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

First Year – First Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1901MA104	Engineering Mathematics –I (Linear Algebra, Calculus and Partial differentiation)	3	1	0	4	40	60	100
1901CH102	Chemistry for Electronic Engineers	3	0	0	3	40	60	100
1901GEX03	Programming for Problem Solving	3	0	0	3	40	60	100
1901ENX01	English for Engineers	2	0	0	2	100	-	100
Laboratory Course								
1901GEX52	Computer Programming Lab	0	0	2	1	50	50	100
1901GEX51	Engineering Intelligence I	0	0	2	1	50	50	100
1901CHX51	Engineering Chemistry Lab	0	0	2	1	50	50	100
1901HS151	Communication Skills	0	0	2	1	100	0	100
Total		**11**	**1**	**8**	**16**	**470**	**330**	**800**

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

1901MA104	MATHEMATICS –I (LINEAR ALGEBRA, CALCULUS AND PARTIAL DIFFERENTIATION)	L	T	P	C
		3	1	0	4

(Common for ECE, MECH & BME Programme)

MODULE I MATRICES **9 Hours**

Inverse and rank of a matrix - rank-nullity theorem - System of linear equations – Symmetric-skew-symmetric and orthogonal matrices – Determinants - Eigen values and Eigen vectors-Diagonalization of matrices-Cayley-Hamilton Theorem - Orthogonal transformation.

MODULE II DIFFERENTIAL CALCULUS **9 Hours**

Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature- Evaluates and involutes.

MODULE III INTEGRAL CALCULUS **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.

MODULE IV SEQUENCES AND SERIES **9 Hours**

Convergence of sequence and series-Tests for convergence - Power series - Taylor's series, Series for exponential - trigonometric and logarithm functions.

MODULE V PARTIAL DIFFERENTIATION **9 Hours**

Partial derivatives, total derivative; Maxima, minima and saddle points; Method of Lagrange multipliers.

TOTAL: 45 HOURS

REFERENCES:

1. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2018.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010

1901CH102 **CHEMISTRY FOR ELECTRONIC ENGINEERS** **L T P C**
(Common for ECE & EEE Programme) **3 0 0 3**

Employability | Entrepreneurship

MODULE I **9 Hours**

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

MODULE II **9 Hours**

Semiconductors- Conductors, insulators, semiconductors, – Band theory semiconductors – Junction devices – Super conductivity – Ionic conductivity – defects in stoichiometric and Non stoichiometric crystals. Optical properties of solids – Lasers and phosphors – Photovoltaic effect- Solar energy storage and conversion materials.

MODULE III **9 Hours**

Materials for communications - crystalline semiconductors; metalized film conductors; dielectric films; solders; ceramics and polymers. Electronic materials, Semiconductor crystals - Silicon, III–V compounds, Photoresist films, Packaging materials, Photonic materials, Crystalline materials - Epitaxial layers, Optical switching, Optical transmission-NLO and OLED Materials.

MODULE IV **9 Hours**

Biosensors- biosensors -types of biosensors- magnetic biosensors, thermal biosensors- piezoelectric biosensors- optical biosensors - applications of biosensor. introduction: classification of polymers – natural and synthetic; thermoplastic and thermosetting. conducting polymers, electron conducting polymers- polyaniline (pan), polypyrroles (ppy), polythiophenes (pt) and polyphenylene vinylenes (ppv) - light emitting diodes , photo-induced doping.

MODULE V **9 Hours**

Nanotechnology - Basics - distinction between molecules, nanoparticles and bulk materials; size-dependent properties. Nanoparticles: nano cluster, nano rod, nanotube (CNT) and nanowire. Synthesis: precipitation, thermolysis, hydrothermal, solvothermal, electrodeposition, chemical vapour deposition, laser ablation; Properties and applications.

TOTAL: 45 HOURS

REFERENCES:

1. Dara S.S, Umare S.S, "Engineering Chemistry", S. Chand & Company Ltd., New Delhi 2010.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company, Ltd., New delhi 2010
3. Gowariker V.R., Viswanathan N.V. and Jayadev Sreedhar, "Polymer Science", New Age .
4. Ozin G. A. and Arsenault A. C., "Nanochemistry: A Chemical Approach to Nanomaterials", RSC Publishing, 2005
5. Biosensors: An Introductory Textbook by C. S. Pundir and Jagriti Narang,2017
6. J.O.M.Bockris & A.K.N.Reddy, "Modern Electrochemistry –Vol. I & II" , Plenum Press, New York, 2000
7. Peter Atkins and Julio de Paula, "Physical Chemistry", VII Edition, Oxford University Press, New York, 2002.
8. A.J. Bard and L.R. Faulkner, "Electrochemical Methods – Fundamentals and applications" 3 rd edition John Wiley & Sons Inc, 2001.

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	PROGRAMMING FOR PROBLEM SOLVING	L	T	P	C
1901GEX03	(Common for all B.E./B.Tech Programme)	3	0	3	4

Entrepreneurship

MODULE I INTODUCTION TO PROGRAMMING **9 Hours**

Components of Computers and its Classifications- Problem Solving Techniques – Algorithm- Flowchart–Pseudo code – Program-Compilation -Execution

MODULE II BASICS OF C PROGRAMMING **9 Hours**

Structure of C program - C programming: Data Types – Storage classes - Constants – Enumeration Constants - Keywords – Operators: Precedence and Associativity - Expressions - Input/output statements – Decision making statements - Switch statement - Looping statements – Pre-processor directives.

MODULE III ARRAYS AND STRINGS **9 Hours**

Introduction to Arrays: Declaration, Initialization – One dimensional array – Two dimensional arrays – Example Program: Matrix Operations - String operations

MODULE IV FUNCTIONS AND POINTERS **9 Hours**

Introduction to functions: Function prototype, function definition, function call, Built-in functions – Recursion – Example Program – Pointers – Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers – Example Program: Sorting of names – Parameter passing: Pass by value, Pass by reference – Example Program: Swapping of two numbers and changing the value of a variable using pass by reference

MODULE V STRUCTURES & FILE PROCESSING **9 Hours**

Structure - Nested structures – Pointer and Structures – Array of structures – Example Program using structures and pointers – Dynamic memory allocation -Files – Types - File processing: Sequential access, Random access - Command line arguments

TOTAL: 45 HOURS

REFERENCES:

1. Paul Deitel and Harvey Deitel, —C How to Program‖, Seventh edition, Pearson Publication
2. Juneja, B. L and Anita Seth, —Programming in C‖, CENGAGE Learning India pvt. Ltd., 2011
3. Pradip Dey, Manas Ghosh, —Fundamentals of Computing and Programming in C‖, First Edition, Oxford University Press, 2009.
4. Anita Goel and Ajay Mittal, —Computer Fundamentals and Programming in C‖, Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
5. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C",McGraw-Hill Education, 1996.

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1901ENX01 **ENGLISH FOR ENGINEERS** **L T P C**

(Common for all B.E./B.Tech. Programme) **3 0 0 3**

Skill Development

MODULE I FOCUS ON LANGUAGE (Vocabulary and Grammar) **9 Hours**

Vocabulary -The Concept of Word Formation - prefixes- suffixes- Synonyms – Antonyms - Grammar -Articles- Preposition- Adjective-Adverb-connectives -Tenses (present, past & future) - Sentence pattern- types of sentences -Active voice –passive voice and Impersonal passive voice - Wh- Questions.

MODULE II LISTENING SKILLS **9 Hours**

Listening- listening intently-arousing and sustaining interest-listening to short or longer texts- formal and informal conversations- telephonic etiquettes- narratives from different sources. -listening and Note taking- correlative verbal and nonverbal communication-listening to TOEFL & IELTS programs-listening to Project presentation- listening to technical seminar and conferences.

MODULE III SPEAKING SKILLS **9 Hours**

Speaking - stress and intonation –persuasive speaking -Describing person, place and thing - sharing personal information — greetings –taking leave -Individual and Group Presentation-impromptu Presentation-public speaking-Group Discussion- project planning-facing viva voce and delivering project.

MODULE IV READING SKILLS **9 Hours**

Reading– comprehending general and technical articles -cloze reading - inductive reading- short narrative and descriptions from newspapers – Skimming and scanning-reading and interpretation-critical reading interpreting and transferring graphical information- sequencing of sentences-analytical reading on various Projects.

MODULE V WRITING SKILLS **9 Hours**

Writing- Precise writing –Summarizing- interpreting visual texts (pie chart, bar chart, picture - advertisements etc., - Proposal writing (launching new units or department in a institution or industry & to get loan from bank) -report writing (accident, progress, project, survey, Industrial visit)- job application- e-mail drafting- letter writing (permission, accepting and decaling)-instructions – recommendations –checklist

TOTAL: 45 HOURS

REFERENCES:

1. Raman, Meenakshi and Sangeetha Sharma, "Technical Communication: Principles and Practice", Oxford University Press, New Delhi, 2011.
2. Rizvi and Ashraf M., "Effective Technical Communication", Tata McGraw-Hill, New Delhi, 2005.
3. G. Radhakrishna Pillai, "English for Success", Central Institute of English and Foreign Languages", Emerald Publishers ,Hyderabad, 2003
4. Jones, D, "The Pronunciation of English", CUP, . Cambridge,2002.

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1901GNX51	ENGINEERING INTELLIGENCE I (Common for all B.E./B.Tech. Programme)	L	T	P	C
		0	0	2	1

MODULE I BEHAVIORAL CHANGES – TRANSITION OF SCHOOL TO COLLEGE **6 Hours**

Vocabulary -The Concept of Word Formation - prefixes- suffixes- Synonyms – Antonyms - Grammar - Articles-Preposition- Adjective-Adverb-connectives -Tenses (present, past & future) - Sentence pattern-types of sentences -Active voice –passive voice and Impersonal passive voice - Wh- Questions.

MODULE II EXPOSURE TO INDIVIDUAL COMPETANCE **6 Hours**

Listening- listening intently-arousing and sustaining interest-listening to short or longer texts- formal and informal conversations- telephonic etiquettes- narratives from different sources. -listening and Note taking- correlative verbal and nonverbal communication-listening to TOEFL & IELTS programs-listening to Project presentation- listening to technical seminar and conferences.

MODULE III CAREER PLANNING **6 Hours**

Speaking - stress and intonation –persuasive speaking -Describing person, place and thing - sharing personal information — greetings –taking leave -Individual and Group Presentation-impromptu Presentation-public speaking-Group Discussion- project planning-facing viva voce and delivering project.

MODULE IV INTRODUCTION TO COMMUNICATION SKILLS **6 Hours**

Reading– comprehending general and technical articles -cloze reading - inductive reading- short narrative and descriptions from newspapers – Skimming and scanning-reading and interpretation-critical reading interpreting and transferring graphical information- sequencing of sentences-analytical reading on various Projects.

MODULE V COMMUNICATION EXERCISE-1 **6 Hours**

Writing- Precise writing –Summarizing- interpreting visual texts (pie chart, bar chart, picture - advertisements etc., - Proposal writing (launching new units or department in a institution or industry & to get loan from bank) -report writing (accident, progress, project, survey, Industrial visit)- job application-e-mail drafting- letter writing (permission, accepting and decaling)-instructions – **recommendations –checklist**

TOTAL: 30 HOURS

REFERENCES:

1. Dr.P.Prasad(2012) "The Functional Aspects of COMMUNICATION SKILLS";fifth Edition;S.K Kataria &Sons Publication
2. Kalyana; (2015) "Soft Skill for Managers"; First Edition; Wiley Publishing Ltd.
3. Aruna Koneru (2008) "Professional Communication"; Second edition; Tata McGraw-Hill Publishing Ltd.

1901HS151

COMMUNICATION SKILLSLAB (Common for all B.E./B.Tech. Programme)	**L**	**T**	**P**	**C**
	0	**0**	**2**	**1**

List of Experiments:

1. **Activities on Fundamentals of Inter-personal Communication**

Starting a conversation - responding appropriately and relevantly - using the right body language - Role Play in different situations & Discourse Skills- using visuals.

2. **Activities on Reading Comprehension**

General Vs Local comprehension, reading for facts, guessing meanings from context, Scanning, skimming, and 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/ Proposal writing/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.- creative and critical thinking.

5. **Activities on Soft 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-Timemanagement-stress management –paralinguistic features- Multiple intelligences – emotionalintelligence – spiritual quotient (ethics) – intercultural communication – creative and critical.

Total: 45 Hours

References:

1. Raman, Meenakshi and Sangeetha Sharma, "Technical Communication: Principles and Practice", Oxford University Press, New Delhi, 2011.
2. Sudha Rani, D , "Advanced Communication Skills Laboratory Manual" , Pearson Education 2011.
3. Paul V. Anderson ,"Technical Communication",. Cengage Learning pvt. Ltd. New Delhi, 2007.
4. "English Vocabulary in Use series", Cambridge University Press 2008.
5. "Management Shapers Series" ,Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
6. Rizvi and Ashraf M., "Effective Technical Communication", Tata McGrawHill, New Delhi, 2005.
7. Jones, D, "The Pronunciation of English", CUP, . Cambridge,2002.

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NAGAPATTINAM – 611 002

B.E ELECTRONICS AND COMMUNICATION ENGINEERING

First Year – Second Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1901MA204	Engineering Mathematics –II (Calculus, Ordinary Differential Equations and Complex Variable)	3	2	0	4	40	60	100
1901PH202	Semiconductor Physics and Optoelectronics	3	0	0	3	40	60	100
1901GEX01	Basic Electrical and Electronics Engineering	3	0	0	3	40	60	100
1901GEX02	Engineering Graphics	2	2	0	3	50	50	100
1901GE201	Engineering Exploration	2	0	0	2	40	60	100
Laboratory Course								
1901GE254	Computer Hardware and IT Essentials Lab	0	0	2	1	50	50	100
1901GE252	Engineering Intelligence - II	0	0	2	1	100	0	100
1901GEX51	CAD Lab	0	0	2	1	50	50	100
1901GEX53	Basic Electrical and Electronics Engineering Lab	0	0	2	1	50	50	100
1901PHX51	Engineering Physics Lab	0	0	2	1	50	50	100

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

1901CHX51

ENGINEERING CHEMISTRY LAB
(Common for all B.E./B.Tech. Programme)

L	T	P	C
0	0	2	1

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 viscometer method
7. Conductometric titration of strong acid Vs strong Base
8. Estimation of dissolved oxygen in a water sample/sewage by Winkler's method.
9. Comparison of alkalinities of the given water samples
10. Determination of concentration of unknown colored solution using spectrophotometer
11. Determination of percentage of copper in alloy
12. Determination of ferrous iron in cement by spectrophotometry method
13. Adsorption of acetic acid on charcoal
14. Determination the flash point and fire point of a given oil using pen skyMartine closed cup apparatus
15. Determination the calorific value of solid fuels
16. Determination the structural of the compound using chemo software.

Total: 45 Hours

References:

1. Furniss B.S. Hannaford A.J, Smith P.W.G and Tatchel A.R., "Vogel"s Textbook of practical organic chemistry", LBS Singapore (1994).
2. 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.
3. Daniel R. Palleros, "Experimental organic chemistry" John Wiley & Sons, Inc., New Yor (2001).
4. Kolthoff I.M., Sandell E.B. et al. "Quantitative chemical analysis", Mcmillan, Madras 1980.

1901MA204	ENGINEERING MATHEMATICS – II (Calculus, Ordinary Differential Equations and Complex Variable)	L	T	P	C
		3	2	0	4

MODULE I LAPLACE TRANSFORM Skill Development Entrepreneurship **12 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.

MODULE II VECTOR CALCULUS **12 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.

MODULE III ORDINARY DIFFERENTIAL EQUATIONS **12Hours**

Second order linear differential equations with variable coefficients, method of variation of parameters.

MODULE IV COMPLEX VARIABLE – DIFFERENTIATION **12Hours**

Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; Conformal mappings, Mobius transformations.

MODULE V COMPLEX VARIABLE– INTEGRATION **12 Hours**

Contour integrals, Cauchy Integral formula (without proof), Taylor"s series, zeros of analytic functions, singularities, Laurent"s series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.

TOTAL: 60 HOURS

REFERENCES:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.
4. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
5. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., McGraw Hill, 2004.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

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1901PH202 SEMICONDUCTOR PHYSICS AND OPTOELECTRONICS

L	T	P	C
3	0	0	3

MODULE I ELECTRONIC MATERIALS **9 Hours**

Free electron theory, Density of states and energy band diagrams, Energy bands in solids, E-k diagram, Direct and indirect bandgaps, Types of electronic materials: metals, semiconductors and insulators, Occupation probability, Fermi level.

MODULE II SEMICONDUCTORS **9 Hours**

Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier- concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Metal- semiconductor junction (Ohmic and Schottky).

MODULE III SEMICONDUCTOR LASERS **9 Hours**

Optical transitions in bulk semiconductors: absorption, spontaneous emission, and stimulated emission; Density of states for photons, Transition rates (Fermi's golden rule), Optical loss and gain. Semiconductor laser (GaAs): materials, device characteristics, figures of merit and Vertical-Cavity Surface-Emitting Lasers (VECSEL), Tunable semiconductor lasers.

MODULE IV SEMICONDUCTOR PHOTODETECTORS **9 Hours**

Types of semiconductor photodetectors -p-n junction, PIN, and Avalanche and their structure, working principle, and characteristics, Noise limits on performance; Solar cells.

MODULE V NANO- OPTOELECTRONIC DEVICES **9 Hours**

Digital systems: Boolean algebra - Reduction of Boolean expressions - De-Morgan"s theorem - Logic gates - Implementation of Boolean expressions.

TOTAL: 45 HOURS

REFERENCES:

1. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc. (1995).
2. B. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc., (2007).
3. S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley (2008).
4. A. Yariv and P. Yeh, Photonics: Optical Electronics in Modern Communications, Oxford University Press, New York (2007).
5. P. Bhattacharya, Semiconductor Optoelectronic Devices, Prentice Hall of India (1997).
6. Online course: "Semiconductor Optoelectronics" by M R Shenoy on NPTEL
7. Online course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Gupta on NPTEL

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1901GEX01 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

L	T	P	C
3	0	0	3

MODULE I INTRODUCTION TO DC AND AC CIRCUITS **7 Hours**

Introduction to DC and AC circuits: Ohms law - Kirchhoff's laws - Mesh analysis - Nodal analysis - Generation of AC waveforms - Analysis of R-L, R-C, R-L-C circuits - Introduction to three phase systems - Types of connections.

MODULEII ELECTRICAL MACHINES **6 Hours**

Electrical Machines: DC Generator, DC Motor, Transformer, Induction Motor: Working principle, construction and applications.

MODULEIII MEASURING INSTRUMENTS Entrepreneurship **6 Hours**

Measuring instruments: Classification of instruments; Voltmeter, Ammeter, Wattmeter, Energy meter, Multimeter, CRO: Principles and operation.

MODULEIV SEMICONDUCTOR DEVICES Entrepreneurship **7 Hours**

Semiconductor devices: V-I characteristics of PN junction diode and Zener diode; Rectifiers - Half wave and full wave rectifiers; BJT - configurations; Amplifiers & Oscillators: classification, operation and applications; SCR: Construction and V-I characteristics; Basic power converters (Block diagram approach only).

MODULEV DIGITAL SYSTEMS **6 Hours**

Digital systems: Boolean algebra - Reduction of Boolean expressions - De-Morgan's theorem - Logic gates - Implementation of Boolean expressions.

MODULEVI COMMUNICATION SYSTEMS **6 Hours**

Communication Systems: Model of communication system - Analog and digital, Wired and wireless channel - Block diagram of various communication systems - Microwave, satellite, optical fiber and cellular mobile system.

MODULEVII ELECTRICAL SAFETY AND WIRING **7 Hours**

Electrical safety and wiring: Safety measures in electrical system - Safety devices - types of wiring - Wiring accessories- staircase, fluorescent lamps and corridor wiring - Basic principles of earthing - Types of earthing - layout of generation, transmission and distribution of power (Single line diagram).

TOTAL: 45 HOURS

REFERENCES:

1. Smarajit Ghosh, "Fundamentals of Electrical and Electronics Engineering", 2nd Edition, PHI Learning, 2010.
2. R. Muthusubramaniam, S. Salaivahanan and K.A. Mureleedharan, "Basic Electrical Electronics and Computer Engineering",Tata McGraw Hill, 2004.
3. D.P. Kothari and I.J. Nagrath, "Theory and Problems of Basic Electrical Engineering", PHI learning, New Delhi, 2004
4. J.B. Gupta, "Fundamentals of Electrical Engineering and Electronics", S.K. Kataria and Sons, Reprint 2012 Edition.
5. R.L. Boylestad and L. Nashelsky, "Electronic Devices and Circuit Theory", Pearson, 11th Edition, 2013.
6. George Kennedy and Bernard Davis, "Kennedy's Electronic communication Systems", McGraw Hill Education, 5th Edition, 2011.
7. Donald P. Leach, Albert Paul Malvino and Goutam Saha, "Digital Principles and Applications", McGraw-Hill Education, 8th Edition, 2014.

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1901GEX02	ENGINEERING GRAPHICS	L	T	P	C
		2	2	0	3

MODULE I CONCEPTS AND CONVENTIONS (Not for Examination) **5 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.

MODULEII PLANE CURVES AND FREE HAND SKETCHING **9 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.

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.

MODULEIII PROJECTION OF POINTS, LINES AND PLANE SURFACES **9 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.

MODULEIV PROJECTION OF SOLIDS **9 Hours**

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

MODULE V PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES **9 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.

MODULE VI ISOMETRIC AND PERSPECTIVE PROJECTIONS **9 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.

TOTAL: 45+5 HOURS

REFERENCES:

1. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore,2016.
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, 2015.
4. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2017.
5. Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2015.
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, 2016.

1901GE201	ENGINEERING EXPLORATION	L	T	P	C
		2	0	0	2

What is Engineering: Engineering Requirement, Knowledge within Engineering disciplines, Engineering advancements

Engineering Design: Problem definition, idea generation through brainstorming and researching, solution creation through evaluating and communicating, text/analysis, final solution and design improvement.

Defining problems and Brainstorming: Researching design, sketching problem solving.

Communicating solution: Dimensioning orthographic drawing, perspective drawing.

Modeling and Testing final output: Product evaluation, reverse engineering, final project report.

Civil Engineering: Structural forces structural analysis, bridge design components, structural design.

Mechanical Engineering: Types of motion, mechanical power system, mechanical power formula, mechanical design.

Electrical Engineering: Reading analog multimeter, measuring current, voltage and resistance, electricity from chemicals, solar cells, magnets, Ohms law and watts law, circuit identification and circuit calculation, resistor color code, continuity.

Computer Engineering: Logic gates, algorithms, computer architecture, binary code.

TOTAL: 30 HOURS

REFERENCES:

1. Ryan A.Brown, Joshua W.Brown and Michael Berkihiser: "Engineering Fundamentals: Design, Principles, and Careers", Goodheart-Willcox Publisher, Second Edition, 2014.
2. Saeed Moaveni ,"Engineering Fundamentals: An Introduction to Engineering", Cengage learning, Fourth Edition, 2011.

1901GE254	COMPUTER HARDWARE AND IT ESSENTIALS LAB	L	T	P	C
		0	0	2	1

List of Experiments:

1. Study of hardware components (such as storage devices, I/O devices, CPU, Motherboard, other peripherals).
2. Installation of operating systems (Windows and Linux).
3. Other software installation.
4. Study of network components.
5. Network establishment(configuring IP address, Domain name system)
6. Study of Internet.
7. Introduction to Web.
8. Usage of internet services- Email, File Sharing, Social Media etc.
9. Study of firewalls and Antivirus.
10. Troubleshooting various problems.

Skill Development

TOTAL: 30 HOURS

REFERENCES:

1. Craig Zacker& John Rourke, "The complete reference:PC hardware", Tata McGrawHill, New Delhi, 2001.
2. Mike Meyers, "Introduction to PC Hardware and Troubleshooting", Tata McGrawHill, New Delhi, 2003.
3. B.Govindarajulu, "IBM PC and Clones hardware trouble shooting and maintenance",
4. Tata McGraw-Hill, New Delhi, 2002
5. R. Kelly Rainer , Casey G. Cegielski , Brad Prince, Introduction to Information Systems, Fifth Edition, Wiley Publication, 2014.
6. James F. Kurose, —Computer networking: A Top-Down Approachl, Sixth Edition, Pearson, 2012.
7. R. Kelly Rainer , Casey G. Cegielski , Brad Prince, Introduction to Information Systems, Fifth Edition, Wiley Publication, 2014
8. Craig Zacker& John Rourke, "The complete reference:PC hardware", Tata McGrawHill, New Delhi, 2001.

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1901GE252	ENGINEERING INTELLIGENCE II	L	T	P	C
		0	0	2	1

Skill Development

MODULE I VOCABULARY BULIDING **6 Hours**

Parts of Grammar- SVA- Art of Writing- word building activities

MODULEII COMMUNICATION WORKSHOP **6 Hours**

Story Telling- Newspaper Reading-Extempore.

MODULEIII INTERPERSONAL SKILLS **6 Hours**

Personality Development - Creativity and innovation –Critical Thinking and Problem Solving – Work Ethics-Technical Skill Vs Interpersonal Skills

MODULEIV LEADERSHIP& EMPLOYABILITY SKILLS **6 Hours**

Levels of Leadership-Making of leader-Types of leadership-Transactions Vs Transformational Leadership – Exercises - Industry Expectations & Career Opportunities- Recruitment patterns.

MODULE V RESUME BUILDING **6 Hours**

Importance of Resume- Resume Preparation - introducing onself

TOTAL: 30 HOURS

REFERENCES:

1. Barun K. Mitra; (2011), "Personality Development & Soft Skills", First Edition; Oxfor Publishers.
2. Raymond Murphy, Essential English Grammar in Use, Cambridge University press, New Delhi, Third Edition , 2007.
3. Arun Sharma and Meenakshi Upadhyav, How to Prepare for Verbal Ability and Reading Comprehension for CAT, McGrawHill Publication, Seventh Edition 2017.

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1901GEX51	CAD (COMPUTER AIDED DRAFTING) LAB	L	T	P	C
		0	0	2	1

List of Experiments:

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

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.
2. Drawing of a Title Block with necessary text and projection symbol.
3. Drawing of curves like parabola, spiral, involute using B-spline or cubic spline.
4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, and dimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. V-block, Base of a mixie, Simple stool, Objects with hole and curves).
6. Drawing sectional views of prism, pyramid, cylinder, cone, etc,
7. Drawing isometric projection of simple objects.
8. Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-D model.

TOTAL: 30 HOURS

References:

1. N.D. Bhatt, Machine Drawing, Charotar Publishing House Pvt. Ltd., 2014.
2. P.S. Gill, A Textbook of Machine Drawing, Katson books, 2013.
3. R.K. Dhawan, A Textbook of Machine Drawing, S. Chand,2012.
4. K.C. John, Textbook of Machine Drawing, PHI Learning Pvt. Ltd.,2009.

1901GEX53	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY	L	T	P	C
		0	0	2	1

List of Experiments:

1. Experiments related to verification of Ohm"s law and Kirchhoff"s laws
2. Experiments involving logic gates
3. Fan and light control using regulators
4. Design of 6V regulated power supply
5. Energy conservation demonstration experiment using energy meter
6. Waveform generation and calculation of RMS and average values
7. IC 555 and IC 741 based experiments
8. Experiments in earthing
9. Staircase wiring and residential building wiring
10. Speed control of DC shunt motor

Total: 30 Hours

References:

1. Edward Hughes, " Electrical Technology,", Pearson Education
2. D.P. Kothari and Nagrath" Basic Electronics",MH Education 2013.
3. Paul Scherz and Simon Monk "Practical Electronics for inventors" Mc Graw Hill Publications 2013.

1901PHX51	ENGINEERING PHYSICS LAB	L	T	P	C
		0	0	2	1

List of Experiments:

1. Determination of wavelength of various colours of mercury spectrum using Laser grating
2. Determination of velocity of liquids using ultrasonic interferometer
3. Determine the dispersive power of a prism using spectrometer
4. Determine the unknown resistance of the given wire using Carey-Foster"s Bridge
5. Determine the band gap of the given semiconductor
6. Determine the acceptance angle and particle size using Laser
7. Torsional pendulum – Rigidity modulus of a steel wire
8. Thickness of a thin wire – Air Wedge
9. Measurement of Young"s modulus – Uniform and Non-uniform bending
10. Thermal conductivity –Lee"s Disc method

Total: 45 Hours

References:

1. „Practical Physics", R.K. Shukla, Anchal Srivastava, New age international (2011)
2. „B.Sc. Practical Physics", C.L Arora, S. Chand &Co. (2012)

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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

References:

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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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

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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