlier. Replace the ADT file alone with other appropriate ADT files. Compare the performance.

Total: 45 Hours

Additional Experiments:

1. Hash table implementation
2. Graph traversals

Course Outcomes:

Employability / Entrepreneurship

After completion of the course, Student will be able to

1. After completion of the course, Student will be able to
2. Identify the model of Abstract Data Type, calculation of algorithm efficiency and designing of recursive algorithms.
3. Design algorithms to solve real life problems using data structures.
4. Analyze various sorting and searching algorithms.
5. Recognize the usage of Non-Linear Data structures such as Binary Search tree, AVL search tree and Heap tree in applications.

References:

1. F.RichardGilberg, A.Behrouz. Forouzan, Data Structures, A Pseudocode Approach with C. Thomson, 2007.
2. M. A. Weiss, Data Structures and Algorithm Analysis in C, Pearson Education, 2009.
3. Y.Langsam, M. J.Augenstein and A. M.Tenenbaum, Data Structures using C, Pearson Education,2004.
4. A. M.AhoHopcroft and J.D. Ullman, Data Structures and Algorithms, Pearson education, 2000.

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1704GE351	LIFE SKILLS: VERBAL ABILITY	L	T	P	C
		0	0	2	-

Course Objectives:

1. To develop the students basic soft skills and enable them to get a job.
2. To develop the students' interpersonal skills and to enable them to respond effectively
3. To develop the students selling skills and to enable them to apply in their interview process.
4. To develop the students' Corporate Etiquettes and enable them to respond effectively
5. To develop the students' learning by practice of giving different situations.

Unit I **Introduction to Soft Skills** **9 Hours**

Soft Skills an Overview - Basics of Communication – Body Language – Positive attitude –Improving Perception and forming values – Communicating with others.

Unit II **Team vs Trust** **9 Hours**

Interpersonal skills – Understanding others – Art of Listening - Group Dynamics – Networking - Individual and group presentations - Group interactions – Improved work Relationship .

Unit III **Selling Oneself** **9 Hours**

How to brand oneself – social media – job hunting – Resume writing – Group Discussion – Mock G.D - .Interview skills – Mock Interview

Unit IV **Corporate Etiquettes** **9 Hours**

What is Etiquette – Key Factors – Greetings – Meeting etiquettes – Telephone etiquettes – email etiquettes – Dining etiquettes – Dressing etiquettes – Rest room etiquettes – Life etiquettes

Unit V **Learning by Practice** **9 Hours**

1. My family. Myself. 2. Meeting people. Making Contacts.3. A city. Getting about town.
4. Our flat. Home life.5Travelling. Going abroad.6. Going through Customs.7. At a hotel.8. Shopping.
9. Eating out.10. Making a phone call.11A modern office.12 Discussing business.

Total: 45 Hours

Assessment Pattern:

Two assignments will be conducted (25 * 2) - 50 marks

Pragmatic Assessment - 50 Marks

Course Outcomes:

Employability / Skill Development

After completion of the course, Student will be able to

1. Students are enabled to communicate effectively in their business environment.
2. Learners are ensured that they improve their interpersonal skills which is mandatory in a corporate world
3. Students are trained to brand themselves to acquire a job .
4. Students are trained to involve in corporate etiquettes
5. Students are learnt to survive in the different situations

References:

1. Dr.k.Alex, "soft skills "Third Edition, S.Chand & Publishing Pvt Limited, 2009
2. Aruna koneru, 'Professional Communication' Second Edition, Tata McGraw-Hill Education, 2008
3. D.K.Sarma,'You & Your Career 'First Edition Wheeler Publishing & Co Ltd, 1999
4. Shiv Khera 'You Can Win' Third Edition Mac Millan Publisher India Pvt Limited, 2005

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NAGAPATTINAM – 611 002

B.E. Electronics and Communication Engineering

Full Time Curriculum and Syllabus

Second Year – Fourth Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1701MA403	Probability and Random Processes	3	2	0	4	40	60	100
1702EC402	Signals and Systems	3	2	0	4	40	60	100
1702EC403	Analog Integrated Circuits	3	0	0	3	40	60	100
1702EC404	Microprocessors and Microcontrollers	3	0	0	3	40	60	100
1702EC405	Transmission Lines and Waveguides	3	0	0	3	40	60	100
1702EC406	Control Systems	3	0	0	3	40	60	100
Laboratory Course								
1702EC451	Analog Integrated Circuits Laboratory	0	0	4	2	50	50	100
1702EC452	Microprocessors and Microcontrollers Laboratory	0	0	4	2	50	50	100
1704GE451	Life Skills: Verbal Ability	0	0	2	-	100	-	100

L – Lecture | T – Tutorial | P – Practical | C – Credit | CA – Continuous Assessment | ES – End Semester

1701MA401	PROBABILITY AND RANDOM PROCESSES	L	T	P	C
		3	2	0	4
	(B.E- ECE)				

Course Objectives:

1. To analyze the concepts of probability, random variables and distribution functions.
2. To acquire skill in handling situation with more than one random variable with time function.
3. To analyze the concept of signals and system.

Unit I **PROBABILITY** **9+3Hours**

Probability- Theorems on Probability- Conditional Probability – Baye's Theorem- Discrete and continuous random variables – Moments – Moment generating functions –Real Time Problems

Unit II **ONE DIMENSIONAL RANDOM VARIABLE** **9+3 Hours**

Discrete Distributions: Binomial, Poisson, Geometric - Continuous Distributions: Uniform, Exponential, Normal distributions- Application of Distribution in Engineering Problems

Unit III **TWO - DIMENSIONAL RANDOM VARIABLES** **9+3 Hours**

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and Linear regression

Unit IV **MARKOV PROCESSES AND MARKOV CHAINS** **9+3 Hours**

Classification – Stationary process – Markov process – Markov chains – transition probabilities – Limiting distributions – Poisson process.

Unit V **SPECTRAL DENSITIES AND LINEAR SYSTEMS WITH RANDOM INPUTS** **9+3 Hours**

Auto correlation-cross correlation-power spectral density-cross spectral density-Properties-Wiener-Khintchine relation-relationship between cross power spectrum and corre lation function. Linear time invariant system-system transfer function-Linear system with random inputs-White noise.

Total: 45 + 15 Hours

Further Reading:

Probabilistic manner which evolve with time

Discrete time Markov chains in modeling Electronic systems.

Employability / Entrepreneurship

Course Outcomes:

After completion of the course, Student will be able to

1. To apply basic probability techniques to analyze the performance of Electronic systems.(K3)
2. To apply standard distributions in describing real life phenomena.(K3)
3. To solve problems involving more than one random variable.(K3)
4. To apply probability technique which evolve with respect to time.(K3)
5. To interpret the response of random input to linear time invariant systems. (K3)

References:

1. O.C. Ibe, Fundamentals of Applied Probability and Random Processes, Elsevier, 1st Indian Reprint, 2007
2. D. Gross and C.M. Harris, Probability and random processes, WileyStudent edition, 2004.
3. Peebles. P.Z., "Probability, Random Variables and Random Signal Principles", Tata Mc Graw Hill, 4th Edition, New Delhi, 2002.
4. Yates. R.D. and Goodman. D.J., "Probability and Stochastic Processes", 2nd Edition, Wiley India Pvt. Ltd., Bangalore, 2012.
5. Stark. H., and Woods. J.W., "Probability and Random Processes with Applications to Signal Processing", 3rd Edition,Pearson Education, Asia, 2002.
6. Miller. S.L. and Childers. D.G., "Probability and Random Processes with Applications to Signal Processing and Communications", Academic Press, 2004.
7. www.indiastudychannel.com
8. nptel.ac.in/courses/111105035, www.nptelvideos.in/2012/11/Mathematics.html
9. www.learnerstv.com/Free-maths-video lectures - ltv348-page1.html

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1702EC402	SIGNALS AND SYSTEMS	L	T	P	C
		3	1	0	4

Course Objectives:

1. To understand the basic properties of Signals and Systems and the various methods of Classification
2. Tolearn Laplace Transform &Fourier transform and their properties
3. To know Z transform & DTFT and their properties.
4. To characterize LTI systems in the Time domain and various Transform domains

Unit I	**CLASSIFICATION OF SIGNALS AND SYSTEMS**	**9+3 Hours**

Classification of Signals- Continuous time signals - Discrete time signals - Periodic and Aperiodic signals - Even and odd signals - Energy and power signals -Deterministic and random signals -Complex exponential and Sinusoidal signals. Classification of Systems: Continuous time systems- Discrete time systems - Linear system - Time Invariant system – causal system - BIBO system - Systems with and without memory - LTI system Classification of Systems

Unit II	**ANALYSIS OF CONTINUOUS TIME SIGNALS**	**9+3 Hours**

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

Unit III	**LTI CT SYSTEM**	**9+3 Hours**

Impulse response - Frequency response – Convolution Integral - Analysis and characterization of LTI system using Laplace transform Solution of Differential equation with initial conditions – zero state response and zero input response.

Unit IV	**ANALYSIS OF DISCRETE TIME SIGNALS**	**9+3 Hours**

Baseband Sampling - DTFT – Properties of DTFT - Z Transform – Properties of Z Transform –Inverse Z transform

Unit V	**LTI DISCRETE TIME SYSTEMS**	**9+3 Hours**

Impulse response - Convolution sum- Analysis and characterization of DT system using Z transform Difference Equations-Block diagram

Total:	**45+15 Hours**

Further Reading:

Programs using mathematical computing tool for CT and DT system analysis using LT and ZT

Entrepreneurship

Course Outcomes:

After completion of the course, Student will be able to

1. Analyze the properties of signals & systems
2. Apply Laplace transform, Fourier transform in signal analysis
3. Apply Z transform and DTFT in signal analysis for Discrete time signals
4. Analyze continuous time LTI systems using Fourier and Laplace Transforms
5. Analyze discrete time LTI systems using Z transform.

References:

1. Allan V.Oppenheim, S.Wilsky and S.H.Nawab, "Signals and Systems", Pearson, 2007.
2. B. P. Lathi, "Principles of Linear Systems and Signals", Second Edition, Oxford, 2009.
3. R.E.Zeimer, W.H.Tranter and R.D.Fannin, "Signals & Systems - Continuous and Discrete", Pearson, 2007.
4. John Alan Stuller, "An Introduction to Signals and Systems", Thomson, 2007.
5. Hwei. P.Hsu, Schaum's Outlines: Signals and Systems, Pearson Education, 2002.

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1702EC403	ANALOG INTEGRATED CIRCUITS	L	T	P	C
		3	0	0	3

Course Objectives:

1. To Learn the fundamental concepts behind transistor biasing and to differentiate small signal and large signal circuit models
2. To Learn the concepts of Analog to digital and Digital to Analog converters for microelectronics
3. To Study the performance metrics of Multistage and Power amplifiers
4. To Understand the working of signal generating and wave shaping circuits

Unit I	BASICS OF OPERATIONAL AMPLIFIERS	9 Hours

Operational Amplifiers, DC and AC characteristics, Typical op-amp parameters: Finite gain, finite bandwidth, Offset voltages and currents, Common-mode rejection ratio, Power supply rejection ratio, Slew rate, Applications of Op-amp: Precision rectifiers. Summing amplifier, Integrators and differentiators, Log and antilog amplifiers. Instrumentation amplifiers, voltage to current converters

Unit II	ACTIVE FILTERS	9 Hours

Second order filter transfer function (low pass, high pass, band pass and band reject), Butterworth, Chebyshev and Bessel filters. Switched capacitor filter, notch filter, All pass filters, self-tuned filters

Unit III	ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS	9 Hours

Opamp as a comparator, Schmitt trigger, Astable and monostable multivibrators, Triangular wave generator, Multivibrators using 555 timer. Data converters: A/D and D/A converters

Unit IV	PHASE LOCKED LOOP	9 Hours

PLL- basic block diagram and operation, Four quadrant multipliers. Phase detector, VCO, Applications of PLL:Frequency synthesizers, AM detection, FM detection and FSK demodulation

Unit V	CMOS DIFFERENTIAL AMPLIFIERS	9 Hours

DC analysis and small signal analysis of differential amplifer with Restive load, current mirror load and current source load, Input common-mode range and Common-mode feedback circuits. OTAs vs Opamps. Slew rate, CMRR, PSRR. Two stage amplifiers, Compensation in amplifiers (Dominant pole compensation).

	Total:	45 Hours

Further Reading:

Collector Emitter Feedback Bias, Bootstrap Darlington Circuit, Effect of Emitter or a Source Bypass Capacitor on Low frequency response, Comparison of Power Amplifiers, BJT Digital Logic Inverter, CMOS Digital Logic Inverter, BiCMOS Cascade Amplifier, Current Mirror Circuits, CMOS Logic Gate Circuits, Power BJTs, Power MOSFETs.

Course Outcomes:

Employability | Entrepreneurship

After completion of the course, Student will be able to

1. Infer the DC and AC characteristics of operational amplifiers and its effect on output and their compensation techniques
2. Elucidate and design the linear and non linear applications of an opamp and special application Ics.
3. Explain and compare the working of multi vibrators using special application IC 555 and general purpose opamp
4. Classify and comprehend the working principle of data converters
5. Illustrate the function of application specific ICs such as Voltage regulators, PLL and its application in communication.

References:

1. *S.Franco, Design with Operational Amplifiers and Analog Integrated Circuits (3/e) TMH, 2003*
2. *Sedra and Smith, Microelectronics Circuits, Oxford Univ. Press, 2004*
3. *Coughlin, Driscoll, OP-AMPS and Linear Integrated Circuits, Prentice Hall, 2001.*
4. John D Ryder, —Electronic fundamentals and Applications: Integrated and Discrete systemsl 5th Edition, PHI, 2003
5. Donald .A. Neamen, Electronic Circuit Analysis and Design, 2nd edition, Tata McGraw Hill, 2009

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1702EC404	Microprocessors and Microcontrollers	L	T	P	C
		3	0	0	3
	(Common to B.E / B.Tech – ECE,CSE & IT)				

Course Objectives:

1. To understand the architecture and functions of 8085 processor
2. To understand the Architecture of 8086 microprocessor
3. To understand the concepts of 8051 microcontroller
4. To learn the design aspects of I/O and Memory Interfacing circuits.
5. To gain the basic knowledge about advanced processors

Unit I **INTRODUCTION TO MICROPROCESSORS** **9 Hours**

Evolution Of Microprocessors - 8-Bit Processor - 8085 Architecture – Register Organization - Instruction Set – Timing Diagram- Addressing Modes – Interrupts- Interrupt Service Routines- Assembly Language Programming Using 8085.

Unit II **THE 8086 MICROPROCESSOR** **9 Hours**

Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set and assembler directives – Assembly language programming – Modular Programming - Linking and Relocation - Stacks - Procedures – Macros – Interrupts and interrupt service routines - 8086 signals.

Unit III **MICROCONTROLLER** **9 Hours**

Architecture of 8051 – Special Function Registers(SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming.

Unit IV **I/O INTERFACING** **9 Hours**

Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display , LCD display, Keyboard display interface and Alarm Controller.

Unit V **ARCHITECTURE OF ADVANCED PROCESSORS** **9 Hours**

Multiprocessor configurations – Intel 80286 – Internal Architectural – Register Organization – Internal Block Diagram – Architectural features and Register Organization of i386, i486 and Pentium processors. ARM architecture.

Total: 45 Hours

Further Reading:

Intel Core i3, i5 and i7

Course Outcomes:

Entrepreneurship / Employability

After completion of the course, Student will be able to

1. Design and implement the functionality of 8085 microprocessor
2. Design and implement the functionality of 8086 microprocessor
3. Design and implement 8051 microcontroller based systems
4. Design I/O circuits. Design Memory Interfacing circuits
5. Acquire the architecture concepts of advanced processors.

References:

1. Ramesh Gaonkar "Microprocessor Architecture, Programming, and Applications with the 8085"- 5th edition Penram International Publishing-2000.
2. A. K. Ray & K. M. Bhurchandi, "Advanced Microprocessors and peripherals- Architectures, Programming and Interfacing", TMH, 2002 reprint.
3. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", Second Edition, Pearson education, 2011.
4. Barry B. Brey, "The Intel Microprocessors, 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, PentiumPro Processor, PentiumII, PentiumIII, Pentium IV Architecture, Programming & Interfacing", 6th Edition, Pearson Education/PHI, 2002.
5. https://www.intel.in
6. https://www.arm.com

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1702EC405	TRANSMISSION LINES AND WAVEGUIDES	L	T	P	C
		3	0	0	3

Course Objectives:

1. To introduce the various types of transmission lines and to discuss the losses associated.

	2. To give thorough understanding about impedance transformation and matching.
	3. To use the Smith chart in problem solving.
	4. To impart knowledge on filter theories and waveguide theories.
	5. To introduce the various types of transmission lines and to discuss the losses associated.

Unit I	**TRANSMISSION LINE THEORY**	**9 Hours**

General solution of transmission line – The two standard forms for voltage and current of a line terminated by an impedance – Physical significance of the equation and the infinite line – Reflection coefficient – Wavelength and velocity of propagation – Waveform distortion – Distortion less transmission line – The telephone cable – Inductance loading of telephone cables – Input impedance of lossless lines – Reflection on a line not terminated by Z_O – Transfer impedance – Reflection factor and reflection loss.

Unit II	**IMPEDANCE MATCHING IN TRANSMISSION LINES**	**9 Hours**

Standing waves and standing wave ratio on a line – One eighth wave line – Quarter wave line and impedance matching – The half-wave line –Smith chart – Application of the smith chart – Conversion from impedance to reflection co-efficient and vice-versa – Impedance to admittance conversion and vice-versa – Input impedance of a lossless line terminated by an impedance – Single stub matching and double stub matching.

Unit III	**FILTERS AND GUIDED WAVES**	**9 Hours**

Constant K Filters - Low pass, High pass band, pass band elimination filters - m -derived sections Waves between parallel planes of perfect conductors – Transverse electric and transverse magnetic waves – Characteristics of TE and TM waves – Transverse electromagnetic waves – Velocities of propagation – Component uniform plane waves between parallel planes – Attenuation of TE and TM waves in parallel plane guides –Wave impedances.

Unit IV	**RECTANGULAR WAVEGUIDES**	**9 Hours**

Transverse magnetic waves in rectangular wave guides – Transverse electric waves in rectangular waveguides – Characteristics of TE and TM waves – Cutoff wavelength and phase velocity – Impossibility of TEM waves in waveguides – Dominant mode in rectangular waveguide – Attenuation of TE and TM modes in rectangular waveguide – Wave impedance – Characteristic impedance – Excitation of modes.

Unit V	**CIRCULAR WAVE GUIDES AND RESONATORS**	**9 Hours**

Bessel functions – Solution of field equations in cylindrical co-ordinates – TM and TE waves in circular guides – Wave impedances and characteristic impedance – Dominant mode in circular waveguide – Excitation of modes – Microwave cavities – Rectangular cavity resonators – Circular cavity resonator – Semicircular cavity resonator – Q factor of a cavity resonator for TE101 mode.

	Total:	**45 Hours**

Further Reading:

Transmission line equations at radio frequencies - Characteristic impedance of symmetrical networks- The circle diagram for the dissipation less line - composite filters.

Course Outcomes:

Employability | Entrepreneurship

After completion of the course, Student will be able to

1. Discuss the propagation of signals through transmission lines.
2. Analyze signal propagation at Radio frequencies.
3. Explain radio propagation in guided systems.
4. Classify the Guided Wave solutions -TE, TM, and TEM.
5. Utilize cavity resonators.

References:

1. J. D. Ryder, "Networks, Lines and Fields", PHI, 2nd Edition, 2010.
2. E.C. Jordan & K.G. Balmain "Electromagnetic Waves and Radiating Systems" Prentice Hall of India 2nd edition 2003.
3. Ramo, Whineery and Van Duzer, "Fields and Waves in Communication Electronics", John Wiley, 2003.

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4. David M.Pozar: Microwave Engineering – 2nd Edition – John Wiley 2000.
5. David K. Cheng, "Field and Waves in Electromagnetism", Pearson Education, 1989.
6. B.Somanathan Nair, Transmission Lines and Wave guides, Sanguine Technical publishers, 2006.

1702EC406	CONTROL SYSTEMS	L	T	P	C
		3	0	0	3

Course Objectives:

1. In this course it is aimed to introduce to the students the principles and applications of control systems.
2. To the basic concepts of block diagram reduction, time domain analysis solutions to time invariant systems.
3. In deals with the different aspects of stability analysis of systems in frequency domain and time domain.
4. To understand the application of control system.
5. In this course it is aimed to introduce to the students the principles and applications of control systems.

Unit I	**INTRODUCTION OF CONTROL SYSTEMS**	**9 Hours**

Basic concept of control systems - Open loop and closed loop control systems and their differences - Block diagram algebra - Representation by signal flow graph - Reduction using Mason's gain formula - Feedback characteristics and effect of feedback.

Unit II	**TIME RESPONSE ANALYSIS**	**9 Hours**

Time response analysis - Time response of first order system - Transient response of second order system - Time domain specification - steady state response - Steady state error - Effect of proportional derivatives - Proportional integral system.

Unit III	**FREQUENCY RESPONSE ANALYSIS**	**9 Hours**

Frequency response - Frequency domain specification - stability analysis from bode plot , polar plot , nyquist plot - Compensation techniques - Lag , Lead , lead-lag controllers design in frequency domain .

Unit IV	**STABILITY ANALSIS AND ROOT LOCUS TECHNIQUES**	**9 Hours**

Concept of stability - Routh Hurwitz criterion - Nyquist stability criterion - Routh locus concept - construction of root locus

Unit V	**APPLICATIONS OF CONTROL SYSTEMS**	**9 Hours**

Aircraft flight control systems - Director(military) - Embedded instrumentation - Fire control system - Guidance , navigation and control - Laser ignition - Weight shift control

Total:	**45 Hours**

Further Reading:

Modern control systems.

Course Outcomes:

Employability

After completion of the course, student will be able to

1. Knowledge on open loop and closed loop control system, concept of feedback in control systems.
2. Transfer function representation through block diagram algebra and signal flow graph , time response analysis .
3. Frequency response analysis through bode plot, polar plot , nyquist plot and basics of state space analysis.

References:

1. Automatic control systems, third edition, Benjamin C. Kuo.
2. Control and Dynamical Systems, Karl Johan Aström ˚ Richard M. Murray, Version v2.10c (March 4, 2010), PRINCETON UNIVERSITY PRESS.
3. Modern Control Systems, TWELFTH EDITION, Richard C. Dorf University of California, Davis, Robert H. Bishop Marquette University.

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1702EC451	ANALOG INTEGRATED CIRCUITS LABORATORY	L	T	P	C
		0	0	3	2

Course Objectives:

1. To expose the students to linear and integrated circuits
2. To understand the basics of linear integrated circuits and available ICs
3. To understand characteristics of operational amplifier
4. To apply operational amplifiers in linear and nonlinear applications.
5. To acquire the basic knowledge of special function IC
6. To use PSPICE software for circuit design

List of Experiments:

1. Inverting, Non inverting and Differential amplifiers.
2. Integrator and Differentiator.
3. Instrumentation Amplifier
4. Active low-pass, High-pass and band-pass filters.
5. Astable & Monostable multivibrators and Schmitt Trigger using op-amp
6. Phase shift and Wien bridge oscillators using op-amp.
7. Astable and monostable multivibrators using NE555 Timer
8. PLL characteristics and its use as Frequency Multiplier
9. DC power supply using LM317 and LM723
10. Mini project using Op-Amp and Specialized IC's

SIMULATION USING SPICE

11. Analog multiplier
12. CMOS Inverter, NAND and NOR

Total: 45 Hours

Additional Experiments:

1. Buck-Boost Converter
2. Design a circuit for Lisajious Figure

Employability | Entrepreneurship

Course Outcomes:

After completion of the course, Student will be able to

1. Design oscillators and amplifiers using operational amplifiers
2. Design filters using Opamp and perform experiment on frequency response
3. Analyse the working of PLL and use PLL as frequency multiplier
4. Design DC power supply using ICs
5. Analyse the performance of oscillators and multivibrators using SPICE

References:

1. Adel. S. Sedra, Kenneth C. Smith, Microelectronic Circuits Theory an Applications ,5th Edition, Oxford University, 2006.
2. Jacob Millman, C. Halkias and Satyabrata Jit, Electronic Devices and Circuits, 3rd Edition, Tata McGraw-Hill, 2011.

1702EC452	Microprocessors and Microcontrollers Laboratory	L	T	P	C
		0	0	4	2
	(Common to B.E / B.Tech – ECE,CSE & IT)				

Course Objectives: **The student should be made to:**

1. Write ALP for arithmetic and logical operations in 8085, 8086 and 8051
2. Differentiate Serial and Parallel Interface
3. Interface different I/Os with Microprocessors& Microcontrollers
4. Be familiar with MASM

List of Experiments:

8085 Programs using kits

1. Basic arithmetic and Logical operations
2. Sorting and Searching the given data.

8086 Programs using kits with MASM

3. Floating point operations

8051 Experiments using kits

4. Basic arithmetic and Logical operations

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5. Square and Find 2's complement of a number	
6. Code conversion	
Peripherals and Interfacing Experiments	
7. Traffic light control	
8. Stepper motor and DC Motor control	
9. Key board and Display	
10. Serial interface and Parallel interface	
11. Printer Interfacing	
12. A/D and D/A interface and Waveform Generation	
Total:	**45 Hours**
Additional Experiments:	https://www.intel.in
	Basic experiments using Arduino processor
Course Outcomes:	
After completion of the course, Student will be able to	
1. Write ALP Programmes for fixed and Floating Point and Arithmetic	
2. interface different I/Os with processor	
3. Generate waveforms using Microprocessors&Execute Programs in 8051	
4. Explain the difference between simulator and Emulator	
References:	
1. Ramesh Gaonkar "Microprocessor Architecture, Programming, and Applications with the 8085"- 5th edition Penram International Publishing-2000.	
2. A. K. Ray & K. M. Bhurchandi, "Advanced Microprocessors and peripherals- Architectures, Programming and Interfacing", TMH, 2002 reprint.	

1704GE451	LIFE SKILLS: VERBAL ABILITY	L	T	P	C
		0	0	2	-

Course Objectives:

1. To help students comprehend and use vocabulary words in their day to day communication.
2. To apply appropriate reading strategies for interpreting technical and non-technical documents used in job-related settings.
3. To ensure students will be able to use targeted grammatical structures meaningfully and appropriately in oral and written production.
4. To enable the students to arrange the sentences in meaningful unit and to determine whether constructions rely on active or passive voice
5. To Apply the principles of effective business writing to hone communication skills

Unit I	**VOCABULARY USAGE**	**9 Hours**

Introduction - Synonyms and Antonyms based on Technical terms – Single word Substitution – Newspaper, Audio and video listening activity.

Unit II	**COMPREHENSION ABILITY**	**9 Hours**

Skimming and Scanning – Social Science passages – Business and Economics passages – latest political and current event based passages – Theme detection – Deriving conclusion from passages

Unit III	**BASIC GRAMMAR AND ERROR DETECTION**	**9 Hours**

Parallelism – Redundancy – Ambiguity – Concord - Common Errors – Spotting Errors – Sentence improvement – Error Detection FAQ in Competitive exams.

Unit IV	**REARRANGEMENT AND GENERAL USAGE**	**9 Hours**

Jumble Sentences – Cloze Test - Idioms and Phrases – Active and passive voice – Spelling test.

Unit V	**APPLICATION OF VERBAL ABILITY**	**9 Hours**

Business Writing - Business Vocabulary - Delivering Good / Bad News - Media Communication - Email Etiquette – Report Writing - Proposal writing – Essay writing– Indexing –Market surveying.

		Total:	**45 Hours**
Further Reading:			
	Modern control systems.		
Course Outcomes:			
	After completion of the course, Student will be able to		
	1. Students are enabled to use new words in their day to day communication.		
	2. Students are capable to gather information swiftly while reading passages		
	3. Students are proficient during their oral and written communication.		
	4. Students are equipped to rearrange the sentences and able to identify the voice of the sentence		
	5. Students use their knowledge of the best practices to craft effective business documents		
References:			
1. Arun Sharma and Meenakshi Upadhyav, How to Prepare for Verbal Ability and Reading Comprehension for CAT, McGrawHill Publication, Seventh Edition 2017			
2. R S Aggarwal and Vikas Aggarwal , Quick Learning Objective General English ,S.Chand Publishing House, 2017			
3. Dr.K.Alex , Soft Skills, S.Chand Publishing House, Third Revise Edition, 2014			
4. Raymond Murphy, Essential English Grammar in Use, Cambridge University press, New Delhi, Third Edition , 2007			

Skill Development

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