



St. Martin's Engineering College

UGC Autonomous
NBA & NAAC A+ Accredited
Dhulapally, Secunderabad-500 100
www.smec.ac.in



DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

I YEAR I SEMESTER

S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1	MA101BS	Matrices and Calculus	3	1	0	4	40	60	100
2	AP102BS	Applied Physics	3	1	0	4	40	60	100
3	CS108ES	C Programming for Engineers	3	0	0	3	40	60	100
4	ME107ES	Engineering Workshop	0	1	3	2.5	40	60	100
5	EN104HS	English for Skill Enhancement	2	0	0	2	40	60	100
6	EC106ES	Elements of Electronics and Communication Engineering	0	0	2	1	50	-	50
7	AP103BS	Applied Physics Laboratory	0	0	3	1.5	40	60	100
8	EN105HS	English Language and Communication Skills Laboratory	0	0	2	1	40	60	100
9	CS109ES	C Programming for Engineers Laboratory	0	0	2	1	40	60	100
Total			11	3	12	20	370	480	850
Mandatory Course (Non-Credit)									
10	*CH109MC	Environmental Science	3	0	0	0	100	-	100
11		Induction Programme	-	-	-	-	-	-	-

I YEAR II SEMESTER

S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1	MA201BS	Ordinary Differential Equations and Vector Calculus	3	1	0	4	40	60	100
2	CH202BS	Engineering Chemistry	3	1	0	4	40	60	100
3	ME208ES	Computer Aided Engineering Graphics	1	0	4	3	40	60	100
4	EE206ES	Basic Electrical Engineering	2	0	0	2	40	60	100
5	EC203ES	Electronic Devices and Circuits	2	0	0	2	40	60	100
6	CS208ES	Applied Python Programming Laboratory	0	1	2	2	40	60	100
7	CH204BS	Engineering Chemistry Laboratory	0	0	2	1	40	60	100
8	EE208ES	Basic Electrical Engineering Laboratory	0	0	2	1	40	60	100
9	EC204ES	Electronic Devices and Circuits Laboratory	0	0	2	1	40	60	100
Total			11	3	12	20	360	540	900

*MC – Satisfied/Unsatisfied



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S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1	MA301BS	Numerical Methods and Complex Variables	3	1	0	4	40	60	100
2	EC302PC	Analog Circuits	3	0	0	3	40	60	100
3	EE310PC	Network analysis and Synthesis	3	0	0	3	40	60	100
4	EC303PC	Digital Logic Design	3	0	0	3	40	60	100
5	EC304PC	Signals and Systems	3	1	0	4	40	60	100
6	EC305PC	Analog Circuits Laboratory	0	0	2	1	40	60	100
7	EC306PC	Digital logic Design Laboratory	0	0	2	1	40	60	100
8	EC307ES	Basic Simulation Laboratory	0	0	2	1	40	60	100
Total			15	2	6	20	320	480	800
Mandatory Course (Non-Credit)									
9	*CI309MC	Constitution of India	3	0	0	-	100	-	100

II YEAR II SEMESTER

S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1	EC401ES	Probability Theory and Stochastic Processes	3	0	0	3	40	60	100
2	EC402PC	Electromagnetic Fields and Transmission Lines	3	0	0	3	40	60	100
3	EC403PC	Analog and Digital Communications	3	0	0	3	40	60	100
4	EC404PC	Linear and Digital IC Applications	3	0	0	3	40	60	100
5	EC405PC	Electronic Circuit Analysis	3	0	0	3	40	60	100
6	EC406PC	Analog and Digital Communications Laboratory	0	0	2	1	40	60	100
7	EC407PC	Linear and Digital IC Applications Laboratory	0	0	2	1	40	60	100
8	EC408PC	Electronic Circuit Analysis Laboratory	0	0	2	1	40	60	100
9	EC409PC	Real Time Project/ Field Based Project	0	0	4	2	50	-	50
Total			15	0	12	20	370	480	850
Mandatory Course (Non-Credit)									
10	*GS409MC	Gender Sensitization Lab	0	0	2	-	100	-	100

*MC – Satisfied/Unsatisfied



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MATRICES AND CALCULUS

I B. TECH- I SEMESTER (R22)								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
MA101BS	B. Tech	3	1	0	4	40	60	100
<p>COURSE OBJECTIVES</p> <p>To learn</p> <ol style="list-style-type: none"> Types of matrices and their properties. Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations. Concept of eigen values and eigen vectors and to reduce the quadratic form to canonical form Geometrical approach to the mean value theorems and their application to the mathematical problems Evaluation of surface areas and volumes of revolutions of curves. Evaluation of improper integrals using Beta and Gamma functions. Partial differentiation, concept of total derivative Finding maxima and minima of function of two and three variables. Evaluation of multiple integrals and their applications <p>COURSE OUTCOMES</p> <p>Upon successful completion of the course, the student is able to</p> <ol style="list-style-type: none"> Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations. Find the Eigen values and Eigen vectors Reduce the quadratic form to canonical form using orthogonal transformations. Solve the applications on the mean value theorems. Evaluate the improper integrals using Beta and Gamma functions Find the extreme values of functions of two variables with/without constraints. Evaluate the multiple integrals and apply the concept to find areas, volumes. 								
UNIT-I	MATRICES						Classes: 10	
Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss- Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.								

UNIT-II	EIGEN VALUES AND EIGEN VECTORS	Classes:10
<p>Linear Transformation and Orthogonal Transformation: Eigen values, Eigen vectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.</p>		
UNIT-III	CALCULUS	Classes:10
<p>Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem, Taylor's Series. Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.</p>		
UNIT-IV	MULTIVARIABLE CALCULUS (PARTIAL DIFFERENTIATION AND APPLICATIONS)	Classes: 10
<p>Definitions of Limit and continuity. Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.</p>		
UNIT-V	MULTIVARIABLE CALCULUS (INTEGRATION)	Classes: 10
<p>Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).</p>		
TEXT BOOKS		
<ol style="list-style-type: none"> 1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010. 2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Editon, 2016. 		
REFERENCE BOOKS		
<ol style="list-style-type: none"> 1. Dr. D. Ranadheer Reddy, Mr. K Upender Reddy & Mr. G Chandra Mohan, A First Course in Linear Algebra and Calculus for Engineers, M/s Students Helpline Publishing House Pvt. Ltd, First Edition-2020. 2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006. 3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint,2002. 4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,Reprint, 2008. 5. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi. 		

WEB REFERENCES

1. <https://www.efunda.com/math/gamma/index.cfm>
2. <https://mathworld.wolfram.com/CanonicalForm.html>
3. <https://mathworld.wolfram.com/Binomial.html>
4. <https://www.mathworld.wolfram.com/>

E -TEXT BOOKS

1. <https://www.e-booksdirectory.com/listing.php?category=4>
2. <https://www.e-booksdirectory.com/details.php?ebook=10830>

MOOCS COURSE

1. https://onlinecourses.nptel.ac.in/noc22_ma75/preview
2. https://onlinecourses.swayam2.ac.in/cec20_ma22/preview

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APPLIED PHYSICS

I B. TECH- I SEMESTER (R22)									
Course Code	Category	Hours / Week			Credits	MaximumMarks			
		L	T	P		C	CIE	SEE	Total
AP102BS	B. Tech	3	1	0	4	40	60	100	
COURSE OBJECTIVES									
To learn									
<ol style="list-style-type: none"> 1. Understand the basic principles of quantum physics and band theory of solids. 2. Understand the underlying mechanism involved in construction and working principles of various semiconductor devices. 3. Study the fundamental concepts related to the dielectric, magnetic and energy materials. 4. Identify the importance of nanoscale, quantum confinement and various fabrication techniques. 5. Study the characteristics of lasers and optical fibres. 									
COURSE OUTCOMES									
Upon successful completion of the course, the student will be able to									
<ol style="list-style-type: none"> 1. Understand physical world from fundamental point of view by the concepts of Quantum mechanics and visualize the difference between conductor, semiconductor and an insulator by classification of solids. 2. Identify the role of semiconductor devices in science and engineering Applications. 3. Explore the fundamental properties of dielectric, magnetic materials and energy for their applications. 4. Appreciate the features and applications of Nanomaterials. 5. Understand various aspects of Lasers and Optical fiber and their applications in diverse fields. 									
UNIT-I		QUANTUM PHYSICS AND SOLIDS					Classes:12		
<p>Quantum Mechanics: Introduction to quantum physics, blackbody radiation – Stefan-Boltzmann’s law, Wein’s and Rayleigh-Jean’s law, Planck’s radiation law - photoelectric effect - Davisson and Germer experiment –Heisenberg uncertainty principle - Born interpretation of the wave function – time independent Schrodinger wave equation - particle in one dimensional potential box.</p> <p>Solids: Symmetry in solids, free electron theory (Drude & Lorentz, Sommerfeld) - Fermi-Dirac distribution - Bloch’s theorem -Kronig-Penney model – E-K diagram- effective mass of electron-origin of energy bands- classification of solids.</p>									

UNIT-II	SEMICONDUCTORS AND DEVICES	Classes: 12
<p>Intrinsic and extrinsic semiconductors – Hall effect - direct and indirect band gap semiconductors - construction, principle of operation and characteristics of P-N Junction diode, Zener diode and bipolar junction transistor (BJT)–LED, PIN diode, avalanche photo diode (APD) and solar cells, their structure, materials, working principle and characteristics.</p>		
UNIT-III	DIELECTRIC, MAGNETIC AND ENERGY MATERIALS	Classes:12
<p>Dielectric Materials: Basic definitions- types of polarizations (qualitative) - ferroelectric, piezoelectric and pyroelectric materials – applications – liquid crystal displays (LCD) and crystal oscillators.</p> <p>Magnetic Materials: Hysteresis-soft and hard magnetic materials-magneto strict ion, magneto resistance - applications - bubble memory devices, magnetic field sensors and multiferroics. Energy Materials: Conductivity of liquid and solid electrolytes- superionic conductors - materials and electrolytes for super capacitors - rechargeable ion batteries, solid fuel cells.</p>		
UNIT-IV	NANOTECHNOLOGY	Classes:12
<p>Nanoscale, quantum confinement, surface to volume ratio, bottom-up fabrication: sol-gel, precipitation, combustion methods – top-down fabrication: ball milling - physical vapor deposition (PVD) - Chemical vapor deposition (CVD) - characterization techniques - XRD, SEM & TEM - applications of nanomaterials.</p>		
UNIT-V	LASER AND FIBER OPTICS	Classes:12
<p>Lasers: Laser beam characteristics-three quantum processes- Einstein coefficients and their relations- lasing action - pumping methods- Ruby laser, He-Ne laser , CO₂ laser, Argon ion Laser, Nd: YAG laser- semiconductor laser-applications of laser.</p> <p>Fiber Optics: Introduction to optical fiber- advantages of optical Fibers - total internal reflection- construction of optical fiber - acceptance angle - numerical aperture- classification of optical fibers- losses in optical fiber - optical fiber for communication system - applications.</p>		
TEXT BOOKS		
<ol style="list-style-type: none"> 1. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy” A Text book of Engineering Physics”- S. Chand Publications, 11th Edition 2019. 2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication,2019 3. Semiconductor Physics and Devices- Basic Principle – Donald A, Neamen, Mc Graw Hill, 4th Edition,2021. 4. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2nd Edition, 2022. 5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives Nano Digest, 1st Edition, 2021. 		

REFERENCE BOOKS

1. Dr. K. Venkanna and Dr. P. NageswarRao, Applied Physics, Seven Hills International Publishers, 2021.
2. Quantum Physics, H.C. Verma, TBS Publication, 2nd Edition 2012.
3. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley & Sons, 11th Edition, 2018.
4. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.
5. Elementary Solid State Physics, S.L. Gupta and V. Kumar, Pragathi Prakashan, 2019.
6. A.K. Bhandhopadhyaya - Nano Materials, New Age International, 1st Edition, 2007.
7. Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Storage Aliaksandr S. Bandarenka, CRC Press Taylor & Francis Group
8. Energy Materials, Taylor & Francis Group, 1st Edition, 2022.

WEB REFERENCES

1. <https://ocw.tudelft.nl/courses/solid-state-physics/subjects/3-quantum-theory-of-solids/>
2. <https://byjus.com/physics/semiconductor-devices/>
3. <https://www.nano.gov/nanotech-101/what/definition>
4. <https://www.studocu.com/in/document/delhi-technological-university/engineering-physics/fiber-optics-laser-notes/26618092>

E -TEXT BOOKS

1. <https://www.pdfdrive.com/physics-for-scientists-engineers-modern-physics-9th-ed-e51722698.html>
2. <https://www.pdfdrive.com/physics-for-scientists-engineers-modern-physics-9th-ed-e43567270.html>

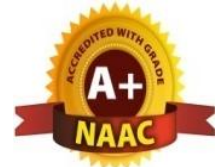
MOOCS COURSE

1. Swayam: https://swayam.gov.in/nd1_noc19_ph13/preview
2. Alison: <https://alison.com/courses?&category=physics>



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C PROGRAMMING FOR ENGINEERS

I B. TECH- I SEMESTER (R22)								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
CS108ES	B. Tech	3	0	0	3	40	60	100
<p>COURSE OBJECTIVES</p> <ol style="list-style-type: none"> 1. To learn the fundamentals of computers. 2. To understand the various steps in Program development. 3. To learn the syntax and semantics of C Programming Language. 4. To learn the usage of structured programming approach in solving problems. <p>COURSE OUTCOMES</p> <p>Upon successful completion of the course, the student is able</p> <ol style="list-style-type: none"> 1. Draw flowcharts for solving arithmetic and logical problems 2. Develop modular reusable code by understanding concepts of functions. 3. Formulate algorithms and programs using arrays, pointers, strings and structures. 4. Write a programs using Searching and sorting algorithms 								
UNIT-I	INTRODUCTION TO COMPUTER ALGORITHMS AND PROGRAMMING					Classes:10		
<p>Components of a computer system: Memory, processor, I/O devices, storage, operating system, the concept of assembler, compiler, interpreter, loader, and linker.</p> <p>From algorithm to program: Representation of an algorithm, flowchart, Pseudocode with examples, converting algorithms to programs.</p> <p>Programming Basics: Structure of C program, writing and executing the first C program, Syntax and logical errors in compilation, object, and executable code. Components of C language, standard I/O in C, data types, variables and constants, memory storage, and storage classes.</p>								
UNIT-II	EXPRESSIONS AND STATEMENTS					Classes:10		
<p>Expressions and their evaluation: Operands and Operators, formation of expressions using arithmetic, relational, logical, and bitwise operators, precedence and associativity rules, mixed operands, type conversion, and evaluation of expressions.</p> <p>Statements: Simple and compound statements, Conditional Branching: if and switch statements, nested if-else, dangling else problem, use of break and default with switch. Iteration and loops: use of while, do-while and for loops, nested loops, use of break and continue statements.</p>								

UNIT-III	FUNCTIONS AND ARRAYS	Classes:10
<p>Designing Structured Programs: Introduction to functions, advantages of modularizing a program into functions, types of functions, passing parameters to functions: call by value; call by reference, passing arrays to functions, recursion with example programs.</p> <p>Arrays: Array notation and representation, manipulating array elements, using multi-dimensional arrays, character arrays, C strings, string input/output functions, Array of strings, string manipulation functions with example programs.</p>		
UNIT-IV	POINTERS AND FILE HANDLING	Classes:10
<p>Pointers: Introduction, declaration, applications, dynamic memory allocation (malloc, calloc, realloc, free), use of pointers in self-referential structures.</p> <p>File handling: File I/O functions, standard C pre-processors, defining and calling macros, command-line arguments.</p>		
UNIT-V	DERIVED TYPES AND BASIC ALGORITHMS	Classes:10
<p>Structures, Union, Enums and Bit-fields: Defining, declaring, and usage of structures, unions, and their arrays, passing structures, and unions to functions, introduction to enums and bit-fields.</p> <p>Basic Algorithms: Searching and Sorting Algorithms (Bubble, Insertion, and Selection), finding roots of equations, notion of order of complexity through example programs.</p>		
TEXT BOOKS		
<ol style="list-style-type: none"> 1. B. A. Forouzan and R. F. Gilberg -Programming & Data Structures, 3rd Ed., Cengage Learning` 2. Byron Gottfried - Schaum's Outline of Programming with C, McGraw-Hil 		
REFERENCE BOOKS		
<ol style="list-style-type: none"> 1. Dr. P. Santosh Kumar Patra, "Programming for Problem Solving in C", Amaravati Publications. 2. Ajay Mittal - Programming in C: A practical approach, Pearson Education, 2010 3. Kernighan Brian W. and Ritchie Dennis M.- The C programming, Pearson Education. 4. J. R. Hanlyand, E. B. Koffman -Problem Solving and Program Design, 5th Ed., Pearson Education. 5. H. Cheng - C for Engineers and Scientists, McGraw-Hill International Edition 6. V. Rajaraman - Computer Basics and C Programming, PHI Learning, 2015. 		
WEB REFERENCES		
<ol style="list-style-type: none"> 1. https://www.tutorialspoint.com/cprogramming/ 2. https://www.tutorialspoint.com/cplusplus/ 3. https://www.cprogramming.com/tutorial/c-tutorial.html 		
E -TEXT BOOKS		
<ol style="list-style-type: none"> 1. https://fresh2refresh.com/c-programming/ 2. https://beginnersbook.com/2014/01/c-tutorial-for-beginners-with-examples/ 3. https://www.sanfoundry.com/simple-c-programs/ 		
MOOCS COURSE		
<ol style="list-style-type: none"> 1. nptel.ac.in/courses/106105085/4 2. https://www.quora.com/Are-IIT-NPTEL-videos-good-to-learn-basic-C-programming 		



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ENGINEERING WORKSHOP

I B. TECH- I SEMESTER (R22)								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
ME107ES	B. Tech	0	1	3	2.5	40	60	100
COURSE OBJECTIVES								
To learn								
<ol style="list-style-type: none"> To Study of different hand operated power tools, uses and their demonstration. To gain a good basic working knowledge required for the production of various engineering products. To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field. To develop a right attitude, team working, precision and safety at work place. It explains the construction, function, use and application of different working tools, equipment and machines. To study commonly used carpentry joints. To have practical exposure to various welding and joining processes. Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances. 								
COURSE OUTCOMES								
<ol style="list-style-type: none"> Study and practice on machine tools and their operations Practice on manufacturing of components using workshop trades including plumbing, fitting, carpentry, and foundry, house wiring and welding. Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling. Apply basic electrical engineering knowledge for house wiring practice. 								
LIST OF EXPERIMENTS								
1. TRADES FOR EXERCISES:								
At least two exercises from each trade:								
<ol style="list-style-type: none"> Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint) Fitting – (V-Fit, Dovetail Fit & Semi-circular fit) Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel) Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern) Welding Practice – (Arc Welding & Gas Welding) House-wiring – (Parallel & Series, Two-way Switch and Tube Light) Black Smithy – (Round to Square, Fan Hook and S-Hook) 								

<p>2. TRADES FOR DEMONSTRATION & EXPOSURE Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working.</p>
<p>TEXT BOOKS</p>
<ol style="list-style-type: none"> 1. Workshop Practice /B. L. Juneja / Cengage 2. Workshop Manual / K. Venugopal / Anuradha.
<p>REFERENCE BOOKS</p>
<ol style="list-style-type: none"> 1. Work shop Manual - R. Hanuma Naik/ R. Suvarana Babu/ Sun Techno Publications 2. Work shop Manual - P. Kannaiah/ K.L. Narayana/ Scitech 3. Workshop Manual / Venkat Reddy/ BSP
<p>WEB REFERENCES</p>
<ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/112105126/ 2. https://nptel.ac.in/downloads/112105127/ 3. https://nptel.ac.in/courses/112107145/ 4. https://nptel.ac.in/courses/122104015/
<p>E -TEXT BOOKS</p>
<ol style="list-style-type: none"> 1. http://103.135.169.82:81/fdScript/RootOfEBooks/MED/Introduction Workshop%20Technology 2. https://www.quora.com/Download-free-mechanical-engineering-ebooks-sites
<p>MOOCS COURSE</p>
<ol style="list-style-type: none"> 1. http://www.nits.ac.in/workshops/Workshop_on_MOOCS_26082017.pdf 2. https://www.nitttrc.ac.in/swayam/index.html



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ENGLISH FOR SKILL ENHANCEMENT

I B. TECH- I SEMESTER (R22)

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EN104HS	B.Tech	2	0	0	2	40	60	100

COURSE OBJECTIVES

To learn

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Develop study skills and communication skills in various professional situations.
3. Equip students to study engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.

COURSE OUTCOMES

1. Understand the importance of vocabulary and sentence structures.
2. Choose appropriate vocabulary and sentence structures for their oral and written communication.
3. Demonstrate their understanding of the rules of functional grammar.
4. Develop comprehension skills from the known and unknown passages.
5. Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts.
6. Acquire basic proficiency in reading and writing modules of English.

UNIT-I	Chapter entitled ' <i>Toasted English</i> ' by R.K.Narayan from " <i>English: Language, Context and Culture</i> " published by Orient BlackSwan, Hyderabad.	Classes: 10
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Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes - Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms

Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Reading: Reading and Its Importance- Techniques for Effective Reading.

Writing: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for Writing precisely – Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence- Organizing Principles of Paragraphs in Documents.

UNIT-II	Chapter entitled ' <i>Appro JRD</i> ' by Sudha Murthy from " <i>English: Language, Context and Culture</i> " published by Orient BlackSwan, Hyderabad.	Classes:10
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Vocabulary: Words Often Misspelt - Homophones, Homonyms and Homographs

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice

Writing: Nature and Style of Writing- Defining /Describing People, Objects, Places and Events – Classifying- Providing Examples or Evidence.

UNIT-III	Chapter entitled ‘ Lessons from Online Learning ’ by F.Haider Alvi, Deborah Hurst et al from “ <i>English: Language, Context and Culture</i> ” published by Orient BlackSwan, Hyderabad.	Classes:10
<p>Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.</p> <p>Reading: Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for Practice.</p> <p>Writing: Format of a Formal Letter-Writing Formal Letters eg., Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.</p>		
UNIT-IV	Chapter entitled ‘ Art and Literature ’ by Abdul Kalam from “ <i>English: Language, Context and Culture</i> ” published by Orient BlackSwan, Hyderabad.	Classes: 10
<p>Vocabulary: Standard Abbreviations in English</p> <p>Grammar: Redundancies and Clichés in Oral and Written Communication.</p> <p>Reading: Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice</p> <p>Writing: Writing Practices- Essay Writing-Writing Introduction and Conclusion -Précis Writing.</p>		
UNIT-V	Chapter entitled ‘ Go, Kiss the World ’ by Subroto Bagchi from “ <i>English: Language, Context and Culture</i> ” published by Orient BlackSwan, Hyderabad.	Classes: 10
<p>Vocabulary: Technical Vocabulary and their Usage</p> <p>Grammar: Common Errors in English (<i>Covering all the other aspects of grammar which were notcovered in the previous units</i>)</p> <p>Reading: Reading Comprehension-Exercises for Practice</p> <p>Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.</p>		
<p>Note: Listening and Speaking Skills which are given under Unit-6 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.</p> <ul style="list-style-type: none"> ➤ Note: 1. As the syllabus of English given in AICTE Model Curriculum-2018 for B.Tech First Year is <i>Open-ended</i>, besides following the prescribed textbook, it is required to prepare teaching/learning materials by the teachers collectively in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class. ➤ Note: 2. Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents. They are advised to teach 40 percent of each topic from the syllabus in blended mode. 		
TEXT BOOKS		
1. “English: Language, Context and Culture” by Orient BlackSwan Pvt. Ltd, Hyderabad. 2022. Print.		

REFERENCE BOOKS

1. Mr. G. Laxmikanth, Dr. Ramchandra Kumar R, and Mr. Ch. Bhaskara Rao, Professional English, Sun Techno Publications, 1st Edition, 2020.
2. Effective Academic Writing by Liss and Davis (OUP)
3. Richards, Jack C. (2022) Interchange Series. Introduction, 1,2,3. Cambridge University Press
4. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
5. Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of Functional Language, Grammar and Vocabulary. (2nd ed.). Sage Publications India Pvt. Ltd.
6. (2019). Technical Communication. Wiley India Pvt. Ltd.
7. Vishwamohan, Aysha. (2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.
8. Swan, Michael. (2016). Practical English Usage. Oxford University Press. Fourth Edition.

WEB REFERENCES

1. www.edufind.com
2. www.myenglishpages.com
3. <http://grammar.ccc.comment.edu>
4. <http://owl.english.prudue.edu>

E -TEXT BOOKS

1. <http://bookboon.com/en/communication-ebooks-zip>
2. http://learningenglishvocabularygrammar.com/files/idiomsandphraseswithmeanin_gsandexamlespdf.pdf

MOOCS COURSE

1. <https://mooc.com/courses/grammar-guru-1>
2. <https://mooc.com/courses/learning-styles>



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ELEMENTS OF ELECTRONICS AND COMMUNICATION ENGINEERING

I B. TECH- I SEMESTER (R 22)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		CIE	SEE	Total
EC106ES	B. Tech	0	0	2	1	50	-	50

COURSE OUTCOMES

Upon successful completion of the course, the student is able

1. Identify the different components used for electronics applications
2. Measure different parameters using various measuring instruments
3. Distinguish various signal used for analog and digital communications

LIST OF EXPERIMENTS

1. Understand the significance of Electronics and communications subjects
2. Identify the different passive and active components
3. Color code of resistors, finding the types and values of capacitors
4. Measure the voltage and current using voltmeter and ammeter
5. Measure the voltage, current with Multimeter and study the other measurements using Multimeter
6. Study the CRO and measure the frequency and phase of given signal
7. Draw the various Lissajous figures using CRO
8. Study the function generator for various signal generations
9. Study of Spectrum analyzer and measure the spectrum
10. Operate Regulated power supply for different supply voltages
11. Study the various gates module and write down the truth table of them
12. Identify various Digital and Analog ICs
13. Observe the various types of modulated signals.
14. Know the available Softwares for Electronics and communication application

TEXT BOOKS

1. Jacob Millman - Electronic Devices and Circuits, McGraw Hill Education
2. Robert L. Boylestead, Louis Nashelsky- Electronic Devices and Circuits theory, 11th Edition, 2009, Pearson.

REFERENCE BOOKS

1. Horowitz -Electronic Devices and Circuits, David A. Bell – 5thEdition, Oxford.
2. Chinmoy Saha, Arindam Halder, Debaati Ganguly - Basic Electronics-Principles and Applications,Cambridge, 2018.

WEB REFERENCES

1. <https://www.physics-and-radio-electronics.com/electronic-devices-and-circuits.html>
2. https://www.electronics-tutorials.ws/transistor/trans_5.html
3. <http://www.gvpcew.ac.in/LN-CSE-IT-22-32/ECE/2-Year/ECA-All-Units.pdf>
4. https://www.electronics-notes.com/articles/analogue_circuits/fet-field-effect-transistor/common-source-amplifier-circuit.php

E -TEXT BOOKS

1. <https://ia902709.us.archive.org/13/items/ElectronicDevicesAndCircuitTheory/Electronic%20Devices%20and%20Circuit%20Theory.pdf>
2. https://www.researchgate.net/publication/275408225_Electronic_Devices_and_Circuits

MOOCS COURSE

1. <https://nptel.ac.in/courses/117103063/2>
2. <https://nptel.ac.in/courses/117106087/4>
3. <https://nptel.ac.in/courses/117106087/20>



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APPLIED PHYSICS LABORATORY

I B. TECH- I SEMESTER (R22)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		CIE	SEE	Total
AP103BS	B. Tech	0	0	3	1.5	40	60	100

COURSE OBJECTIVES

The objectives of this course for the student to

1. Capable of handling instruments related to the Hall effect and photoelectric effect experiments and their measurements.
2. Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT, LED, solar cell, lasers and optical fiber and measurement of energy gap and resistivity of semiconductor materials.
3. Able to measure the characteristics of dielectric constant of a given material.
4. Study the behavior of B-H curve of ferromagnetic materials.
5. Understanding the method of least squares fitting.

COURSE OUTCOMES

Upon successful completion of the course, the student is able

1. Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.
2. Appreciate quantum physics in semiconductor devices and optoelectronics.
3. Gain the knowledge of applications of dielectric constant.
4. Understand the variation of magnetic field and behavior of hysteresis curve.
5. Carried out data analysis.

LIST OF EXPERIMENTS

1. Determination of work function and Planck's constant using photoelectric effect.
2. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
3. Characteristics of series and parallel LCR circuits.
4. V-I characteristics of a p-n junction diode and Zener diode
5. Input and output characteristics of BJT (CE, CB & CC configurations)
6. a) V-I and L-I characteristics of light emitting diode (LED)
b) V-I Characteristics of solar cell
7. Determination of Energy gap of a semiconductor.
8. Determination of the resistivity of semiconductor by two probe method.
9. Study B-H curve of a magnetic material.
10. Determination of dielectric constant of a given material
11. a) Determination of the beam divergence of the given LASER beam
b) Determination of Acceptance Angle and Numerical Aperture of an optical fiber.
12. Understanding the method of least squares – torsional pendulum as an example.

Note: Any 8 experiments are to be performed

REFERENCE BOOK

1. Dr. K. Venkanna and T. Vamshi Prasad, Applied Physics Lab Book. Spectrum Publishers, 2021
2. S. Balasubramanian, M.N. Srinivasan “A Text book of Practical Physics”- S ChandPublishers, 2017.

WEB REFERENCES

1. Fundamental concepts of semi conductors: <https://nptel.ac.in/courses/115102025/>
2. Semi conductor Optoelectronics: <https://nptel.ac.in/courses/115102103/>

E -TEXT BOOKS

1. <http://www.lehman.edu/faculty/kabat/F2019-166168.pdf>
2. <https://www.scribd.com/doc/143091652/ENGINEERING-PHYSICS-LAB-MANUAL>

MOOCS COURSE

1. https://swayam.gov.in/nd1_noc19_ph13/preview
2. <https://alison.com/courses?&category=physics>



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ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY

I B. TECH- I SEMESTER (R22)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		CIE	SEE	Total
EN105HS	B. Tech	0	0	2	1	40	60	100

The English Language and Communication Skills (ELCS) Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

COURSE OBJECTIVES

The objectives of this course for the student to

1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
3. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
4. To improve the fluency of students in spoken English and neutralize the impact of dialects.
5. To train students to use language appropriately for public speaking, group discussions and interviews

COURSE OUTCOMES

Upon successful completion of the course, the student is able

1. Understand the nuances of English language through audio- visual experience and group activities
2. Neutralize their accent for intelligibility
3. Speak with clarity and confidence which in turn enhances their employability skills

SYLLABUS:

English Language and Communication Skills Lab (ELCS) shall have two parts:

- a. Computer Assisted Language Learning (CALL) Lab
- b. Interactive Communication Skills (ICS) Lab

LISTENING SKILLS:

Objectives

1. To enable students develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions.

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different

sounds, to be able to mark stress and recognize and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

SPEAKING SKILLS:

Objectives

1. To involve students in speaking activities in various contexts
 2. To enable students express themselves fluently and appropriately in social and professional contexts
- Oral practice
 - Describing objects/situations/people
 - Role play – Individual/Group activities
 - Just A Minute (JAM) Sessions

The following course content is prescribed for the English Language and Communication Skills Lab

EXERCISE – I

CALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening. Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs- Consonant Clusters- Past Tense Marker and Plural Marker- Testing Exercises

ICS Lab:

Understand: Spoken vs. Written language- Formal and Informal English. Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

EXERCISE – II

CALL Lab:

Understand: Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Stress pattern in sentences – Intonation. Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern in sentences – Intonation - Testing Exercises

ICS Lab:

Understand: Features of Good Conversation – Strategies for Effective Communication. Practice: Situational Dialogues – Role Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette

EXERCISE – III

CALL Lab:

Understand: Errors in Pronunciation-Neutralising Mother Tongue Interference (MTI). Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation -Testing Exercises

ICS Lab:

Understand: Descriptions- Narrations- Giving Directions and Guidelines – Blog Writing Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

EXERCISE – IV

CALL Lab:

Understand: Listening for General Details.

Practice: Listening Comprehension Tests - Testing Exercises

ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication- Presentation Skills.

Practice: Making a Short Speech – Extempore- Making a Presentation.

EXERCISE – V**CALL Lab:**

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests -Testing Exercises

ICS Lab:

Understand: Group Discussion

Practice: Group Discussion

MINIMUM REQUIREMENT OF INFRASTRUCTURAL FACILITIES FOR ELCS LAB:**1. Computer Assisted Language Learning (CALL) Lab:**

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

System Requirement (Hardware component):

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

- i) Computers with Suitable Configuration
- ii) High Fidelity Headphones

2. Interactive Communication Skills (ICS) Lab :

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio- visual aids with a Public Address System, a T. V. or LCD, a digital stereo –audio & video system and camcorder etc.

Source of Material (Master Copy):

- *Exercises in Spoken English. Part 1, 2, 3.* CIEFL and Oxford University Press

Note: Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus.

SUGGESTED SOFTWARE

- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10th Edition.
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
- Digital All
- Orell Digital Language Lab (Licensed Version)

REFERENCE BOOKS

1. English Language Communication Skills (2022) – Lab Manual cum Workbook. Cengage Learning India Pvt. Ltd.
2. Shobha, KN & Rayen, J. Lourdes. (2019). Communicative English – A workbook. Cambridge University Press
3. Kumar, Sanjay & Lata, Pushp. (2019). Communication Skills: A Workbook. Oxford University Press
4. Board of Editors. (2016). ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities. Orient Black Swan Pvt. Ltd.
5. Mishra, Veerendra et al. (2020). English Language Skills: A Practical Approach. Cambridge University Press

WEB REFERENCES

1. <https://www.asha.org/PRPSpecificTopic.aspx?folderid=8589935321§ion=References>
2. <https://www.englishlab.co.in/blog/types-of-communication-skills-lab-english-language-lab/>

E -TEXT BOOKS

1. <https://www.pdfdrive.com/basic-english-grammar-for-english-language-learners-basic-english-grammar-for-english-language-learners-e158730664.html>
2. <https://www.pdfdrive.com/english-language-communication-skills-e53852464.html>

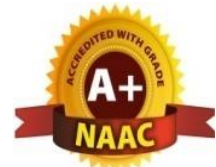
MOOCS COURSE

1. <https://www.coursera.org/specializations/improve-english>
2. <https://www.edx.org/professional-certificate/upvalenciavax-upper-intermediate-english>



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C PROGRAMMING FOR ENGINEERS LABORATORY

I B. TECH- I SEMESTER (R22)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		CIE	SEE	Total
CS109ES	B. Tech	0	0	2	1	40	60	100

COURSE OUTCOMES

The objectives of this course for the student to

1. Write algorithms and to draw flowcharts for solving problems and translate the algorithms/flowcharts to programs (in C language).
2. Use functions to develop modular reusable code.
3. Use arrays, pointers, strings and structures to formulate algorithms and programs.
4. Understand Searching and sorting algorithms

LIST OF EXPERIMENTS

1. Write a C program to find the sum of individual digits of a positive integer.
Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.
3. Write a C program to generate the first n terms of the sequence.
4. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
5. Write a C program to find the roots of a quadratic equation.
6. Write a C program to find the factorial of a given integer.
7. Write a C program to find the GCD (greatest common divisor) of two given integers.
8. Write a C program to solve Towers of Hanoi problem.
9. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use Switch Statement)
10. Write a C program to find both the largest and smallest number in a list of integers.
11. Write a C program that uses functions to perform the following:
 - i) Addition of Two Matrices
 - ii) Multiplication of Two Matrices
12. Write a C program that uses functions to perform the following operations:
 - i) To insert a sub-string in to a given main string from a given position.
 - ii) To delete n Characters from a given position in a given string.
13. Write a C program to determine if the given string is a palindrome or not
14. Write a C program that displays the position or index in the string S where the string T begins, or - 1 if S doesn't contain T.
15. Write a C program to count the lines, words and characters in a given text.
16. Write a C program to generate Pascal's triangle.
17. Write a C program to construct a pyramid of numbers
18. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:
 $1+x+x^2+x^3+ \dots +x^n$
 For example: if n is 3 and x is 5, then the program computes
 1+5+25+125. Print x, n, the sum

Perform error checking.

For example, the formula does not make sense for negative exponents – if n is less than 0
Have your program print an error message if $n < 0$, then go back and read in the next pair of numbers without computing the sum. Are any values of x also illegal? If so, test for them too.

19. 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
20. Write a C program to convert a Roman numeral to its decimal equivalent.
21. Write a C program that uses functions to perform the following operations:
 - i) Reading a complex number
 - ii) Writing a complex number
 - iii) Addition of two complex numbers
 - iv) Multiplication of two complex numbers(Note: represent complex number using a structure.)
22.
 - i. Write a C program which copies one file to another.
 - ii. Write a C program to reverse the first n characters in a file.(Note: The file name and n are specified on the command line.)
23.
 - i. Write a C program to display the contents of a file.
 - ii. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)
24. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
 - i) Bubble sort
 - ii) Selection sort
 - iii) Insertion sort
25. Write C programs that use both recursive and non-recursive functions to perform the following searching operations for a Key value in a given list of integers:
 - i) Linear search
 - ii) Binary search

REFERENCE BOOK

1. D.Krishna and S.Mallibabu, "Programming for Problem Solving Lab Record", Spectrum Publications, 1st Edition (2020).
2. Computer Fundamentals, Anita Goel, Pearson Education India, 2010.
3. Introduction to computers, Peter Norton, 8th Edition, Tata McGraw Hill.

WEBREFERENCES

1. https://www.tutorialspoint.com/basics_of_computers/basics_of_computers_introduction.htm
2. <https://www.geeksforgeeks.org/basics-of-computer-and-its-operations/>
3. <https://www.javatpoint.com/software-engineering-tutorial>
4. <https://www.javatpoint.com/data-structure-tutorial>
5. <https://www.guru99.com/operating-system-tutorial.html>

E –TEXT BOOKS

1. <https://www.amazon.com/Invitation-Computer-Science-G-Michael-Schneider/dp/1337561916>

MOOCS COURSE

1. <https://nptel.ac.in/courses/106103068>
2. https://onlinecourses.nptel.ac.in/noc20_cs68/preview
3. <https://archive.nptel.ac.in/courses/106/105/106105214/>
4. https://onlinecourses.nptel.ac.in/noc22_cs51/preview



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ENVIRONMENTAL SCIENCE

I B. TECH- I SEMESTER (R22)								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
*CH109MC	B. Tech	3	0	0	0	40	60	100
COURSE OBJECTIVES								
To learn								
<ol style="list-style-type: none"> 1. Understanding the importance of ecological balance for sustainable development. 2. Understanding the impacts of developmental activities and mitigation measures. 3. Understanding the environmental policies and regulations 								
COURSE OUTCOMES								
Upon successful completion of the course, the student is able to								
<ol style="list-style-type: none"> 1. Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development. 								
UNIT-I	ECOSYSTEMS						Classes:10	
Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.								
UNIT-II	NATURAL RESOURCES:						Classes:10	
Classification Of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.								
UNIT-III	BIODIVERSITY AND BIOTIC RESOURCES						Classes:10	
Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In- Situ and Ex-situ conservation. National Biodiversity act.								
UNIT-IV	ENVIRONMENTAL POLLUTION AND CONTROL TECHNOLOGIES						Classes:10	
Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. Global Environmental Issues and Global Efforts: Climate change and impacts on human								

environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT-V	ENVIRONMENTAL POLICY, LEGISLATION & EIA	Classes: 10
<p>Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). Towards Sustainable Future: Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.</p>		
TEXT BOOKS		
<ol style="list-style-type: none"> 1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission. 2. Environmental Studies by R. Rajagopalan, Oxford University Press. 		
REFERENCE BOOKS		
<ol style="list-style-type: none"> 1. A. Aditya Prasad, S. Hemambika, A. Rambabu, "Environmental Science", Spectrum Educational Books, Hyderabad, 1stedition-2021. 2. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi. 3. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHILearning Pvt. Ltd. 4. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition. 5. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers. 6. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications. 7. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications. 		
WEB REFERENCES		
<ol style="list-style-type: none"> 1. https://education.nationalgeographic.org/resource/ecosystem 2. https://byjus.com/chemistry/natural-resources-pdf/ 		
E –TEXTBOOKS		
<ol style="list-style-type: none"> 1. https://www.pdfdrive.com/biodiversity-inventories-in-high-gear-dna-barcoding-facilitates-a-rapid-biotic-survey-of-a-temperate-d149274581.html 2. https://www.pdfdrive.com/pollution-causes-effects-and-control-e159560577.html 		
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<ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/120108004 2. https://archive.nptel.ac.in/content/storage2/courses/122102006/mod1/Overview%20of%20ecology.htm 		



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ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

I B. TECH- II SEMESTER (R22)								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
MA201BS	B. Tech	3	1	0	4	40	60	100
COURSE OBJECTIVES								
To learn								
<ol style="list-style-type: none"> 1. Methods of solving the differential equations of first and higher order. 2. Concept, properties of Laplace transforms 3. Solving ordinary differential equations using Laplace transforms techniques. 4. The physical quantities involved in engineering field related to vector valued functions 5. The basic properties of vector valued functions and their applications to line, surface and volume integrals 								
COURSE OUTCOMES								
Upon successful completion of the course, the student is able to								
<ol style="list-style-type: none"> 1. Identify whether the given differential equation of first order is exact or not 2. Solve higher differential equation and apply the concept of differential equation to real world problems. 3. Use the Laplace transforms techniques for solving ODE's. 4. Evaluate the line, surface and volume integrals and converting them from one to another 								
UNIT-I	FIRST ORDER ODE						Classes: 10	
Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay.								
UNIT-II	ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER						Classes: 10	
Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , $e^{ax}V(x)$ and $x V(x)$, method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation. Applications: Electric Circuits								
UNIT-III	LAPLACE TRANSFORMS						Classes: 10	
Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, Second shifting theorem, Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.								

UNIT-IV	VECTOR DIFFERENTIATION	Classes: 10
Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional derivatives, Tangent plane and normal line, Vector Identities, Scalar potential functions, Solenoidal and Irrotational vectors.		
UNIT-V	VECTOR INTEGRATION	Classes: 10
Line, Surface and Volume Integrals, Theorems of Green, Gauss and Stokes (without proofs) and their applications.		
TEXT BOOKS		
<ol style="list-style-type: none"> 1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010 2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016. 		
REFERENCE BOOKS		
<ol style="list-style-type: none"> 1. Dr. D. Ranadheer Reddy, Dr. S. Someshwar & Mrs. M. Jhansi Lakshmi, Advanced Calculus for Engineers, M/s Students Helpline Publishing House Pvt. Ltd, First Edition-2020. 2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006. 3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002. 4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi. 5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008. 		
WEB REFERENCES		
<ol style="list-style-type: none"> 1. https://www.efunda.com/math/gamma/index.cfm 2. https://www.mathworld.wolfram.com/ 3. https://www.efunda.com/math/laplace_transform/index.cfm?search_string=laplace%20transforms 		
E -TEXT BOOKS		
<ol style="list-style-type: none"> 1. https://www.e-booksdirectory.com/listing.php?category=4 2. https://www.e-booksdirectory.com/details.php?ebook=10830 		
MOOCS COURSE		
<ol style="list-style-type: none"> 1. https://archive.nptel.ac.in/content/storage2/courses/122104018/node69.html 2. https://archive.nptel.ac.in/courses/111/106/111106139/ 3. https://onlinecourses.nptel.ac.in/noc22_ma75/preview 		



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ENGINEERING CHEMISTRY

I B. TECH- II SEMESTER (R22)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
CH202BS	B. Tech	3	1	0	4	40	60	100

COURSE OBJECTIVES

To learn

1. To bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
2. To include the importance of water in industrial usage, fundamental aspects of battery chemistry, significance of corrosion its control to protect the structures.
3. To imbibe the basic concepts of petroleum and its products.
4. To acquire required knowledge about engineering materials like cement, smart materials and Lubricants.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Students will acquire the basic knowledge of electrochemical procedures related to corrosion and its control.
2. The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
3. They can learn the fundamentals and general properties of polymers and other engineering materials.
4. They can predict potential applications of chemistry and practical utility in order to become good engineers and entrepreneurs.

UNIT-I WATER AND ITS TREATMENT Classes: 10

Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and break - point chlorination. Defluoridation - Determination of F⁻ ion by ion- selective electrode method.

Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods - Softening of water by ion- exchange processes. Desalination of water – Reverse osmosis.

UNIT-II BATTERY CHEMISTRY & CORROSION Classes: 10

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction, working and applications of: Zn-air and Lithium ion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

Corrosion: Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods.

UNIT-III	POLYMERIC MATERIALS	Classes: 10
<p>Definition – Classification of polymers with examples – Types of polymerization – addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Terylene Plastics: Definition and characteristics- thermoplastic and thermosetting plastics, Preparation, Properties and engineering applications of PVC and Bakelite, Teflon, Fiber reinforced plastics (FRP). Rubbers: Natural rubber and its vulcanization.</p> <p>Elastomers: Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokol rubber.</p> <p>Conducting polymers: Characteristics and Classification with examples-mechanism of conduction in trans-polyacetylene and applications of conducting polymers.</p> <p>Biodegradable polymers: Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.</p>		
UNIT-IV	ENERGY SOURCES	Classes: 10
<p>Introduction, Calorific value of fuel – HCV, LCV- Dulong's formula. Classification- solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking types – moving bed catalytic cracking, Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG, Biodiesel – Transesterification, advantages.</p>		
UNIT-V	ENGINEERING MATERIALS	Classes: 12
<p>Cement: Portland cement, its composition, setting and hardening. Smart materials and their engineering applications</p> <p>Shape memory materials- Poly L- Lactic acid. Thermoresponse materials- Polyacryl amides, Poly vinyl amides</p> <p>Lubricants: Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.</p>		
TEXT BOOKS		
<ol style="list-style-type: none"> 1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010 2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, 2016 3. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K. Shashikala, Pearson Publications, 2021. 4. Text book of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications. 		
REFERENCE BOOKS		
<ol style="list-style-type: none"> 1. A. Aditya Prasad , S. Hemambika and N.V.V. Panduranga Rao “Engineering Chemistry”, Spectrum Medico Plus Pharma Publishers., Hyderabad, 1st Edition-2020. 2. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015) 3. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011) 4. Engineering Chemistry by A. Aditya Prasad, S. Hemambika and N. V. V. Panduranga Rao, Spectrum Medico Plus Pharma Publishers., Hyderabad, 1st edition (2020) 5. Engineering Chemistry by Thirumala Chary Laxminarayana, Shashikala, Pearson Publications (2020) 		
WEB REFERENCES		
<ol style="list-style-type: none"> 1. https://www.wileyindia.com/engineering-chemistry-as-per-aicte.html 2. https://www.wileyindia.com/wiley-engineering-chemistry-second-edition.html 3. https://www.wyzant.com/resources/lessons/science/chemistry 4. http://www.chem1.com/acad/webtext/virtualtextbook.html 		

E –TEXTBOOKS

1. <https://www.pdfdrive.com/engineering-chemistry-e33546326.html>
2. <https://www.pdfdrive.com/engineering-chemistry-fundamentals-and-applications-2nd-edition-e191456798.html>
3. <https://www.pdfdrive.com/engineering-chemistry-e48867824.html>

MOOCS COURSE

1. <https://nptel.ac.in/courses/122101001>
2. <https://nptel.ac.in/courses/105106205>

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COMPUTER AIDED ENGINEERING GRAPHICS

I B. TECH - II SEMESTER (R22)								
Course Code	Programme	Hours / Week			Credits	Maximum Marks		
ME208ES	B. Tech	L	T	P	C	CIE	SEE	Total
		1	0	4	3	40	60	100
<p>COURSE OBJECTIVES</p> <ol style="list-style-type: none"> To develop the ability of visualization of different objects through technical drawings To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products <p>COURSE OUTCOMES</p> <p>At the end of the course, the student will be able to:</p> <ol style="list-style-type: none"> Apply computer aided drafting tools to create 2D and 3D objects sketch conics and different types of solids Appreciate the need of Sectional views of solids and Development of surfaces of solids Read and interpret engineering drawings Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting 								
UNIT-I	INTRODUCTION TO ENGINEERING GRAPHICS						Classes: 15	
Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Introduction to Computer aided drafting – views, commands and conics								
UNIT-II	ORTHOGRAPHIC PROJECTIONS						Classes: 15	
Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections – points, lines and planes								
UNIT-III	PROJECTIONS OF REGULAR SOLIDS						Classes:15	
Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views, Computer aided projections of solids – sectional views								
UNIT-IV	DEVELOPMENT OF SURFACES OF RIGHT REGULAR SOLIDS						Classes: 15	
Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting								

UNIT-V	ISOMETRIC PROJECTIONS	Classes: 10
<p>Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa –Conventions. Conversion of orthographic projection into isometric view using computer aided drafting.</p>		
<p>TEXT BOOKS</p>		
<ol style="list-style-type: none"> 1. Engineering Drawing N.D. Bhatt / Charotar 2. Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapooan, Vikas: S. Chand and company Ltd. 		
<p>REFERENCE BOOKS</p>		
<ol style="list-style-type: none"> 1. Dr. D. V. Sreekanth, Dr. M. Bhojendra Naik and S. Amith Kumar, “ Engineering Graphics” Spectrum University Press, First Edition-2020. 2. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGraw Hill 3. Engineering Graphics and Design, WILEY, Edition 2020 4. Engineering Drawing, M. B. Shah, B.C. Rane / Pearson. 5. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford 6. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers 		
<p>WEB REFERENCES</p>		
<ol style="list-style-type: none"> 1. http://freevideolectures.com/Course/3420/Engineering-Drawing 2. https://www.slideshare.net/search/slideshow?searchfrom=header&q=engineering+drawing 3. https://www.wiziq.com/tutorials/engineering-drawing 4. http://road.issn.org/issn/2344-4681-journal-of-industrial-design-and-engineering-graphics 		
<p>E –TEXT BOOKS</p>		
<ol style="list-style-type: none"> 1. http://rgpv-ed.blogspot.com/2009/09/development-of-surfaces.html 2. http://www.techdrawingtools.com/12/11201.htm 		
<p>MOOCS COURSE</p>		
<ol style="list-style-type: none"> 1. https://nptel.ac.in/course.php 2. https://swayam.gov.in/explorer 		



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BASIC ELECTRICAL ENGINEERING

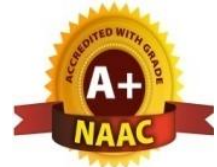
I B. TECH- II SEMESTER (R22)								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
EE206ES	B. Tech	2	0	0	2	40	60	100
COURSE OBJECTIVES								
To learn								
<ol style="list-style-type: none"> 1. To understand DC and Single & Three phase AC circuits 2. To study and understand the different types of DC, AC machines and Transformers. 3. To import the knowledge of various electrical installations and the concept of power, power factor and its improvement. 								
COURSE OUTCOMES								
Upon successful completion of the course, the student is able to								
<ol style="list-style-type: none"> 1. Understand and analyze basic Electrical circuits 2. Study the working principles of Electrical Machines and Transformers 3. Introduce components of Low Voltage Electrical Installations. 								
UNIT-I	D.C. CIRCUITS						Classes: 12	
Electrical circuit elements (R, L and C), voltage and current sources, KVL & KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin's and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.								
UNIT-II	A.C. CIRCUITS						Classes: 12	
Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.								
UNIT-III	TRANSFORMERS						Classes: 10	
Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections								
UNIT-IV	ELECTRICAL MACHINES						Classes: 12	
Construction and working principle of dc machine, performance characteristics of dc shunt machine. Generation of rotating magnetic field, Construction and working of a three-phase induction motor, Significance of torque-slip characteristics. Single-phase induction motor, Construction and working. Construction and working of synchronous generator.								

UNIT-V	ELECTRICAL INSTALLATIONS	Classes: 10
Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.		
TEXT BOOKS		
<ol style="list-style-type: none"> 1. D.P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 4th Edition, 2019. 2. MS Naidu and S Kamakshiah, “Basic Electrical Engineering”, Tata McGraw Hill, 2nd Edition, 2008. 		
REFERENCE BOOKS		
<ol style="list-style-type: none"> 1. P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, “Basic Electrical Engineering”, S. Chand, 2nd Edition, 2019. 2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009 3. M. S. Sukhija, T. K. Nagsarkar, “Basic Electrical and Electronics Engineering”, Oxford, 1st Edition, 2012. 4. Abhijit Chakrabarthy, Sudipta Debnath, Chandan Kumar Chanda, “Basic Electrical Engineering”, 2nd Edition, McGraw Hill, 2021. 5. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011. 6. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010. 7. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989 		
WEB REFERENCES		
<ol style="list-style-type: none"> 1. https://www.electrical4u.com/ 2. http://www.basicsofelectricalengineering.com/ 3. https://www.khanacademy.org/science/physics/circuits-topic/circuits-resistance/a/ee-voltage-and-current 4. https://circuitglobe.com/ 		
E –TEXTBOOKS		
<ol style="list-style-type: none"> 1. https://easyengineering.net/basic-electrical-engineering-by-wadhwa/ 2. https://easyengineering.net/objective-electrical-technology-by-mehta/ 		
MOOCS COURSE		
<ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/108108076/1 2. https://nptel.ac.in/courses/108102146/ 3. https://nptel.ac.in/courses/108108076/35 		



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ELECTRONIC DEVICES AND CIRCUITS

I B. TECH- II SEMESTER (R22)								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
EC203ES	B. Tech	2	0	0	2	40	60	100
COURSE OBJECTIVES								
To learn								
<ol style="list-style-type: none"> 1. To introduce components such as diodes, BJTs and FETs. 2. To know the applications of devices. 3. To know the switching characteristics of devices. 								
COURSE OUTCOMES								
Upon successful completion of the course, the student is able to								
<ol style="list-style-type: none"> 1. Acquire the knowledge of various electronic devices and their use on real life. 2. Know the applications of various devices. 3. Acquire the knowledge about the role of special purpose devices and their applications. 								
UNIT-I	DIODES						Classes: 10	
Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances, V-I Characteristics, Diode as a switch- switching times.								
UNIT-II	DIODE APPLICATIONS						Classes: 10	
Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters, Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clamper.								
UNIT-III	BIPOLAR JUNCTION TRANSISTOR (BJT)						Classes: 10	
Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, switching times,								
UNIT-IV	JUNCTION FIELD EFFECT TRANSISTOR (FET)						Classes: 10	
Construction, Principle of Operation, Pinch-Off Voltage, Volt- Ampere Characteristic, Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET, MOSTET as a capacitor.								
UNIT-V	SPECIAL PURPOSE DEVICES						Classes: 10	
Zener Diode - Characteristics, Zener diode as Voltage Regulator, Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode, Photo diode, Solar cell, LED, Schottky diode.								

TEXT BOOKS
<ol style="list-style-type: none"> 1. Jacob Millman - Electronic Devices and Circuits, McGraw Hill Education 2. Robert L. Boylestead, Louis Nashelsky- Electronic Devices and Circuits theory, 11th Edition, 2009, Pearson.
REFERENCE BOOKS
<ol style="list-style-type: none"> 1. Dr. S. V. S. Ramkrishnam Raju, Dr. A. Anand, Ms. P. Pushpa, Dr. M. Thirupathi, Mr. K. Balasubramanyam “Electronic Devices and Circuits”, Amaravathi Publications, 1st Edition, 2021. 2. Horowitz -Electronic Devices and Circuits, David A. Bell – 5th Edition, Oxford. 3. Chinmoy Saha, Arindam Halder, Debaati Ganguly - Basic Electronics-Principles and Applications, Cambridge, 2018.
WEB REFERENCES
<ol style="list-style-type: none"> 1. https://www.physics-and-radio-electronics.com/electronic-devices-and-circuits.html 2. https://www.electronics-tutorials.ws/transistor/tran_5.html 3. http://www.gvpcew.ac.in/LN-CSE-IT-22-32/ECE/2-Year/ECA-All-Units.pdf 4. https://www.electronics-notes.com/articles/analogue_circuits/fet-field-effect-transistor/common-source-amplifier-circuit.php
E -TEXT BOOKS
<ol style="list-style-type: none"> 1. https://ia902709.us.archive.org/13/items/ElectronicDevicesAndCircuitTheory/Electronic%20Devices%20and%20Circuit%20Theory.pdf 2. https://www.researchgate.net/publication/275408225_Electronic_Devices_and_Circuits
MOOCS COURSE
<ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/117103063/2 2. https://nptel.ac.in/courses/117106087/4 3. https://nptel.ac.in/courses/117106087/20



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APPLIED PYTHON PROGRAMMING LABORATORY

I B. TECH- II SEMESTER (R22)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		CIE	SEE	Total
CS208ES	B. Tech	0	1	2	2	40	60	100

COURSE OUTCOMES

Upon successful completion of the course, the student is able

1. Build basic programs using fundamental programming constructs
2. Write and execute python codes for different applications
3. Capable to implement on hardware boards

LIST OF EXPERIMENTS

Cycle - 1

1. Downloading and Installing Python and Modules
 - a) Python 3 on Linux
Follow the instructions given in the URL <https://docs.python-guide.org/starting/install3/linux/>
 - b) Python 3 on Windows
Follow the instructions given in the URL <https://docs.python.org/3/using/windows.html> (Please remember that Windows installation of Python is harder!)
 - c) pip3 on Windows and Linux
Install the Python package installer by following the instructions given in the URL <https://www.activestate.com/resources/quick-reads/how-to-install-and-use-pip3/>
 - d) Installing numpy and scipy
You can install any python3 package using the command `pip3 install <packagename>`
 - e) Installing jupyterlab
Install from pip using the command `pip install jupyterlab`
2. Introduction to Python3
 - a) Printing your biodata on the screen
 - b) Printing all the primes less than a given number
 - c) Finding all the factors of a number and show whether it is a *perfect* number, i.e., the sum of all its factors (excluding the number itself) is equal to the number itself
3. Defining and Using Functions
 - a) Write a function to read data from a file and display it on the screen
 - b) Define a boolean function *is palindrome*(<input>)
 - c) Write a function *collatz(x)* which does the following: if *x* is odd, $x = 3x + 1$; if *x* is even, then $x = x/2$. Return the number of steps it takes for $x = 1$
 - d) Write a function $N(m, s) = \exp(-(x-m)^2/(2s^2))/\sqrt{2\pi}s$ that computes the Normal distribution
4. The package numpy
 - a) Creating a matrix of given order $m \times n$ containing *random numbers* in the range 1 to 99999

- b) Write a program that adds, subtracts and multiplies two matrices.
Provide an interface such that, based on the prompt, the function (addition, subtraction, multiplication) should be performed
- c) Write a program to solve a system of n linear equations in n variables using matrix inverse
- 5. The package `scipy` and `pyplot`
 - a) Finding if two sets of data have the same *mean* value
 - b) Plotting data read from a file
 - c) Fitting a function through a set a data points using *polyfit* function
 - d) Plotting a histogram of a given data set
- 6. The strings package
 - a) Read text from a file and print the number of lines, words and characters
 - b) Read text from a file and return a list of all n letter words beginning with a vowel
 - c) Finding a secret message hidden in a paragraph of text
 - d) Plot a histogram of words according to their length from text read from a file

Cycle -2

- 7. Installing OS on Raspberry Pi
 - a) Installation using PiImager
 - b) Installation using image file
 - Downloading an Image
 - Writing the image to an SD card using Linux
 - using Windows
 - Booting up

Follow the instructions given in the URL <https://www.raspberrypi.com/documentation/computers/getting-started.html>
- 8. Accessing GPIO pins using Python
 - a) Installing GPIO Zero library.
First, update your repositories list:
`sudo apt update`
Then install the package for Python 3:
`sudo apt install python3-gpiozero`
 - b) Blinking an LED connected to one of the GPIO pin
 - c) Adjusting the brightness of an LED
 - d) Adjust the brightness of an LED (0 to 100, where 100 means maximum brightness) using the in-built PWM wavelength.
- 9. Collecting Sensor Data
 - a) DHT Sensor interface
 - Connect the terminals of DHT GPIO pins of Raspberry Pi.
 - Import the DHT library using `import Adafruit_DHT`
 - Read sensor data and display it on screen.

TEXT BOOKS

1. Supercharged Python: Take your code to the next level, Overland
2. Learning Python, Mark Lutz, O'reilly

REFERENCE BOOKS

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Python Programming A Modular Approach with Graphics, Database, Mobile, and WebApplications, Sheetal Taneja, Naveen Kumar, Pearson
3. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition

4. Think Python, Allen Downey, Green Tea Press
5. Core Python Programming, W. Chun, Pearson
6. Introduction to Python, Kenneth A. Lambert, Cengage

WEB REFERENCES

1. <https://www.tutorialspoint.com/python3/>
2. <https://www.udemy.com/machine-learning-using-r-and-python/>
3. <https://www.udemy.com/r-programming-language/>
4. <https://www.simpliv.com/itcertification/data-analytics-using-r-programming>
5. <https://books.goalkicker.com/PythonBook/>

E -TEXT BOOKS

1. <https://www.amazon.in/Advanced-Python-Programming-Brian-Overland/dp/0135159946>
2. <https://www.oreilly.com/library/view/learning-python-5th/9781449355722/>

MOOCS COURSE

1. <https://nptel.ac.in/courses/106106145>
2. <https://nptel.ac.in/courses/106106182>

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ENGINEERING CHEMISTRY LABORATORY

I B. TECH- II SEMESTER (R 22)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		CIE	SEE	Total
CH204BS	B. Tech	0	0	2	1	40	60	100

COURSE OBJECTIVES

The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

1. Estimation of hardness of water to check its suitability for drinking purpose.
2. Students are able to perform estimations of acids and bases using conductometry, potentiometry and pH metry methods.
3. Students will learn to prepare polymers such as Bakelite and nylon-6 in the laboratory.
4. Students will learn skills related to the lubricant properties such as saponification value, surface tension and viscosity of oils.

COURSE OUTCOMES

The experiments will make the student gain skills on:

1. Determination of parameters like hardness of water and rate of corrosion of mild steel in various conditions.
2. Able to perform methods such as conductometry, potentiometry and pH metry in order to find out the concentrations or equivalence points of acids and bases.
3. Students are able to prepare polymers like bakelite and nylon-6.
4. Estimations saponification value, surface tension and viscosity of lubricant oils.

LIST OF EXPERIMENTS

- I. Volumetric Analysis:** Estimation of Hardness of water by EDTA Complexometry method.
- II. Conductometry:** Estimation of the concentration of an acid by Conductometry.
- III. Potentiometry:** Estimation of the amount of Fe^{+2} by Potentiometry.
- IV. pH Metry:** Determination of an acid concentration using pH meter.
- V. Preparations:**
 1. Preparation of Bakelite.
 2. Preparation Nylon – 6.

VI. Lubricants:

1. Estimation of acid value of given lubricant oil.
2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.

VII. Corrosion: Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.

VIII. Virtual lab experiments

1. Construction of Fuel cell and its working.
2. Smart materials for Biomedical applications
3. Batteries for electrical vehicles.

REFERENCE BOOKS

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5th edition
3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007)

WEB REFERENCES

1. https://www.academia.edu/39911915/Engineering_Chemistry_Laboratory_Manual_and_Observation_Subject_Code_18CHEL16_26
2. <https://www.vlab.co.in/broad-area-chemical-engineering>

E -TEXT BOOKS

1. <https://www.pdfdrive.com/engineering-chemistry-lab-manual-e51801253.html>
2. <https://www.pdfdrive.com/engineering-chemistry-lab-manual-autonomous-2015-16-e37927940.html>

MOOCS COURSE

1. <https://www.coursera.org/browse/physical-science-and-engineering/chemistry>
2. <https://libguides.mines.edu/chem/online-course-resources>
3. <https://ecampus.oregonstate.edu/online-degrees/undergraduate/online-chemistry-lab-course/>



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BASIC ELECTRICAL ENGINEERING LABORATORY

I B. TECH- II SEMESTER (R22)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		CIE	SEE	Total
EE208ES	B. Tech	0	0	2	1	40	60	100

COURSE OBJECTIVES

1. To measure the electrical parameters for different types of DC and AC circuits using conventional and theorems approach.
2. To study the transient response of various R, L and C circuits using different excitations.
3. To determine the performance of different types of DC, AC machines and Transformers.

COURSE OUTCOMES

After learning the contents of this paper the student must be able to

1. Verify the basic Electrical circuits through different experiments.
2. Evaluate the performance calculations of Electrical Machines and Transformers through various testing methods.
3. Analyze the transient responses of R, L and C circuits for different input conditions

LIST OF EXPERIMENTS

PART- A (compulsory)

1. Verification of KVL and KCL
2. Verification of Thevenin's and Norton's theorem
3. Transient Response of Series RL and RC circuits for DC excitation
4. Resonance in series RLC circuit
5. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
7. Performance Characteristics of a DC Shunt Motor
8. Torque-Speed Characteristics of a Three-phase Induction Motor.

PART-B (any two experiments from the given list)

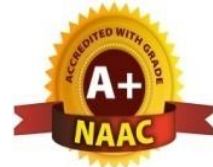
1. Verification of Superposition theorem.
2. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)
3. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
4. Measurement of Active and Reactive Power in a balanced Three-phase circuit
5. No-Load Characteristics of a Three-phase Alternator

TEXT BOOKS
<ol style="list-style-type: none"> 1. D.P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 4th Edition, 2019. 2. MS Naidu and S Kamakshaiyah, “Basic Electrical Engineering”, Tata McGraw Hill, 2nd Edition, 2008.
REFERENCE BOOKS
<ol style="list-style-type: none"> 1. P. Ramana, M. Suryakalavathi, G.T.Chandrasheker,”Basic Electrical Engineering”, S. Chand, 2nd Edition, 2019. 2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009 3. M. S. Sukhija, T. K. Nagsarkar, “Basic Electrical and Electronics Engineering”, Oxford, 1st Edition, 2012. 4. Abhijit Chakrabarthy, Sudipta Debnath, Chandan Kumar Chanda, “Basic Electrical Engineering”, 2nd Edition, McGraw Hill, 2021. 5. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011. 6. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010. 7. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.
WEB REFERENCES
<ol style="list-style-type: none"> 1. https://www.electrical4u.com/ 2. http://www.basicsofelectricalengineering.com/ 3. https://www.khanacademy.org/science/physics/circuits- topic/circuits-resistance/a/ee-voltage-and-current 4. https://circuitglobe.com/
E –TEXTBOOKS
<ol style="list-style-type: none"> 1. https://easyengineering.net/basic-electrical-engineering-by-wadhwa/ 2. https://easyengineering.net/objective-electrical-technology-by-mehta/
MOOCS COURSE
<ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/108108076/1 2. https://nptel.ac.in/courses/108102146/ 3. https://nptel.ac.in/courses/108108076/35



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ELECTRONIC DEVICES AND CIRCUITS LABORATORY

I B. TECH- II SEMESTER (R 22)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		CIE	SEE	Total
EC204ES	B. Tech	0	0	2	1	40	60	100

COURSE OBJECTIVES

1. Acquire the knowledge of various semiconductor devices and their use in real life.
2. Design aspects of biasing and keep them in active region of the device for functional circuits
3. Acquire the knowledge about the role of special purpose devices and their applications.

LIST OF EXPERIMENTS (TWELVE EXPERIMENTS TO BE DONE)

Verify any twelve experiments in H/W Laboratory

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Full Wave Rectifier with & without filters
3. Types of Clippers at different reference voltages
4. Types of Clampers at different reference voltages
5. The steady state output waveform of clampers for a square wave input
6. Input and output characteristics of BJT in CB Configuration
7. Input and output characteristics of BJT in CE Configuration
8. Input and output characteristics of BJT in CC Configuration
9. Input and output characteristics of MOS FET in CS Configuration
10. Input and output characteristics of MOS FET in CD Configuration
11. Switching characteristics of a transistor
12. Zener diode characteristics and Zener as voltage Regulator
13. SCR Characteristics.
14. UJT Characteristics and identify negative region
15. Photo diode characteristics
16. Solar cell characteristics
17. LED Characteristics
 *Design a circuit to switch on and off LED using diode/BJT/FET as a switch.

Major Equipment required for Laboratories:

1. Regulated Power Suppliers, 0-30V
2. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
3. Functions Generators-Sine and Square wave signals
4. Multimeters, voltmeters and Ammeters
5. Electronic Components and devices

TEXT BOOKS
<ol style="list-style-type: none"> 1. Jacob Millman - Electronic Devices and Circuits, McGraw Hill Education 2. Robert L. Boylestead, Louis Nashelsky- Electronic Devices and Circuits theory, 11th Edition, 2009, Pearson.
REFERENCE BOOKS
<ol style="list-style-type: none"> 1. Dr. S. V. S. Ramkrishnam Raju, Dr. A. Anand, Ms. P. Pushpa, Dr. M. Thirupathi, Mr. K. Balasubramanyam “Electronic Devices and Circuits”, Amaravathi Publications, 1st Edition, 2021. 2. Horowitz -Electronic Devices and Circuits, David A. Bell – 5th Edition, Oxford. 3. Chinmoy Saha, Arindam Halder, Debaati Ganguly - Basic Electronics-Principles and Applications, Cambridge, 2018.
WEB REFERENCES
<ol style="list-style-type: none"> 1. https://www.physics-and-radio-electronics.com/electronic-devices-and-circuits.html 2. https://www.electronics-tutorials.ws/transistor/trans_5.html 3. http://www.gvpcew.ac.in/LN-CSE-IT-22-32/ECE/2-Year/ECA-All-Units.pdf 4. https://www.electronics-notes.com/articles/analogue_circuits/fet-field-effect-transistor/common-source-amplifier-circuit.php
E -TEXT BOOKS
<ol style="list-style-type: none"> 1. https://ia902709.us.archive.org/13/items/ElectronicDevicesAndCircuitTheory/Electronic%20Devices%20and%20Circuit%20Theory.pdf 2. https://www.researchgate.net/publication/275408225_Electronic_Devices_and_Circuits
MOOCS COURSE
<ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/117103063/2 2. https://nptel.ac.in/courses/117106087/4 3. https://nptel.ac.in/courses/117106087/20



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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

NUMERICAL METHODS AND COMPLEX VARIABLES

II B.TECH- I SEMESTER (R22)								
Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
MA301BS	B.Tech	3	1	0	4	40	60	100
COURSE OBJECTIVES								
To learn								
<ol style="list-style-type: none"> Expressing periodic function by Fourier series and a non-periodic function by Fourier transforms Various numerical methods to find roots of polynomial and transcendental equations. Concept of finite differences and to estimate the value for the given data using interpolation. Evaluation of integrals using numerical techniques Solving ordinary differential equations of first order using numerical techniques. Differentiation and integration of complex valued functions. Evaluation of integrals using Cauchy's integral formula and Cauchy's residue theorem. Expansion of complex functions using Taylor's and Laurent's series. 								
COURSE OUTCOMES								
Upon successful completion of the course, the student is able to								
<ol style="list-style-type: none"> Express any periodic function in terms of sine and cosine Find the root of a given polynomial and transcendental equations. Estimate the value for the given data using interpolation Find the numerical solutions for a given first order ODE's Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems Taylor's and Laurent's series expansions in complex function 								
UNIT-I	FOURIER SERIES & FOURIER TRANSFORMS					Classes: 12		
Fourier series - Dirichlet's Conditions - Half-range Fourier series - Fourier Transforms: Fourier Sine and cosine transforms - Inverse Fourier transforms.								
UNIT-II	NUMERICAL METHODS-I					Classes: 14		
Solution of polynomial and transcendental equations: Bisection method, Iteration Method, Newton-Raphson method and Regula-Falsi method. Jacobi and Gauss-Seidal iteration methods for solving linear systems of equations. Finite differences: forward differences, backward differences, central differences, symbolic relations and separation of symbols, Interpolation using Newton's forward and backward difference formulae. Central difference interpolation: Gauss's forward and backward formulae, Lagrange's method of interpolation.								

UNIT-III	NUMERICAL METHODS-II	Classes: 12
<p>Numerical integration: Trapezoidal rule and Simpson's $1/3^{\text{rd}}$ and $3/8^{\text{th}}$ rules. Ordinary differential equations: Taylor's series, Picard's method, Euler and modified Euler's methods, Runge-Kutta method of fourth order for first order ODE</p>		
UNIT-IV	COMPLEX DIFFERENTIATION	Classes: 12
<p>Limit, Continuity and Differentiation of Complex functions. Cauchy-Riemann equations (without proof), Milne-Thomson methods, analytic functions, harmonic functions, finding harmonic conjugate, elementary analytic functions (exponential, trigonometric, logarithm) and their properties. (All theorems without Proofs), Conformal mappings, Mobius transformations.</p>		
UNIT-V	COMPLEX INTEGRATION	Classes: 12
<p>Line integrals, Cauchy's theorem, Cauchy's Integral formula, zeros of analytic functions, singularities, Taylor's series, Laurent's series, Residues, Cauchy Residue theorem. and their properties. (All theorems without Proofs)</p>		
TEXT BOOKS		
<ol style="list-style-type: none"> 1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010. 2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005. 		
REFERENCE BOOKS		
<ol style="list-style-type: none"> 1. Dr.P. Santosh Kumar Patra, Dr. D. Ranadheer Reddy, G.Chandra Mohan & Mrs. G.Vanaja, Transformations, Complex variables & Numerical Techniques, M/s SevenHills International Publishers, First Edition-2022. 2. M. K. Jain, S.R.K. Iyengar, R.K. Jain, Numerical methods for Scientific and Engineering Computations, New Age International publishers. 3. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006. 4. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Edition, Mc-GrawHill, 2004. 		
WEB REFERENCES		
<ol style="list-style-type: none"> 1. https://www.efunda.com/math/laplace_transform/index.cfm 2. https://www.efunda.com/math/fourier_transform/index.cfm 3. https://www.efunda.com/math/complex_numbers/complex.cfm 		
E -TEXT BOOKS		
<ol style="list-style-type: none"> 1. https://www.e-booksdirectory.com/details.php?ebook=10602 2. https://www.e-booksdirectory.com/details.php?ebook=4708 		
MOOCS COURSE		
<ol style="list-style-type: none"> 1. https://swayam.gov.in/ 2. https://swayam.gov.in/NPTEL 		



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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ANALOG CIRCUITS

II B. TECH- I SEMESTER (R22)

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
EC302PC	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

To learn

1. Learn the concepts of, load line analysis and biasing techniques
2. Learn the concepts of high frequency analysis of transistors.
3. To give understanding of various types of amplifier circuits
4. Learn the concepts of small signal analysis of BJT and FET
5. To familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Design the amplifiers with various biasing techniques.
2. Design single stage amplifiers using BJT and FET
3. Design multistage amplifiers and understand the concepts of High Frequency Analysis of BJT.
4. Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to sustained oscillations.

UNIT-I	BJT BIASING	Classes: 12
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BJT Biasing: Transistor Biasing and Stabilization - Operating point, DC & AC load lines, Biasing - Fixed Bias, Self Bias, Bias Stability, Bias Compensation using Diode
 Analysis and Design of Small Signal Low Frequency BJT Amplifiers: Transistor Hybrid model, Determination of h-parameters from transistor characteristics, Typical values of h-parameters in CE, CB and CC configurations, Transistor amplifying action, Analysis of CE, CC, CB Amplifiers and CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors on CE Amplifier.

UNIT-II	FIELD EFFECT TRANSISTOR(FET)	Classes: 12
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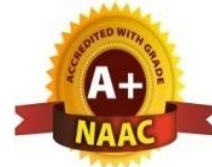
FET- Biasing Techniques
 FET Amplifiers: Analysis of CS, CD, CG JFET Amplifiers, comparison of performance with BJT Amplifiers, Basic Concepts of MOSFET Amplifiers, MOS Small signal model, Common source amplifier with resistive, Diode connected and Current source loads, Source follower, Common Gate Stage, Cascode and Folded Cascode Amplifier – frequency response.

UNIT-III	MULTISTAGE AMPLIFIERS	Classes: 12
<p>Multistage Amplifiers: Classification of Amplifiers, Distortion in amplifiers, Different coupling schemes used in amplifiers, Frequency response and Analysis of multistage amplifiers, Cascade RC Coupled amplifiers, Cascode amplifier, Darlington pair.</p> <p>Transistor at High Frequency: Hybrid π-model of Common Emitter transistor model, f_{α}, f_{β} and unitygain bandwidth, Gain-bandwidth product.</p>		
UNIT-IV	FEEDBACK AMPLIFIERS	Classes: 12
<p>Feedback Amplifiers: Concepts of feedback – Classification of feedback amplifiers – General characteristics of Negative feedback amplifiers – Effect of Feedback on Amplifier characteristics – Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple problems.</p>		
UNIT-V	OSCILLATORS	Classes: 12
<p>Oscillators: Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge Oscillators, LC type Oscillators –Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators, Frequency and amplitude stability of Oscillators, Crystal Oscillator.</p>		
TEXT BOOKS		
<ol style="list-style-type: none"> 1. Jacob Millman, Christos C Halkias -Integrated Electronics, McGraw Hill Education. 2. Robert L. Boylestead, Louis Nashelsky -Electronic Devices and Circuits theory, 11th Edition, 2009, Pearson 		
REFERENCE BOOKS		
<ol style="list-style-type: none"> 1. Dr. S. V. S. Ramkrishnam Raju, Dr. A. Anand, Ms. P. Pushpa, Dr. M. Thirupathi, Mr. K. Balasubramanyam “Electronic Devices and Circuits”, Amaravathi Publications, 1st Edition, 2021. 2. David A. Bell – Electronic Devices and Circuits, 5th Edition, Oxford. 3. Adel S. Sedra, Kenneth C. Smith- Microelectronic Circuits- Theory and Applications, Oxford. 4. Chinmoy Saha, Arindam Halder, Debaati Ganguly -Basic Electronics-Principles and Applications, 2018, Cambridge. 		
WEB REFERENCES		
<ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/108/106/108106105/ 2. https://nptel.ac.in/courses/117/105/117105147/ 3. https://nptel.ac.in/courses/117/108/117108047/ 4. http://www.chipcenter.com/power/powaarch.html 5. http://www.amasci.com/amateur/elehob.html 		
E -TEXT BOOKS		
<ol style="list-style-type: none"> 1. Circuit Analysis by John E. Whitehouse, Horwood Engineering Science Series 2. Analog Circuits, Edited by Yuping Wu 		
MOOCS COURSE		
<ol style="list-style-type: none"> 1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-002-circuits-and-electronics-spring-2007/video-lectures/lecture-9-part-1/ 2. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-002-circuits-and-electronics-spring-2007/video-lectures/lecture-10/ 3. https://www.coursera.org/learn/linear-circuits-ac-analysis 		



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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING NETWORK ANALYSIS AND SYNTHESIS

II B. TECH- I SEMESTER (R22)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
EE310PC	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

To learn

1. To understand the basic concepts on RLC circuits.
2. To know the behavior of the steady state and transient states in RLC circuits.
3. To understand the two port network parameters.
4. Learn the design concepts of various filters and attenuators

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Gain the knowledge on basic RLC circuits behaviour.
2. Analyse the Steady state and transient analysis of RLC Circuits.
3. Characterization of two port network parameters.
4. Analyse the Design aspect of various filters and attenuators

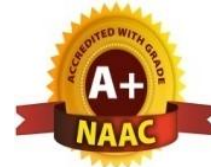
UNIT-I	NETWORK TOPOLOGY	Classes: 9
Network Topology, Basic cut-set and tie-set matrices for planar networks, Magnetic Circuits, Self and Mutual inductances, dot convention, impedance, reactance concept, Impedance transformation and coupled circuits, co-efficient of coupling, equivalent T for Magnetically coupled circuits, Ideal Transformer.		
UNIT-II	TRANSIENT AND STEADY STATE ANALYSIS	Classes: 9
Transient and steady state analysis of RC, RL and RLC Circuits, Sinusoidal and Step responses. RC Circuits as integrator and Differentiators. 2nd order series and parallel RLC Circuits, Root locus, damping factor, over damped, under damped and critically damped cases, quality factor and bandwidth for series and parallel resonance, resonance curves.		
UNIT-III	TWO PORT NETWORK PARAMETERS	Classes: 9
Two port network parameters, Z, Y, ABCD, h and g parameters, Characteristic impedance, Image transfer constant, image and iterative impedance, network function, driving point and transfer functions – using transformed (S) variables, Poles and Zeros. Standard T, π , L Sections, Characteristic impedance, image transfer constants, Design of Attenuators, impedance matching network.		
UNIT-IV	FILTERS AND ATTENUATORS	Classes: 9

Filters: Classification of Filters, Filter Networks, Constant-K Filters-Low pass, high pass, Band pass, band-stop filters, M-derived Filters- T and π filters- Low pass, high pass Attenuators: Types – T, π , L, Bridge T and lattice, Asymmetrical Attenuators T, π , L Equalizers- Types- Series, Shunt, Constant resistance, bridge T attenuation, bridge T phase, Lattice attenuation, lattice Phase equalizers		
UNIT-V	NETWORK SYNTHESIS	Classes: 9
Network Synthesis: Driving point impedance and admittance, transfer impedance and admittance, network functions of Ladder and non ladder networks, Poles, Zeros analysis of network functions, Hurwitz polynomials, Positive Real Functions, synthesis of LC, RC and RL Functions by foster andcauser methods.		
TEXT BOOKS		
1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, 3rd Edition, 2000. 2. Networks, Lines and Fields - JD Ryder, PHI, 2nd Edition, 1999.		
REFERENCE BOOKS		
1. Dr. P. Santosh Kumar Patra, Ms. P. Priyanka, Mr. N, Daniel Manoj “Network Analysis and Transmission Lines”, SunRaise International Publishers First Edition-2021. 2. Engineering Circuit Analysis – William Hayt and Jack E Kemmerly, MGH, 5th Edition, 1993. 3. Electric Circuits – J. Edminister and M.Nahvi – Schaum’s Outlines, Mc Graw Hill Education,1999. 4. Network Theory – Sudarshan and Shyam Mohan, Mc Graw Hill Education. 5. Joseph A. Edminister (2002), Schaum’s outline of Electrical Circuits, 4th edition, Tata McGraw Hill Publications, New Delhi, India 6. A. Chakraborty (2010), Electrical Circuits, 5rd edition, Dhanpat Rai & Sons Publications, New Delhi.		
WEB REFERENCES		
1. https://nptel.ac.in/courses/108102042/ 2. https://lecturenotes.in/subject/537/network-analysis-na 3. https://nptel.ac.in/courses/108/104/108104139/ 4. https://nptel.ac.in/courses/108/105/108105065/		
E -TEXT BOOKS		
1. https://menglim498.files.wordpress.com/2013/04/schaum_s_outlines_-_basic_circuit_analysis.pdf 2. https://bookboon.com/en/electrical-electronic-engineering-ebooks		
MOOCS COURSES		
1. https://www.courses.com/electrical-engineering 2. https://www.edx.org/course/circuits-and-electronics-1-basic-circuit-analysis		



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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

DIGITAL LOGIC DESIGN

II B. TECH- I SEMESTER (R22)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P		CIE	SEE	Total
EC303PC	B. Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

To learn

1. To understand common forms of number representation in logic circuits
2. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems
3. To understand the concepts of combinational logic circuits and sequential circuits
4. To understand the Realization of Logic Gates Using Diodes & Transistors

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. **Identify**, manipulate different number systems and use different coding techniques like Hamming Codes to detect and correct the errors.
2. **Remember** the theorems and postulates of Boolean algebra and also learn how to use K-Map and Tabular Method (QM) to minimize digital functions.
3. **Discuss** combinational, sequential circuits and use standard functions/ building blocks to build larger and more complex circuits.
4. **Analyze** sequential circuits and use standard sequential functions/building blocks to build larger & more complex circuits.
5. **Understand** Logic Families and realize Logic Gates using Diodes & Transistors

UNIT-I	NUMBER SYSTEMS	Classes: 12
<p>Number systems, Complements of Numbers, Codes- Weighted and Non-weighted codes and its Properties, Parity check code and Hamming code.</p> <p>Boolean Algebra: Basic Theorems and Properties, Switching Functions- Canonical and Standard Form, Algebraic Simplification, Digital Logic Gates, EX-OR gates, Universal Gates, Multilevel NAND/NOR realizations.</p>		
UNIT-II	MINIMIZATION OF BOOLEAN FUNCTIONS	Classes: 12
<p>Minimization of Boolean functions: Karnaugh Map Method - Up to five Variables, Don't Care Map Entries, Tabular Method</p> <p>Realization of Logic Gates Using Diodes & Transistors: AND, OR and NOT Gates using Diodes and Transistors, DCTL, RTL, DTL, TTL, CML and CMOS Logic Families and its Comparison, standard TTL NAND Gate-Analysis & characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tri-state outputs, IC interfacing- TTL driving CMOS & CMOS driving TTL.</p>		

UNIT-III	COMBINATIONAL AND SEQUENTIAL CIRCUITS	Classes: 12
<p>Combinational Logic Circuits: Adders, Subtractors, Comparators, Multiplexers, Demultiplexers, Encoders, Decoders and Code converters, Hazards and Hazard Free Relations.</p> <p>Sequential Circuits Fundamentals: Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.</p>		
UNIT-IV	REGISTERS, COUNTERS AND SEQUENTIAL MACHINES	Classes:12
<p>Registers and Counters: Shift Registers – Left, Right and Bidirectional Shift Registers, Applications of Shift Registers - Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters.</p> <p>Sequential Machines: Finite State Machines, Synthesis of Synchronous Sequential Circuits-Serial Binary Adder, Sequence Detector, Parity-bit Generator, Synchronous Modulo N – Counters.</p>		
UNIT-V	FINITE STATE MACHINE	Classes: 12
<p>Finite state machine: capabilities and limitations, Mealy and Moore models, State equivalence and machine minimization, simplification of incompletely specified machines, Merger graphs. Asynchronous design-modes of operation, Hazards, synthesis of SIC fundamental mode circuits, synthesis of burst mode circuits. Introduction to ASM Charts</p>		
TEXT BOOKS		
<ol style="list-style-type: none"> 1. Switching and Finite Automata Theory – Zvi Kohavi & Niraj K. Jha, 3rd Edition, Cambridge, 2010. 2. Modern Digital electronics RP Jain 4th Edition, McGraw Hill 3. Introduction to Switching Theory and Logic Design – Fredriac J. Hill, Gerald R. Peterson, 3rd Ed, John Wiley & Sons Inc. 4. Fundamentals of Logic Design- Charles H. Roth, Cengage Learning, 5th, Edition, 2004. 		
REFERENCE BOOKS		
<ol style="list-style-type: none"> 1. Dr. P. Santosh Kumar Patra, Mrs. K. Anitha, Dr. P, Joel Josephson, Mr. S.P Manikanta “Digital System Design”, Seven Hills International Publishers First Edition-2021. 2. Digital Design- Morris Mano, PHI, 4th Edition,2006 3. Digital Principles, 3/e, Roger L. Tokheim, Schaum’s outline series, 1994. 4. Switching Theory and Logic Design – A Anand Kumar, PHI, 2013. 		
WEB REFERENCES		
<ol style="list-style-type: none"> 1. http://blog.digitalelectronics.co.in/ 2. www.nesoacademy.org/electronics-engineering/digital-electronics/digital 3. https://www.slideshare.net/JournalsPubwwwjourna/international-journal-of-digital-electronics-vol-2-issue-2 4. https://lecturenotes.in/subject/203/switching-theory-and-logic-design-stld 5. http://www.infocobuild.com/education/audio-video-courses/electronics/DigitalCircuitsSystems 6. https://nptel.ac.in/courses/117105080/ 		

E -TEXT BOOKS

1. <https://pages.uoregon.edu/rayfrey/DigitalNotes.pdf>
2. <https://easyengineering.net/fundamentals-of-digital-circuits-by-anand-kumar/>

MOOCS COURSE

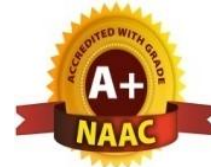
1. <https://www.smartzworld.com/notes/digital-logic-design-dld/>
2. <https://swayam.gov.in/courses/1392-digital-circuits-and-systems>
3. <https://swayam.gov.in/courses/4410-synthesis-of-digital-systems>

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SIGNALS AND SYSTEMS

II B. TECH- I SEMESTER (R22)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
EC304PC	B.Tech	3	1	0	4	40	60	100

COURSE OBJECTIVES

To learn

1. This gives the basics of Signals and Systems required for all Electronics and Communication Engineering related courses.
2. To understand the behavior of signal in time and frequency domain
3. To understand the characteristics of LTI systems
4. This gives concepts of Signals and Systems and its analysis using different transform techniques.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Differentiate various signal functions.
2. Represent any arbitrary signal in time and frequency domain.
3. Understand the characteristics of linear time invariant systems.
4. Relate different transform techniques
5. Perform the Sampling, Reconstruction of signals and Correlation of signals.

UNIT-I	SIGNAL ANALYSIS	Classes: 12
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Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Closed or complete set of Orthogonal functions, Orthogonality in Complex functions, Classification of Signals and systems, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function.

UNIT-II	FOURIER SERIES AND FOURIER TRANSFORMS	Classes: 12
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Fourier series: Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet's conditions, Trigonometric Fourier Series and Exponential Fourier Series, Complex Fourier spectrum.

Fourier Transforms: Deriving Fourier Transform from Fourier series, Fourier Transform of arbitrary signal, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of Fourier Transform, Fourier Transforms involving Impulse function and Signum function, Introduction to Hilbert Transform.

UNIT-III	SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS	Classes: 12
<p>Linear System, Impulse response, Response of a Linear System, Linear Time Invariant(LTI) System, Linear Time Variant (LTV) System, Transfer function of a LTI System, Filter characteristic of Linear System, Distortion less transmission through a system, Signal bandwidth, System Bandwidth, Ideal LPF, HPF, and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between Bandwidth and rise time, Convolution and Correlation of Signals, Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution.</p>		
UNIT-IV	LAPLACE TRANSFORMS AND Z-TRANSFORMS	Classes: 12
<p>Laplace Transforms: Laplace Transforms (L.T), Inverse Laplace Transform, Concept of Region of Convergence (ROC) for Laplace Transforms, Properties of L.T, Relation between L.T and F.T of a signal, Laplace Transform of certain signals using waveform synthesis.</p> <p>Z-Transforms: Concept of Z- Transform of a Discrete Sequence, Distinction between Laplace, Fourier and Z Transforms, Region of Convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-transform, Properties of Z-transforms.</p>		
UNIT-V	SAMPLING THEOREM AND CORRELATION	Classes: 12
<p>Sampling theorem: Graphical and analytical proof for Band Limited Signals, Impulse Sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling –Aliasing, Introduction to Band Pass Sampling.</p> <p>Correlation: Cross Correlation and Auto Correlation of Functions, Properties of Correlation Functions, Energy Density Spectrum, Parsevals Theorem, Power Density Spectrum, Relation between Autocorrelation Function and Energy/Power Spectral Density Function, Relation between Convolution and Correlation, Detection of Periodic Signals in the presence of Noise by Correlation, Extraction of Signal from Noise by Filtering.</p>		
TEXT BOOKS		
<ol style="list-style-type: none"> 1. Signals, Systems & Communications - B.P. Lathi, 2013, BSP. 2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawabi, 2 Ed. 		
REFERENCE BOOKS		
<ol style="list-style-type: none"> 1. Mr. G. Ramesh Reddy, Mr. N. Vishwanath, Mr. V. V. Ramana Rao “ Signals and Systems”, Sun Techno Publications First Edition-2021. 2. Signals and Systems – Simon Haykin and Van Veen, Wiley 2 Ed.,. 3. Signals and Systems – A. Rama Krishna Rao, 2008, TMH. 4. Fundamentals of Signals and Systems - Michel J. Robert, 2008, MGH International Edition. 5. Signals, Systems and Transforms - C. L. Philips, J.M.Parr and Eve A.Riskin, 3 Ed., 2004, PE 6. Signals and Systems – K. Deerga Rao, Birkhauser, 2018. 		

WEB REFERENCES

1. https://nptel.ac.in/noc/individual_course.php?id=noc19-ee07
2. <https://nptel.ac.in/courses/108106075/8>
3. <https://nptel.ac.in/courses/117105134/13>
4. <https://nptel.ac.in/courses/117102059/4>

E -TEXT BOOKS

1. SIGNALS & SYSTEMS 2nd Edition Paperback – 1 Jul 2017 by H Hsu (Author), R Ranjan (Author)
2. Signals and Systems 2nd edition 2nd Edition (English, Paperback, Alan V. Oppenheim, Alan S. Willsky, S. Hamid Nawab)

MOOCS COURSE

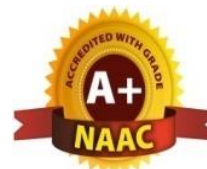
1. <https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/>
2. <https://www.coursera.org/lecture/dsp/5-3-c-the-sampling-theorem-DcFxD>

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ANALOG CIRCUITS LAB

II B. TECH- I SEMESTER (R22)								
Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
EC305PC	B.Tech	0	0	2	1	40	60	100
COURSE OBJECTIVES <ol style="list-style-type: none"> 1. To understand the importance of MULTISIM software. 2. To identify the basic electronic devices like diode, transistor. 3. To analyze the applications of Diode like clipper and clamper circuits. 4. To analyze transistor amplifiers and their frequency responses. 5. To analyze the oscillator circuits. 								
COURSE OUTCOMES <p>Upon successful completion of the course, the student is able to</p> <ol style="list-style-type: none"> 1. Understand the diode and transistor characteristics. 2. Verify the Amplifier Frequency Response using software. 3. Design the biasing circuits like self biasing. 4. Design various amplifiers like CE, CC, common source FET amplifiers and also observe their frequency responses. 5. Design the biasing circuits like self biasing. 								
LIST OF EXPERIMENTS <ol style="list-style-type: none"> 1. Perform an experiment to choose Q-point for a Transistor that operate in active region and observe the effect of external Load resistance on Q-point. 2. Design a Self bias Circuit and determine the Q-point of the Transistor and its Stability factor by both simulation and realization with hardware components. 3. Obtain the I/O Characteristics of CE, CB, CC amplifiers. Calculate h-parameters from the Characteristics. 4. Design and Simulate a Common Drain Amplifier with voltage divider bias and determine the Stability factor. 5. Obtain the Drain and Transfer characteristics of CD, CS amplifiers of JFET. Calculate gm, rd from the Characteristics. 6. By experiment prove that the voltage gain of Emitter Follower Circuit is one. 7. Design a Common Emitter Amplifier with a gain of 30db and Bandwidth of 10KHZ and plot the frequency response practically. 8. Design a two stage RC Coupled amplifier and prove that gain is increased and analyze the effects of coupling capacitance. 9. Practically prove that the Darlington pair has high input impedance. 								

10. Draw the high frequency response of common emitter transistor amplifier and calculate f_{α} , f_{β} and gain bandwidth product.
11. Design a cascode amplifier for a given specifications
12. Design four topologies of feedback amplifiers and draw the frequency response of them with and without feedback.
13. Design an RC phase shift oscillator circuit and derive the gain condition for oscillations practically for given frequency.
14. Design a Colpitts oscillator circuit for the given frequency and draw the output waveform.

TEXT BOOKS

1. Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw Hill Education.
2. Electronic Devices Conventional and current version -Thomas L. Floyd 2015, Pearson.

REFERENCE BOOKS

1. Dr. S. V. S. Ramkrishnam Raju, Dr. A. Anand, Ms. P. Pushpa, Dr. M. Thirupathi, Mr. K. Balasubramanyam "Electronic Devices and Circuits", Amaravathi Publications, 1st Edition, 2021.
2. Electronic Devices and Circuits, David A. Bell – 5th Edition, Oxford.
3. Electronic Devices and Circuits theory– Robert L. Boylestead, Louis Nashelsky, 11th Edition, 2009, Pearson

WEB REFERENCES

1. <https://nptel.ac.in/courses/108/106/108106105/>
2. <https://nptel.ac.in/courses/117/105/117105147/>
3. <https://nptel.ac.in/courses/117/108/117108047/>
4. <http://www.chipcenter.com/power/powaarch.htm>
5. <http://www.amasci.com/amateur/elehob.html>

E -TEXT BOOKS

1. Circuit Analysis by John E. Whitehouse, Horwood Engineering Science Series.
2. Analog Circuits, Edited by Yuping Wu

MOOCS COURSE

1. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-002-circuits-and-electronics-spring-2007/video-lectures/lecture-9-part-1/>
2. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-002-circuits-and-electronics-spring-2007/video-lectures/lecture-10/>
3. <https://www.coursera.org/learn/linear-circuits-ac-analysis>



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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

DIGITAL LOGIC DESIGN LABORATORY

II B. TECH- I SEMESTER (R22)								
Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
EC306PC	B. Tech	0	0	2	1	40	60	100
<h4>COURSE OBJECTIVES</h4> <p>To learn</p> <ol style="list-style-type: none"> 1. To understand the use of logic gates and to design basic gates using universal gates 2. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems 3. To understand the concepts and design techniques of combinational logic circuits 4. To understand the concepts and design techniques of sequential logic circuits <h4>COURSE OUTCOMES</h4> <p>Upon successful completion of the course, the student is able to</p> <ol style="list-style-type: none"> 1. Design and Realization of Boolean Expressions using logic gates 2. Understand how to generate different logic gates using Universal gates 3. Design of clock generator using NAND/NOR gates 4. Analyze and design combinational circuit like Adder/Subtractor, Comparators, MUX etc. 5. Design and develop sequential circuits like Shift Registers, Counters and understand memory elements <h4>LIST OF EXPERIMENTS</h4> <ol style="list-style-type: none"> 1. Realization of Logic circuit to generate r's Complement using Logic Gates. 2. Realization of given Boolean function using universal gates and minimizing the same. Compare the gate count before and after minimization. 3. Design and realize Full Adder circuit using gates/universal gates. Implement Full Subtractor using full adder. 4. Designing a 2 – bit Comparator using AND, OR and NOT gates. Realize 4 – bit Comparator using 2– bit Comparators. 5. Realize 2:1 MUX using the given gates and Design 8:1 using 2:1 MUX. 6. Implement the given Boolean function using the given MUX(ex: code converters). 7. Realize a 2x4 Decoder using logic gates and implement 3x8 Decoder using 2x4 Decoder. 8. Implement the given Boolean function using given Decoders. 9. Convert Demultiplexer to Decoder and vice versa. 10. Verification of truth tables of flipflops using different clocks (level triggering, positive and negative edge triggering) also converts the given flipflop from one type to other. 								

<ol style="list-style-type: none"> 11. Designing of Universal n-bit shift register using flipflops and Multiplexers. Draw the timing diagram of the Shift Register. 12. Design a Synchronous binary counter using D-flipflop/given flipflop. 13. Design a asynchronous counter for the given sequence using given flipflops. 14. Designing of MOD 8 Counter using JK flipflops. 15. Designing of sequence detecting State Machine with minimal states using the given flipflops. 16. Designing of Parity Bit(even/odd) generator using the given flipflops. 17. Realize all logic gates with TTL logic. 18. Realize all logic gates with DTL logic. <ul style="list-style-type: none"> *Design a sequence detector to detect a given sequence and verify practically *Design a serial subtractor for 4 bit binary numbers
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<p>TEXT BOOKS</p> <ol style="list-style-type: none"> 1. Digital Design- Morris Mano, PHI, 4th Edition,2006 2. Introduction to Switching Theory and Logic Design – Fredriac J. Hill, Gerald R. Peterson, 3rd Ed, John Wiley & Sons Inc. 3. Fundamentals of Logic Design- Charles H. Roth, Cengage Learning, 5th, Edition, 2004.
<p>REFERENCE BOOKS</p> <ol style="list-style-type: none"> 1. Dr. P. Santosh Kumar Patra, Mrs. K. Anitha, Dr. P, Joel Josephson, Mr. S.P Manikanta “Digital System Design”, Seven Hills International Publishers First Edition-2021. 2. Switching and Finite Automata Theory – Zvi Kohavi & Niraj K. Jha, 3rd Edition, Cambridge, 2010. 3. Digital Principles, 3/e, Roger L. Tokheim, Schaum’s outline series, 1994. 4. Modern Digital electronics RP Jain 4th Edition, McGraw Hill 5. Switching Theory and Logic Design – A Anand Kumar, PHI, 2013.
<p>WEB REFERENCES</p> <ol style="list-style-type: none"> 1. http://blog.digitalelectronics.co.in/ 2. www.nesoacademy.org/electronics-engineering/digital-electronics/digital 3. https://www.slideshare.net/JournalsPubwwwjourna/international-journal-of-digital-electronics-vol-2-issue-2 4. https://lecturenotes.in/subject/203/switching-theory-and-logic-design-stld 5. http://www.infocobuild.com/education/audio-video-courses/electronics/DigitalCircuitsSystems 6. https://nptel.ac.in/courses/117105080/
<p>E-TEXT BOOKS</p> <ol style="list-style-type: none"> 1. https://pages.uoregon.edu/rayfrey/DigitalNotes.pdf 2. https://easyengineering.net/fundamentals-of-digital-circuits-by-anand-kumar/
<p>MOOCS COURSE</p> <ol style="list-style-type: none"> 1. https://www.smartzworld.com/notes/digital-logic-design-dld/ 2. https://swayam.gov.in/courses/1392-digital-circuits-and-systems 3. https://swayam.gov.in/courses/4410-synthesis-of-digital-systems



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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

BASIC SIMULATION LABORATORY

II B. TECH- I SEMESTER (R22)								
Course Code	Programme	Hours / Week			Credits	Maximum Marks		
EC307ES	B.Tech	L	T	P	C	CIE	SEE	Total
		0	0	2	1	40	60	100

COURSE OBJECTIVES

To learn

1. This gives the basics of Signals and Systems required for all Electronics and Communication Engineering related courses.
2. To understand the behavior of signal in time and frequency domain
3. To understand the characteristics of LTI systems
4. This gives concepts of Signals and Systems and its analysis using different transform techniques.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. **Understand** Basics of MATLAB syntax, functions and programming and Analyze the generation Various Signals and Sequences in MATLAB, including the operations on Signals and Sequences.
2. **Analyze** the Fourier Transform of a given signal and plotting its magnitude and phase spectrum and Sampling Theorem.
3. **Determine** the Convolution and Correlation between Signals and sequences and Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System.
4. **Understand** the Waveform Synthesis using Laplace Transform and Remember for Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for the given transfer function.
5. **Verification** of Weiner-Khinchine Relations and random processes for stationary in wide-sense.

LIST OF EXPERIMENTS

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
4. Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts of Signal.
5. Convolution for Signals and sequences.
6. Auto Correlation and Cross Correlation for Signals and Sequences.
7. Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System.
8. Computation of Unit sample, Unit step and Sinusoidal responses of the given LTI system and verifying its physical realizability and stability properties.
9. Gibbs Phenomenon Simulation.
10. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
11. Waveform Synthesis using Laplace Transform.
12. Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for the given transfer function.
13. Generation of Gaussian noise (Real and Complex), Computation of its mean, M.S. Value and its Skew, Kurtosis, and PSD, Probability Distribution Function.
14. Verification of Sampling Theorem.
15. Removal of noise by Autocorrelation / Crosscorrelation.
16. Extraction of Periodic Signal masked by noise using Correlation.
17. Verification of Wiener-Khinchine Relations.
18. Checking a Random Process for Stationarity in Widesense.

TEXT BOOKS

1. Signals, Systems & Communications - B.P. Lathi, 2013, BSP.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawabi, 2 Ed.

REFERENCE BOOKS

1. Signals and Systems – Simon Haykin and Van Veen, Wiley 2 Ed.,
2. Signals and Systems – A. Rama Krishna Rao, 2008, TMH
3. Fundamentals of Signals and Systems - Michel J. Robert, 2008, MGH International Edition
4. Signals, Systems and Transforms - C. L. Philips, J.M.Parr and Eve A.Riskin, 3 Ed., 2004, PE.
5. Signals and Systems – K. Deerga Rao, Birkhauser, 2018.

WEB REFERENCES

1. https://nptel.ac.in/noc/individual_course.php?id=noc19-ee07
2. <https://nptel.ac.in/courses/108106075/8>
3. <https://nptel.ac.in/courses/117105134/13>
4. <https://nptel.ac.in/courses/117102059/4>

E -TEXT BOOKS

1. SIGNALS & SYSTEMS 2nd Edition Paperback – 1 Jul 2017by H Hsu (Author), R Ranjan (Author)
2. Signals and Systems 2nd edition 2nd Edition (English, Paperback, Alan V. Oppenheim, Alan S. Willsky, S. Hamid Nawab)

MOOCS COURSE

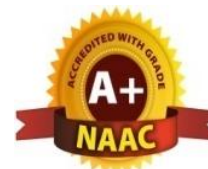
1. <https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/>
2. <https://www.coursera.org/lecture/dsp/5-3-c-the-sampling-theorem-DcFxD>

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CONSTITUTION OF INDIA

II B. TECH- I SEMESTER (R22)

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
*CI309MC	B. Tech	3	0	0	0	100	-	100

COURSE OBJECTIVES

To learn

1. Sovereign -independent to conduct internal as well as external affairs
2. Socialist - preventing concentration of wealth into few hands
3. Secular - respecting all religions equally
4. Democratic- government by the people, of the people, for the people
5. Republic - Head of the state will be elected not hereditary

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. To understand the basic concepts of democracy, republicanism, constitutionalism and to know about the constitutional theories, virtues and constitutional interpretation
2. To study and analyze the quasi-federal nature of Indian Constitution and the basic function of a written constitution regarding the allocation of State power, the functions, powers and limits of the organs of state
3. To analyze elaborately regarding the emergency and amendment procedures; the need for granting of special status or special provisions to some states
4. To know about Panchayats, Municipalities, Scheduled and Tribal areas

UNIT-I	HISTORY OF INDIAN CONSTITUTION	Classes: 12
History of Making of the Indian Constitution- History of Drafting Committee.		
UNIT-II	PHILOSOPHY OF INDIAN CONSTITUTION	Classes: 12
Philosophy of the Indian Constitution- Preamble Salient Features		
UNIT-III	CONTOURS OF CONSTITUTION RIGHTS AND DUTIES	Classes: 12
Contours of Constitutional Rights & Duties - Fundamental Rights <ul style="list-style-type: none"> • Right to Equality • Right to Freedom • Right against Exploitation • Right to Freedom of Religion 		

	<ul style="list-style-type: none"> • Cultural and Educational Rights • Right to Constitutional Remedies • Directive Principles of State Policy • Fundamental Duties. 	
UNIT-IV	ORGANS OF GOVERNANCE	Classes: 12
Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions		
UNIT-V	LOCAL ADMINISTRATION	Classes: 12
Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayat raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO ZilaPanchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy		
UNIT-V	ELECTION COMMISSION	Classes: 12
Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.		
TEXT BOOKS		
<ol style="list-style-type: none"> 1. H.M. Seervai: Constitutional Law of India 2. M.P. Jain: Indian Constitutional Law 3. Mahendra P. Singh: V. N. Shukla's Constitution of India 4. Granville Austin: The Indian Constitution: Cornerstone of a Nation 5. D.D. Basu: Shorter Constitution of India 		
REFERENCE BOOKS		
<ol style="list-style-type: none"> 1. A. Sarveswarareddy, K. Sathish, K. Sudha, Constitution of India, M/S Spectrum Publications, First Edition 2021 2. An Introduction to the Constitution of India by Dr.Durga Das Basu 3. An Introduction to the Constitution of India by M.V.Pylee 4. Indian Constitutional Law by M.P. Jain 		
WEB REFERENCES		
<ol style="list-style-type: none"> 1. http://www.wdl.org/en/item/2672/ 2. https://nptel.ac.in/courses/109103135/24 		
E -TEXT BOOKS		
<ol style="list-style-type: none"> 1. https://iasexamportal.com/ebook/the-constitution-of-india 2. https://www.india.gov.in/my-government/documents/e-books 		
MOOCS COURSE		
<ol style="list-style-type: none"> 1. http://nludelhi.ac.in/images/moocs/moocs-courses.pdf 2. https://www.classcentral.com/tag/constitutional-law 		



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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

PROBABILITY THEORY AND STOCHASTIC PROCESSES

II B. TECH- II SEMESTER (R22)

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
EC401ES	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. This gives basic understanding of random signals and processing
2. Utilization of Random signals and systems in Communications and Signal Processing areas.
3. To know the Spectral and temporal characteristics of Random Process.
4. To Learn the Basic concepts of Noise sources.

COURSE OUTCOMES

Upon completion of the subject, students will be able to compute:

1. Simple probabilities using an appropriate sample space
2. Simple probabilities and expectations from probability density functions (pdfs)
3. Likelihood ratio tests from pdfs for statistical engineering problems.
4. Least -square & maximum likelihood estimators for engineering problems.
5. Mean and covariance functions for simple random processes.

UNIT-I	PROBABILITY & RANDOM VARIABLE	Classes: 9
<p>Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Joint Probability, Conditional Probability, Total Probability, Bay's Theorem, Independent Events, <i>Random Variable</i>- Definition, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Methods of defining Conditioning Event, Conditional Distribution, Conditional Density and their Properties.</p>		
UNIT-II	OPERATIONS ON SINGLE & MULTIPLE RANDOM VARIABLES – EXPECTATIONS	Classes: 9
<p>Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic and Non-monotonic Transformations of Continuous Random Variable, Transformation of a Discrete Random Variable.</p> <p>Vector Random Variables, Joint Distribution Function and its Properties, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning,</p>		

<p>Conditional Distribution and Density – Interval conditioning, Statistical Independence. Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, (Proof not expected). Unequal Distribution, Equal Distributions. Expected Value of a Function of Random Variables: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.</p>		
UNIT-III	RANDOM PROCESSES – TEMPORAL CHARACTERISTICS	Classes: 9
<p>The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second- Order and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationarity, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation Function and Its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process. Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output.</p>		
UNIT-IV	RANDOM PROCESSES – SPECTRAL CHARACTERISTICS	Classes: 9
<p>The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function. Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output.</p>		
UNIT-V	NOISE SOURCES & INFORMATION THEORY	Classes: 9
<p>Resistive/Thermal Noise Source, Arbitrary Noise Sources, Effective Noise Temperature, Noise equivalent bandwidth, Average Noise Figures, Average Noise Figure of cascaded networks, Narrow Band noise, Quadrature representation of narrow band noise & its properties. Entropy, Information rate, Source coding: Huffman coding, Shannon Fano coding, Mutual information, Channel capacity of discrete channel, Shannon-Hartley law; Trade -off between bandwidth and SNR.</p>		
TEXT BOOKS		
<ol style="list-style-type: none"> 1. Probability, Random Variables & Random Signal Principles - Peyton Z. Peebles, TMH, 4th Edition, 2001. 2. Principles of Communication systems by Taub and Schilling (TMH),2008 		

REFERENCE BOOKS

1. Dr. P. Santosh Kumar Patra, Mr. N. Vishwanath, Mr. G. Ramesh Reddy, Mr. V. V. Ramana Rao “Probability Theory and Stochastic Process”, StudentsHelpline Publishing House First Edition-2021.
2. Random Processes for Engineers-Bruce Hajck, Cambridge unipress,2015
3. Probability, Random Variables and Stochastic Processes – Athanasios Papoulis and S. Unnikrishna Pillai, PHI, 4th Edition, 2002.
4. Probability, Statistics & Random Processes-K. Murugesan, P.Guruswamy, Anuradha Agencies, 3rd Edition, 2003.
5. Signals, Systems & Communications - B.P. Lathi, B.S. Publications, 2003.
6. Statistical Theory of Communication – S.P Eugene Xavier, New Age Publications, 2003

WEB REFERENCES

1. <https://nptel.ac.in/courses/111102111/>
2. <http://nptel.ac.in/courses/106106097>
3. <http://nptel.ac.in/courses/117106090>
4. <http://nptel.ac.in/courses/117105085>

E -TEXT BOOKS

1. Probability, Statistics And Random Processes-T.Veerarajan, 2nd EditionTata McGraw-Hill Education, 01-Nov-2002 - Engineering.
2. Probability and Random Processes-Geoffrey Grimmett, Publisher by Oxford University Press.
3. Probability, Random Variables, and Random Processes: Theory and Signal Processing Applications 1st Edition, Kindle Edition,by John J. Shynk (Author).

MOOCS COURSE

1. <https://lecturenotes.in/subject/473/probability-theory-and-stochastic-processes-ptsp>
2. <https://www.coursera.org/learn/introductiontoprobability>
3. <https://ocw.mit.edu/courses/mathematics/18-s096-topics-in-mathematics-with-applications-in-finance-fall-2013/video-lectures/lecture-6-regression-analysis/>



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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ELECTROMAGNETIC FIELDS AND TRANSMISSION LINES

II B. TECH- II SEMESTER (R22)

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
EC402PC	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

To learn

1. To learn the Basic Laws, Concepts and proofs related to Electrostatic Fields and Magneto static Fields, and apply them to solve physics and engineering Problems.
2. To distinguish between static and time-varying fields, and understand the significance and utility of Maxwell's Equations and Boundary Conditions, and Gain ability to provide solutions to communication engineering problems.
3. To analyze the characteristics of Uniform Plane Waves (UPW), determine their propagation parameters and estimate the same for dielectric and dissipative Media.
4. To conceptually understand the UPW Polarization features and Poynting Theorem, and apply them for practical problems.
5. To determine the basic Transmission Line Equations and telephone line parameters and estimate the distortions present and to understand the concepts of RF Lines and their characteristics, Smith Chart and its applications, acquire knowledge to configure circuit elements.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Get the knowledge of Basic Laws, Concepts and proofs related to Electrostatic Fields and Magnetostatic fields
2. Distinguish between the static and time-varying fields, establish the Corresponding sets of Maxwell's Equations and Boundary Conditions, and use them for solving engineering problems know the characteristics of various components.
3. Analyze the Wave Equations for good conductors and good dielectrics, and evaluate the UPW Characteristics for several practical media of interest understand the utilization of components.
4. Estimate the polarization features, reflection and transmission coefficients for UPW propagation, distinguish between Brewster and Critical Angles, and acquire knowledge of their applications. Understand the biasing techniques.
5. Analyze the RF Line features and configure them as SC, OC Lines, QWTs and HWTs, and design the same for effective impedance transformation. Study the Smith Chart profile and stub matching features.

UNIT-I	ELECTROSTATICS	Classes: 12
Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V, Maxwell's Two Equations for Electrostatic Fields, Energy Density. Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitance – Parallel Plate, Coaxial, Spherical Capacitors.		
UNIT-II	MAGNETOSTATICS	Classes: 12
Biot-Savart's Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law.		
UNIT-III	MAXWELL'S EQUATIONS (TIME VARYING FIELDS)	Classes: 12
Faraday's Law and Transformer EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Forms, Conditions at a Boundary Surface - Dielectric-Dielectric and Dielectric-Conductor Interfaces.		
UNIT-IV	EM WAVE CHARACTERISTICS	Classes: 12
Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definitions, Relation between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Polarization. Reflection and Refraction of Plane Waves – Normal and Oblique Incidences for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector and Poynting Theorem.		
UNIT-V	TRANSMISSION LINES	Classes: 12
Transmission Lines: Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Equivalent Circuit, Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Lossless / Low Loss Characterization, Condition for Distortion less line, Minimum Attenuation, Loading - Types of Loading, SC and OC Lines, $\lambda/4$, $\lambda/2$, $\lambda/8$ Lines, Reflection Coefficient, VSWR Smith Chart – Configuration and Applications, Single Stub Matching		
TEXT BOOKS		
<ol style="list-style-type: none"> 1. William H. Hayt Jr. and John A. Buck- Engineering Electromagnetics, 8th Ed., McGraw Hill, 2014. 2. Matthew N.O. Sadiku and S.V. Kulkarni - Principles of Electromagnetics, 6th Ed., Oxford University Press, Aisan Edition, 2015. 		
REFERENCE BOOKS		
<ol style="list-style-type: none"> 1. Dr. P. Santosh Kumar Patra, Dr. A. Chaitanya Krishna, Mr. S. Ravi Kumar, Mrs. K. Anitha "Electromagnetic Fields and Waves", S International Publishers First Edition- 2022. 2. J.D. Kraus -Electromagnetics with Applications ,5th Ed., TMH 3. Umesh Sinha, Satya Prakashan -Transmission Lines and Networks, (Tech. IndiaPublications), New Delhi, 2001⁸³ 		

4. JD Ryder -Networks, Lines and Fields, 2nd Ed., PHI, 1999

WEB REFERENCES

1. <https://nptel.ac.in/courses/108/106/108106073/>
2. <https://nptel.ac.in/courses/108/104/108104087/>
3. <https://nptel.ac.in/courses/117/103/117103065/>

E -TEXT BOOKS

1. Principles of Electromagnetics – Matthew N.O. sadiku and S.V. Kulkarni, 6th Ed., Oxford University Press, Aisan Edition, 2015
2. Electromagnetics and Applications- David H. Staelin

MOOCS COURSE

1. <https://ocw.mit.edu/courses/physics/8-311-electromagnetic-theory-spring-2004/>
2. <https://www.mooc-list.com/tags/electromagnetic-field>

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ANALOG AND DIGITAL COMMUNICATIONS

II B. TECH- II SEMESTER (R22)								
Course Code	Programme	Hours / Week			Credits	Maximum Marks		
EC403PC	B.Tech	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100
COURSE OBJECTIVES								
<ol style="list-style-type: none"> 1. To develop ability to analyze system requirements of analog communication systems. 2. To understand the need for modulation. 3. To understand the generation, detection of various analog modulation techniques and also perform the mathematical analysis associated with these techniques. 4. To acquire knowledge to analyze the noise performance of analog modulation techniques. 5. To acquire theoretical knowledge of each block in AM and FM receivers. 6. To understand the pulse modulation techniques. 								
COURSE OUTCOMES								
<p>Upon successful completion of the course, the student is able to</p> <ol style="list-style-type: none"> 1. Able to analyze and design various modulation and demodulation analog systems. 2. Understand the characteristics of noise present in analog systems. 3. Study of signal to Noise Ratio (SNR) performance, of various Analog Communication systems. 4. Analyze and design the various Pulse Modulation Systems. 5. Understand the concepts of Multiplexing: Time Division Multiplexing (TDM) and Frequency Division Multiplexing (FDM). 								
UNIT-I	AMPLITUDE MODULATION						Classes: 12	
<p>Need for modulation, Amplitude Modulation - Time and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves - Switching modulator, Detection of AM Waves - Envelope detector, DSBSC modulation - time and frequency domain description, Generation of DSBSC Waves - Balanced Modulators, Coherent detection of DSB-SC Modulated waves, COSTAS Loop, SSB modulation - time and frequency domain description, frequency discrimination and Phase discrimination methods for generating SSB, Demodulation of SSB Waves, principle of Vestigial side band modulation</p>								

UNIT-II	ANGLE MODULATION	Classes: 12
<p>Basic concepts of Phase Modulation, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave using Bessel functions, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave – Generation of FM Signal- Armstrong Method, Detection of FM Signal: Balanced slope detector, Phase locked loop, Comparison of FM and AM., Concept of Pre-emphasis and de-emphasis.</p>		
UNIT-III	TRANSMITTERS AND RECEIVERS	Classes: 12
<p>Transmitters: Classification of Transmitters, AM Transmitters, FM Transmitters Receivers: Radio Receiver – Receiver Types – Tuned radio frequency receiver, Superhetrodyne receiver, RF section and Characteristics – Frequency changing and tracking, Intermediate frequency, Image frequency, AGC, Amplitude limiting, FM Receiver, Comparison of AM and FM Receivers.</p>		
UNIT-IV	PULSE MODULATION	Classes: 12
<p>Pulse Modulation: Types of Pulse modulation- PAM, PWM and PPM. Comparison of FDM and TDM. Pulse Code Modulation: PCM Generation and Reconstruction, Quantization Noise, Non-Uniform Quantization and Companding, DPCM, Adaptive DPCM, DM and Adaptive DM, Noise in PCM and DM.</p>		
UNIT-V	DIGITAL MODULATION TECHNIQUES	Classes: 12
<p>Digital Modulation Techniques: ASK- Modulator, Coherent ASK Detector, FSK- Modulator, Non- Coherent FSK Detector, BPSK- Modulator, Coherent BPSK Detection. Principles of QPSK, Differential PSK and QAM. Baseband Transmission and Optimal Reception of Digital Signal: A Baseband Signal Receiver, Probability of Error, Optimum Receiver, Coherent Reception, ISI, Eye Diagrams.</p>		
TEXT BOOKS		
<ol style="list-style-type: none"> 1. Analog and Digital Communications – Simon Haykin, John Wiley, 2005. 2. Electronics Communication Systems-Fundamentals through Advanced-Wayne Tomasi, 5th Edition, 2009, PHI. 		
REFERENCE BOOKS		
<ol style="list-style-type: none"> 1. Dr. P. Santosh Kumar Patra, Dr. S. V. S. Ramakrishnam Raju, Mr. D. Prasad, Mr. K. Nishakar “Analog and Digital Communications” Srikrishna Techno Books First Edition-2022. 2. Principles of Communication Systems - Herbert Taub, Donald L Schilling, Goutam Saha, 3rd Edition, McGraw-Hill, 2008. 3. Electronic Communications – Dennis Roddy and John Coolean , 4th Edition , PEA, 2004 4. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004 5. Analog and Digital Communication – K. Sam Shanmugam, Willey, 2005 		

WEB REFERENCES

1. <https://nptel.ac.in/courses/117/105/117105143/>
2. <https://nptel.ac.in/courses/117/102/117102059/>
3. <https://nptel.ac.in/courses/117/108/117108107/>

E -TEXT BOOKS

1. Analog Communications 4th Edition by Anand Kumar Person Publication.
2. Communication Systems by Millman & Taub, TMH, 3rd Edition.

MOOCS COURSE

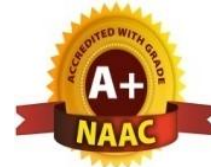
1. https://swayam.gov.in/nd1_noc19_ee46
2. <https://www.coursera.org/learn/c-plus-plus-a>

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

LINEAR AND DIGITAL IC APPLICATIONS

II B. TECH- II SEMESTER (R22)								
Course Code	Programme	Hours / Week			Credits	Maximum Marks		
EC404PC	B. Tech	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

COURSE OBJECTIVES

To learn

1. To introduce the basic building blocks of linear integrated circuits.
2. To introduce the theory and applications of analog multipliers and PLL
3. To teach the linear and non - linear applications of operational amplifiers.
4. To introduce the theory and applications of 555 timer and PLL.
5. To teach the theory of ADC and DAC.
6. To introduce the concepts of waveform generation and introduce some special function ICs.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. A thorough **understanding** of operational amplifiers with linear integrated circuits.
2. To **design** circuits using operational amplifiers for various applications and to study different kinds of voltage regulators.
3. To **analyze** different active filters and to introduce the concepts of waveform generation, oscillators
4. To develop the **knowledge** in functional diagrams and applications using linear ICs like 555, 565 and to study oscillators.
5. To develop the knowledge in data converters and **Evaluate** the specifications of ADCs and DACs.

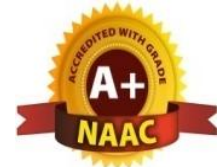
UNIT-I	OPERATIONAL AMPLIFIER	Classes: 12
Operational Amplifier: Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation-Inverting, Non-Inverting, Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.		
UNIT-II	OP-AMP, IC-555 & IC-565 APPLICATIONS	Classes: 12
Op-Amp, IC-555 & IC565 Applications: Introduction to Active Filters, Characteristics of Bandpass, Bandreject and All Pass Filters, Analysis of 1 st order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Sawtooth, Square Wave, IC555 Timer-Functional Diagram, Monostable and Astable Operations, Applications, IC565 PLL-Block Schematic, principle and Applications.		

UNIT-III	DATA CONVERTERS	Classes: 12
Data Converters: Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs – Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.		
UNIT-IV	COMBINATIONAL LOGIC ICs	Classes: 12
Combinational Logic ICs: Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs - Code Converters, Decoders, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators.		
UNIT-V	SEQUENTIAL LOGIC ICs AND MEMORIES	Classes: 12
Sequential Logic IC's and Memories: Familiarity with commonly available 74XX & CMOS40XX Series ICs - All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers. Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.		
TEXT BOOKS		
<ol style="list-style-type: none"> 1. Ramakanth A. Gayakwad - Op-Amps & Linear ICs, PHI, 2003. 2. Floyd and Jain- Digital Fundamentals, 8th Ed., Pearson Education, 2005. 		
REFERENCE BOOKS		
<ol style="list-style-type: none"> 1. Mrs. K. Anitha, Dr. S. V. S. Ramakrishnam Raju, Dr. B. Hari Krishna, Mrs. G. Vinatha "Linear IC Applications" Amaravathi Publishers First Edition- 2022. 2. D. Roy Chowdhury – Linear Integrated Circuits, New Age International(p) Ltd, 2nd Ed., 2003. 3. John. F. Wakerly – Digital Design Principles and Practices, 3rd Ed., Pearson, ,2009. 4. Salivahana -Linear Integrated Circuits and Applications, TMH, 2008. 5. William D. Stanley- Operational Amplifiers with Linear Integrated Circuits, 4th Ed., Pearson Education India, 2009. 		
WEB REFERENCES		
<ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/117/106/108106105/ 2. https://nptel.Ac.In/Courses/117103063/26 		
E -TEXT BOOKS		
<ol style="list-style-type: none"> 1. https://open.umn.edu/opentextbooks/textbooks/574 2. https://books.google.co.in/books/about/Linear_Integrated_Circuits.html?id=-zAe0P33BAcC 		
MOOCS COURSE		
<ol style="list-style-type: none"> 1. https://www.electronics-tutorials.ws/waveforms/555_timer.htm 2. https://circuitdigest.com/article/555-timer-ic 		



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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ELECTRONIC CIRCUIT ANALYSIS

II B. TECH- II SEMESTER (R22)								
Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
EC405PC	B.Tech	3	0	0	3	40	60	100
<p>COURSE OBJECTIVES</p> <ol style="list-style-type: none"> Learn the concepts of high frequency analysis of transistors To give understanding of various types of amplifier circuits such as small signal, To give understanding of cascaded To give understanding large signal and tuned amplifiers. To familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback <p>COURSE OUTCOMES</p> <p>Upon successful completion of the course, the student is able to</p> <ol style="list-style-type: none"> Design the multistage amplifiers. Understand the concepts of High Frequency Analysis of Transistors. Utilize the Concepts of negative feedback to improve the stability of amplifiers Design positive feedback to generate sustained oscillations Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications. 								
UNIT-I	LARGE SIGNAL AMPLIFIERS						Classes: 12	
Large Signal Amplifiers: Class A Power Amplifier- Series fed and Transformer coupled, Conversion Efficiency, Class B Power Amplifier- Push Pull and Complimentary Symmetry configurations, Conversion Efficiency, Principle of operation of Class AB and Class –C and D Amplifiers.								
UNIT-II	TUNED AMPLIFIERS						Classes: 12	
Tuned Amplifiers: Introduction, single Tuned Amplifiers – Q-factor, frequency response, Double Tuned Amplifiers – Q-factor, frequency response, Concept of stagger tuning and synchronous tuning								
UNIT-III	MULTIVIBRATORS						Classes: 12	
Multivibrators: Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using Transistors.								
UNIT-IV	TIME BASE GENERATORS						Classes: 12	

Time Base Generators: General features of a Time base Signal, Methods of Generating Time Base Waveform, concepts of Transistor Miller and Bootstrap Time Base Generator, Methods of Linearity improvement.		
UNIT-V	SYNCHRONIZATION AND FREQUENCY DIVISION	Classes: 12
Synchronization and Frequency Division: Pulse Synchronization of Relaxation Devices, Frequency division in Sweep Circuits, Stability of Relaxation Devices, Astable Relaxation Circuits, Monostable Relaxation Circuits, Synchronization of a Sweep Circuit with Symmetrical Signals, Sine wave frequency division with a Sweep Circuit, A Sinusoidal Divider using Regeneration and Modulation. Sampling Gates: Basic operating principles of Sampling Gates, Unidirectional and Bi-directional Sampling Gates, Four Diode Sampling Gate, Reduction of pedestal in Gate Circuits		
TEXT BOOKS		
<ol style="list-style-type: none"> 1. Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw Hill Education. 2. J. Millman, H. Taub and Mothiki S. Prakash Rao - Pulse, Digital and Switching Waveforms –2nd Ed., TMH, 2008, 		
REFERENCE BOOKS		
<ol style="list-style-type: none"> 1. Dr. P. Santosh Kumar Patra, Ms. P. Pushpa, Dr. M. Thirupathi, Mr. N. Vishwanath “Electronic Circuit Analysis” Spectrum University Press First Edition-2022. 2. David A. Bell - Electronic Devices and Circuits, 5th Ed., Oxford. 3. Robert L. Boylestead, Louis Nashelsky - Electronic Devices and Circuits theory, 11th Ed., Pearson, 2009 4. Ronald J. Tocci - Fundamentals of Pulse and Digital Circuits, 3rd Ed., 2008. 5. David A. Bell - Pulse, Switching and Digital Circuits, 5th Ed., Oxford, 2015. 		
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<ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/108/106/108106105/ 2. https://nptel.ac.in/courses/117/105/117105147/ 3. https://nptel.ac.in/courses/117/108/117108047/ 4. http://www.chipcenter.com/power/powaarch.htm 5. http://www.amasei.com/amateur/elehob.html 		
E -TEXT BOOKS		
<ol style="list-style-type: none"> 1. Circuit Analysis by John E. Whitehouse, Horwood Engineering Science Series 2. Analog Circuits, Edited by Yuping Wu 		
MOOCS COURSE		
<ol style="list-style-type: none"> 1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-002-circuits-and-electronics-spring-2007/video-lectures/lecture-9-part-1/ 2. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-002-circuits-and-electronics-spring-2007/video-lectures/lecture-10/ 3. https://www.coursera.org/learn/linear-circuits-ac-analysis 		



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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ANALOG AND DIGITAL COMMUNICATIONS LAB

II B. TECH- II SEMESTER (R22)								
Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
EC406PC	B.Tech	0	0	2	1	40	60	100
COURSE OBJECTIVES								
<ol style="list-style-type: none"> 1. This gives the basics of communications required for all Electronics and Communication Engineering related courses. 2. To understand the behavior of Analog and Pulse Modulations. 3. To understand the characteristics of AGC, Time & Frequency Division Multiplexing. 4. To Verify the Sampling Theorem 5. To Understand Frequency Synthesizer & PLL as FM Demodulator 								
COURSE OUTCOMES								
<p>Upon successful completion of the course, the student is able to</p> <ol style="list-style-type: none"> 1. Understand Basics of MATLAB syntax, functions and programming and Analyze the generation Analog Modulations in MATLAB. 2. Analyze the Fourier Transform of a given signal and plotting its magnitude spectrum of Time & Frequency Multiplexing. 3. Determine the differences between Time & Frequency domain between Signals Amplitude & Frequency Spectrum. 4. Understand the Waveform of Frequency Synthesizers and PLL Operations 5. Verification of Sampling Theorem in Time Domain. 								
LIST OF EXPERIMENTS								
<ol style="list-style-type: none"> 1. (i) Amplitude modulation and demodulation (ii) Spectrum analysis of AM 2. (i) Frequency modulation and demodulation (ii) Spectrum analysis of FM 3. DSB-SC Modulator & Detector 4. SSB-SC Modulator & Detector (Phase Shift Method) 5. Frequency Division Multiplexing & Demultiplexing 6. Pulse Amplitude Modulation & Demodulation 7. Pulse Width Modulation & Demodulation 8. Pulse Position Modulation & Demodulation 9. PCM Generation and Detection 10. Delta Modulation 11. DPCM Generation and Detection 12. Frequency Shift Keying: Generation and Detection 								

<p>13. Binary Phase Shift Keying: Generation and Detection</p> <p>14. Generation and Detection (i) DPSK (ii) QPSK</p> <p>15. Generate FSK modulated signal using PLL</p>
<p>TEXT BOOKS</p>
<p>1. Communication Systems by Simon Haykins John Wiley & Sons, 4th Edition.</p> <p>2. Electronics & Communication System – George Kennedy and Bernard Davis, McGraw Hill Education 2004.</p>
<p>REFERENCE BOOKS</p>
<p>1. Dr. P. Santosh Kumar Patra, Dr. S. V. S. Ramakrishnam Raju, Mr. D. Prasad, Mr. K. Nishakar “Analog and Digital Communications” Srikrishna Techno Books First Edition-2022.</p> <p>2. Communication theory, thomas, 2 edition, McGraw-Hill Education</p> <p>3. Communication Systems, 2E, R. P. Singh, S. D. Sapre, McGraw-Hill Education, 2008.</p> <p>4. Analog and Digital Communication – K. Sam Shanmugam, Willey, 2005</p> <p>5. Electronics Communication Systems- Wayne Tomasi, 6th Edition, Person 2009.</p>
<p>WEB REFERENCES</p>
<p>1. https://nptel.ac.in/courses/117/105/117105143/</p> <p>2. https://nptel.ac.in/courses/117/102/117102059/</p> <p>3. https://nptel.ac.in/courses/117/108/117108107/</p> <p>4. https://nptel.ac.in/courses/117/105/117105143/</p>
<p>E -TEXT BOOKS</p>
<p>1. Analog Communications 4th Edition by Anand Kumar Person Publication.</p> <p>2. Communication Systems by Millman & Taub, TMH, 3rd Edition.</p>
<p>MOOCS COURSE</p>
<p>1. https://swayam.gov.in/nd1_noc19_ee46</p> <p>2. https://www.coursera.org/learn/c-plus-plus-a</p>



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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

LINEAR AND DIGITAL IC APPLICATIONS LAB

II B. TECH- II SEMESTER (R22)								
Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
EC407PC	B.Tech	0	0	2	1	40	60	100

COURSE OBJECTIVES

To learn

1. To introduce the basic building blocks of linear integrated circuits.
2. To introduce the theory and applications of analog multipliers and PLL
3. To teach the linear and non - linear applications of operational amplifiers.
4. To introduce the theory and applications of 555 timer and PLL.
5. To teach the theory of ADC and DAC.
6. To introduce the concepts of waveform generation and introduce some special function ICs.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. A thorough **understanding** of operational amplifiers with linear integrated circuits.
2. To **design** circuits using operational amplifiers for various applications and to study different kinds of voltage regulators.
3. To **analyze** different active filters and to introduce the concepts of waveform generation, oscillators
4. To develop the **knowledge** in functional diagrams and applications using linear ICs like 555, 565 and to study oscillators.
5. To develop the knowledge in data converters and **Evaluate** the specifications of ADCs and DACs.

LIST OF EXPERIMENTS

1. Design an Inverting and Non-inverting Amplifier using Op Amp and calculate gain.
2. Design Adder and Subtractor using Op Amp and verify addition and subtraction process.
3. Design a Comparator using Op Amp and draw the comparison results of $A=B$, $A<B$, $A>B$.
4. Design a Integrator and Differentiator Circuits using IC741 and derive the required condition practically.
5. Design a Active LPF, HPF cutoff frequency of 2 KHZ and find the roll off of it.
6. Design a Circuit using IC741 to generate sine/square/triangular wave with period of 1KHZ and draw the output waveform.
7. Construct Mono-stable Multivibrator using IC555 and draw its output waveform.
8. Construct Astable Multivibrator using IC555 and draw its output waveform and also find its duty cycle.

9. Design a Schmitt Trigger Circuit and find its LTP and UTP.
10. Design Frequency modulator and demodulator circuit and draw the respective waveforms.
11. Design Voltage Regulator using IC 723, IC 7805/7809/7912 and find its load regulation factor.
12. Design R-2R ladder DAC and find its resolution and write a truth table with respective voltages.
13. Design Parallel comparator type/ counter type/ successive approximation ADC and find its efficiency.
14. Design a Gray code converter and verify its truth table.
15. Design an even priority encoder using IC 74xx and verify its truth table.
16. Design a 8x1 multiplexer using digital ICs.
17. Design a 4-bit Adder/Subtractor using digital ICs and Add/Sub the following bits.
 - (i) 1010 (ii) 0101 (iii) 1011
 - 0100 0010 1001.**
18. Design a Decade counter and verify its truth table and draw respective waveforms.
19. Design a Up/down counter using IC 74163 and draw read/write waveforms.
20. Design a Universal shift register using IC 74194/195 and verify its shifting operation.
21. Design a 16x4 RAM using 74189 and draw its read/write operation.
22. Design a 8x3 encoder/3x8 decoder and verify its truth table.

TEXT BOOKS

1. Linear Integrated Circuits, D. Roy Chowdhury, New Age International (p) Ltd.
2. Op-Amps & Linear ICs, Ramakanth A. Gayakwad, PHI

REFERENCE BOOKS

1. Mrs. K. Anitha, Dr. S. V. S. Ramakrishnam Raju, Dr. B. Hari Krishna, Mrs. G. Vinatha "Linear IC Applications" Amaravathi Publishers First Edition- 2022.
2. Operational Amplifiers & Linear Integrated Circuits, R.F. Coughlin & Fredrick F. Driscoll, PHI.
3. Operational Amplifiers & Linear Integrated Circuits: Theory & Applications, Denton Daibey, TMH.
4. Design with Operational Amplifiers & Analog Integrated Circuits, Sergio Franco, McGraw Hill.
5. Digital Fundamentals - Floyd and Jain, Pearson Education.

WEB REFERENCES

1. <https://nptel.ac.in/courses/117/106/108106105/>
2. <https://nptel.Ac.In/Courses/117103063/26>

E-TEXT BOOKS

1. <https://open.umn.edu/opentextbooks/textbooks/574>
2. https://books.google.co.in/books/about/Linear_Integrated_Circuits.html?id=-zAe0P33B

MOOCS COURSE

1. https://Www.Electronics-Tutorials.Ws/Waveforms/555_Timer.Htm
2. <https://Circuitdigest.Com/Article/555-Timer-Ic>



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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING ELECTRONIC CIRCUIT ANALYSIS LAB

II B. TECH- II SEMESTER (R22)

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
EC408PC	B.Tech	0	0	2	1	40	60	100

COURSE OBJECTIVES

1. To understand the importance of MULTISIM software.
2. To identify the basic electronic devices like diode, transistor.
3. To analyze the applications of Diode like clipper and clamper circuits.
4. To analyze transistor amplifiers and their frequency responses.
5. To analyze the oscillator circuits.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. **Understand** the diode and transistor characteristics.
2. **Verify** the Amplifier Frequency Response using software.
3. **Design** the biasing circuits like self biasing.
4. **Design** various amplifiers like CE, CC, common source FET amplifiers and also observe their frequency responses.
5. **Design** the biasing circuits like self biasing.

LIST OF EXPERIMENTS

1. Design transformer coupled class A power amplifier and draw the input and output waveforms find its efficiency
2. Design class B power amplifier and draw the input and output waveforms, find 2nd order and above harmonics.
3. Prove that the complementary symmetry pushpull amplifier eliminate cross over distortion.
4. Design class C power amplifier and draw the input and output waveforms
5. Design a single tuned amplifier and determine the Q of its tuned circuit practically.
6. Design a Bistable Multivibrator and analyze the effect of commutating capacitors and draw the wave forms at base and collector of transistors.
7. Design an Astable Multivibrator and draw the wave forms at base and collector of transistors.
8. Design a Monostable Multivibrator and draw the input and output waveforms
9. Draw the response of Schmitt trigger for gain of greater than and less than one.
10. Design a Bootstrap sweep circuit using BJT and draw its output time base waveform

<ul style="list-style-type: none"> 11. Design a Miller sweep circuit using BJT and draw its output time base waveform. 12. Design a constant current sweep generator and draw input and output waveforms 13. Design unidirectional and bidirectional sampling gates 14. Prove practically Schmitt Trigger generates square wave 15. Frequency division with sweep circuit
<p>TEXT BOOKS</p>
<ul style="list-style-type: none"> 1. Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw Hill Education. 2. Electronic Devices Conventional and current version -Thomas L. Floyd 2015, Pearson.
<p>REFERENCE BOOKS</p>
<ul style="list-style-type: none"> 1. Dr. P. Santosh Kumar Patra, Ms. P. Pushpa, Dr. M. Thirupathi, Mr. N. Vishwanath “Electronic Circuit Analysis” Spectrum University Press First Edition-2022. 2. Electronic Devices and Circuits, David A. Bell – 5th Edition, Oxford. 3. Electronic Devices and Circuits theory– Robert L. Boylestead, Louis Nashelsky, 11th Edition, 2009, Pearson
<p>WEB REFERENCES</p>
<ul style="list-style-type: none"> 1. https://nptel.ac.in/courses/108/106/108106105/ 2. https://nptel.ac.in/courses/117/105/117105147/ 3. https://nptel.ac.in/courses/117/108/117108047/ 4. http://www.chipcenter.com/power/powaarch.htm 5. http://www.amasci.com/amateur/elehob.html
<p>E -TEXT BOOKS</p>
<ul style="list-style-type: none"> 1. Circuit Analysis by John E. Whitehouse, Horwood Engineering Science Series. 2. Analog Circuits, Edited by Yuping Wu
<p>MOOCS COURSE</p>
<ul style="list-style-type: none"> 1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-002-circuits-and-electronics-spring-2007/video-lectures/lecture-9-part-1/ 2. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-002-circuits-and-electronics-spring-2007/video-lectures/lecture-10/ 3. https://www.coursera.org/learn/linear-circuits-ac-analysis



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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

GENDER SENSITIZATION LAB

II B. TECH- II SEMESTER (R22)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P		C	CIE	SEE
*GS409MC	B.Tech	0	0	2	0	100	-	100

COURSE OBJECTIVES

To learn

1. To develop students' sensibility with regard to issues of gender in contemporary India.
2. To provide a critical perspective on the socialization of men and women.
3. To introduce students to information about some key biological aspects of genders.
4. To expose the students to debates on the politics and economics of work.
5. To help students reflect critically on gender violence.
6. To expose students to more egalitarian interactions between men and women.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Students will have developed a better understanding of important issues related to gender in contemporary India.
2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
4. Students will acquire insight into the gendered division of labor and its relation to politics and economics.
5. Men and women students and professionals will be better equipped to work and live together as equals.
6. Students will develop a sense of appreciation of women in all walks of life.
7. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

UNIT-I

UNDERSTANDING GENDER

Classes: 9

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men- Preparing for Womanhood. Growing up Male. First lessons in Caste.

UNIT-II	GENDER ROLES AND RELATIONS	Classes: 8
Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles- Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences- Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary		
UNIT-III	GENDER AND LABOUR	Classes:10
Division and Valuation of Labour-Housework: The Invisible Labor- “My Mother doesn’t Work.” “Share the Load.”-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming		
UNIT-IV	GENDER-BASED VIOLENCE	Classes: 8
The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No!-Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: “ <i>Chupulu</i> ”. Domestic Violence: Speaking Out Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-“I Fought for my Life....”		
UNIT-V	GENDER AND CULTURE	Classes: 10
Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks-The Brave Heart.		
TEXT BOOKS		
1. Towards a World of Equals: A Bilingual Textbook on Gender” written by A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu and published by Telugu Akademi, Hyderabad,Telangana State in the year 2015.		
REFERENCE BOOKS		
1. Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012 Abdulali Sohaila. “I Fought For My Life...and Won.” Available online at: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdul/		
WEB REFERENCES		
1. Modified on 2015/05/14 10:40 by Sean Zheng — Categorized as: Chapter 2 – Education. 2. Hedman, Birgitta, Francesca Perucci and Pehr Sundström (1996). Engendering Statistic: A Tool for Change. Stockholm: Statistics Sweden. 3. Milek, Anne, Stork Christoph and Alison Gillwald (2011) Engendering communication: a perspective on ICT access and usage in Africa, Info, vol. 13 No. 3, pp.125-141. Bingley, United Kingdom: Emerald Group Publishing.		

4. Hedman, Birgitta, Francesca Perucci and Pehr Sundström (1996). Engendering Statistic: A Tool for Change. Stockholm: Statistics Sweden.

E -TEXT BOOKS

1. Gender Sensitization Hardcover – 2012 by Dr. Tanuja Trivedi (Author).

MOOCS COURSE

1. <https://www.mooc-list.com> › tags › gender-equality
2. <https://www.udemy.com> › course › gender-equality-and-sexual-diversity
3. <https://www.edx.org> › learn › gender-studies

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