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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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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

II YEAR I SEMESTER

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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III YEAR I SEMESTER

S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1	EC501PC	Microcontrollers	3	1	0	4	40	60	100
2	EC502PC	IoT Architectures and Protocols	3	0	0	3	40	60	100
3	EC503PC	Control Systems	3	1	0	4	40	60	100
4	BE504MS	Business Economics & Financial Analysis	3	0	0	3	40	60	100
5		**Professional Elective-I**	3	0	0	3	40	60	100
6	EC505PC	Microcontrollers Laboratory	0	0	2	1	40	60	100
7	EC509PC	IoT Architectures and Protocols Laboratory	0	0	2	1	40	60	100
8	EC506PC	Advanced Communication Laboratory	0	0	2	1	40	60	100
		Total	**15**	2	6	20	**320**	**480**	**800**
Mandatory Course (Non-Credit)									
9	*IP510MC	Intellectual Property Rights	3	0	0	0	100	-	100

III YEAR II SEMESTER

S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1	EC601PC	Antennas and Wave Propagation	3	0	0	3	40	60	100
2	EC602PC	Digital Signal Processing	3	0	0	3	40	60	100
3	EC603PC	CMOS VLSI Design	3	0	0	3	40	60	100
4		**Professional Elective II**	3	0	0	3	40	60	100
5		**Open Elective I**	3	0	0	3	40	60	100
6	EC604PC	Digital Signal Processing Laboratory	0	0	2	1	40	60	100
7	EC605PC	CMOS VLSI Design Laboratory	0	0	2	1	40	60	100
8	EN606HS	Advanced English Communication Skills Laboratory	0	0	2	1	40	60	100
9	EC607PC	Industry Oriented Mini Project/ Internship	0	0	4	2	-	100	100
		Total	**15**	0	10	20	**320**	**580**	**900**
Mandatory Course (Non-Credit)									
10	*ES607MC	Environmental Science	3	0	0	0	100	-	100

***MC - Environmental Science – Should be Registered by Lateral Entry Students Only**

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IV YEAR I SEMESTER

S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1	EC701PC	Microwave and Optical Communications	3	1	0	4	40	60	100
2		**Professional Elective - III**	3	0	0	3	40	60	100
3		**Professional Elective - IV**	3	0	0	3	40	60	100
4		**Open Elective - II**	3	0	0	3	40	60	100
5	SM702MS	Professional Practice, Law & Ethics	2	0	0	2	40	60	100
6	EC703PC	Microwave and Optical Communications Laboratory	0	0	4	2	40	60	100
7	EC704PC	Project Stage-I	0	0	6	3	-	-	-
		Total	**15**	**1**	**10**	**20**	**240**	**360**	**600**

IV YEAR II SEMESTER

S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1		**Professional Elective V**	3	0	0	3	40	60	100
2		**Professional Elective VI**	3	0	0	3	40	60	100
3		**Open Elective III**	3	0	0	3	40	60	100
4	EC801PC	Project Stage-II including Seminar	0	0	22	11	40	60	100
		Total	**9**	**0**	**22**	**20**	**160**	**240**	**400**

***MC – Satisfactory/Unsatisfactory**

Professional Elective – I

EC511PE	Computer Organization & Operating Systems
EC512PE	Data Communications and Computer Networks
EC513PE	Electronic Measurements and Instrumentation

Professional Elective – II

EC611PE	Artificial Intelligence
EC612PE	Mobile Communications and Networks
EC613PE	Embedded System Design

Professional Elective – III

EC711PE	Digital Image Processing
EC712PE	CMOS Analog IC Design
EC713PE	Artificial Neural Networks

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Professional Elective – IV

EC721PE	Network Security and Cryptography
EC722PE	Satellite Communications
EC723PE	Biomedical Instrumentation

Professional Elective – V

EC811PE	Radar Systems
EC812PE	5G and beyond Communication
EC813PE	Machine Learning

Professional Elective – VI

EC821PE	Multimedia Database Management Systems
EC822PE	System on Chip Architecture
EC823PE	Wireless Sensor Networks

Open Elective – I

EC600OE	Fundamentals of Internet of Things
EC601OE	Principles of Signal Processing
EC602OE	Digital Electronics for Engineering

Open Elective – II

EC700OE	Electronic Sensors
EC701OE	Electronics for Health Care
EC702OE	Telecommunications for Society

Open Elective – III

EC800OE	CommunicationTechnologies
EC801OE	Measuring Instruments
EC802OE	Fundamentals of Social Networks

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MATRICES AND CALCULUS

I B. TECH- I SEMESTER								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
MA101BS	**B. Tech**	**3**	**1**	**0**	**4**	**40**	**60**	**100**

COURSE OBJECTIVES

To learn

1. Types of matrices and their properties.
2. Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
3. Concept of eigen values and eigen vectors and to reduce the quadratic form to canonical form
4. Geometrical approach to the mean value theorems and their application to the mathematical problems
5. Evaluation of surface areas and volumes of revolutions of curves.
6. Evaluation of improper integrals using Beta and Gamma functions.
7. Partial differentiation, concept of total derivative
8. Finding maxima and minima of function of two and three variables.
9. Evaluation of multiple integrals and their applications

COURSE OUTCOMES

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

1. Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations.
2. Find the Eigen values and Eigen vectors
3. Reduce the quadratic form to canonical form using orthogonal transformations.
4. Solve the applications on the mean value theorems.
5. Evaluate the improper integrals using Beta and Gamma functions
6. Find the extreme values of functions of two variables with/without constraints.
7. 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.

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UNIT-II	EIGEN VALUES AND EIGEN VECTORS	Classes:10

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.

UNIT-III	CALCULUS	Classes:10

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.

UNIT-IV	MULTIVARIABLE CALCULUS (PARTIAL DIFFERENTIATION AND APPLICATIONS)	Classes: 10

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.

UNIT-V	MULTIVARIABLE CALCULUS (INTEGRATION)	Classes: 10

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).

TEXT BOOKS

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

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 CompanyLimited, New Delhi.

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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

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

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

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

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.

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.

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UNIT-II	SEMICONDUCTORS AND DEVICES	Classes: 12
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.		
UNIT-III	**DIELECTRIC, MAGNETIC AND ENERGY MATERIALS**	**Classes:12**
Dielectric Materials: Basic definitions- types of polarizations (qualitative) - ferroelectric, piezoelectric and pyroelectric materials – applications – liquid crystal displays (LCD) and crystal oscillators. 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.		
UNIT-IV	**NANOTECHNOLOGY**	**Classes:12**
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.		
UNIT-V	**LASER AND FIBER OPTICS**	**Classes:12**
Lasers: Laser beam characteristics-three quantum processes- Einstein coefficients and their relations- lasing action - pumping methods- Ruby laser, He-Ne laser , CO_2 laser, Argon ion Laser, Nd: YAG laser- semiconductor laser-applications of laser. 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.		

TEXT BOOKS

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.

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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. Bhandhopadhya - Nano Materials, New Age International, 1stEdition, 2007.
7. Energy Materials a Short Introduction to Functional Materials for Energy Conversion andStorage 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

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS108ES	B. Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

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.

COURSE OUTCOMES

Upon successful completion of the course, the student is able
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

Components of a computer system: Memory, processor, I/O devices, storage, operating system, the concept of assembler, compiler, interpreter, loader, and linker.
From algorithm to program: Representation of an algorithm, flowchart, Pseudocode with examples, converting algorithms to programs.
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.

UNIT-II	EXPRESSIONS AND STATEMENTS	Classes:10

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.
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.

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UNIT-III	FUNCTIONS AND ARRAYS	Classes:10

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.

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.

UNIT-IV	POINTERS AND FILE HANDLING	Classes:10

Pointers: Introduction, declaration, applications, dynamic memory allocation (malloc, calloc, realloc,free), use of pointers in self-referential structures.

File handling: File I/O functions, standard C pre-processors, defining and calling macros, command-line arguments.

UNIT-V	DERIVED TYPES AND BASIC ALGORITHMS	Classes:10

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.

Basic Algorithms: Searching and Sorting Algorithms (Bubble, Insertion, and Selection), finding rootsof equations, notion of order of complexity through example programs.

TEXT BOOKS

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

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

1. https://www.tutorialspoint.com/cprogramming/
2. https://www.tutorialspoint.com/cplusplus/
3. https://www.cprogramming.com/tutorial/c-tutorial.html

E -TEXT BOOKS

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

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								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
ME107ES	**B. Tech**	**0**	**1**	**3**	**2.5**	**40**	**60**	**100**

COURSE OBJECTIVES

To learn

1. To Study of different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at work place.
5. It explains the construction, function, use and application of different working tools, equipment and machines.
6. To study commonly used carpentry joints.
7. To have practical exposure to various welding and joining processes.
8. Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

COURSE OUTCOMES

1. Study and practice on machine tools and their operations
2. Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, and foundry, house wiring and welding.
3. Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
4. Apply basic electrical engineering knowledge for house wiring practice.

LIST OF EXPERIMENTS

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

I. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
II. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
III. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
V. Welding Practice – (Arc Welding & Gas Welding)
VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
VII. Black Smithy – (Round to Square, Fan Hook and S-Hook

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2. TRADES FOR DEMONSTRATION & EXPOSURE

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working.

TEXT BOOKS

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.

REFERENCE BOOKS

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

WEB REFERENCES

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/

E -TEXT BOOKS

1. http://103.135.169.82:81/fdScript/RootOfEBooks/MED/Introduction Workshop%20Technology
2. https://www.quora.com/Download-free-mechanical-engineering-ebooks-sites

MOOCS COURSE

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								
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 theoreticaland 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 '***Toasted English*' by R.K.Narayan** from ***"English: Language, Context andCulture"*** published by Orient BlackSwan, Hyderabad.	**Classes: 10**

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes - Acquaintance withPrefixes 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 ProperPunctuation- 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 **'Appro JRD' by Sudha Murthy** from ***"English: Language, Context and Culture" published*** by Orient BlackSwan, Hyderabad.	**Classes:10**

Vocabulary: Words Often Misspelt - Homophones, Homonyms and Homographs

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement andSubject-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.

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UNIT-III	Chapter entitled **'Lessons from Online Learning' by F.Haider Alvi, Deborah Hurst et al** from ***"English: Language, Context and Culture"*** published by Orient BlackSwan, Hyderabad.	**Classes:10**
Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses. **Reading:** Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for Practice. **Writing:** Format of a Formal Letter-Writing Formal Letters eg., Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.		
UNIT-IV	Chapter entitled **'Art and Literature' by Abdul Kalam** from ***"English: Language, Context andCulture"*** published by Orient BlackSwan, Hyderabad.	**Classes: 10**
Vocabulary: Standard Abbreviations in English **Grammar:** Redundancies and Clichés in Oral and Written Communication. **Reading**: Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice **Writing:** Writing Practices- Essay Writing-Writing Introduction and Conclusion -Précis Writing.		
UNIT-V	Chapter entitled **'Go, Kiss the World' by Subroto Bagchi** from ***"English: Language, Context andCulture"*** published by Orient BlackSwan, Hyderabad.	**Classes: 10**
Vocabulary: Technical Vocabulary and their Usage **Grammar:** Common Errors in English (*Covering all the other aspects of grammar which were notcovered in the previous units*) **Reading:** Reading Comprehension-Exercises for Practice **Writing:** Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.		

Note: **Listening and Speaking Skills which are given under Unit-6 in AICTE Model Curriculum are coveredin the syllabus of ELCS Lab Course.**

- **Note: 1**. As the syllabus of English given in AICTE *Model Curriculum-2018 for B.Tech First Year is* ***Open-ended***, besides following the prescribed textbook, it is required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on theneeds 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.

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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/idiomsandphraseswith meanin gsandexamlespdf.pdf

MOOCS COURSE

1. https://mooec.com/courses/grammar-guru-1
2. https://mooec.com/courses/learning-styles

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ELEMENTS OF ELECTRONICS AND COMMUNICATION ENGINEERING

I B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	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.

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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
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

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	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

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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

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	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 theLSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speechof 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

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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 professionalcontexts

- 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.

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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)

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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&section=Re ferences
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/upvalenciax-upper-intermediate- english

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C PROGRAMMING FOR ENGINEERS LABORATORY

I B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	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 valuesupplied 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 geometricprogression:
    $1+x+x^2+x^3+.....+x^n$
    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.

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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 of 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 filefollowed 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 inascending 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 followingsearching 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								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
***CH109MC**	**B. Tech**	**3**	**0**	**0**	**0**	**40**	**60**	**100**

COURSE OBJECTIVES

To learn

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

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

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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

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.

TEXT BOOKS

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

1. A. Aditya Prasad, S. Hemambika, A. Rambabu, "Environmental Science", Spectrum Educational Books, Hyderabad, 1st edition-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

1. https://education.nationalgeographic.org/resource/ecosystem
2. https://byjus.com/chemistry/natural-resources-pdf/

E –TEXTBOOKS

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

MOOCS COURSE

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								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
MA201BS	**B. Tech**	**3**	**1**	**0**	**4**	**40**	**60**	**100**

COURSE OBJECTIVES

To learn

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

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 worldproblems.
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, $e^{a}(x)$ 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.

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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

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

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 CompanyLimited, New Delhi.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,Reprint, 2008.

WEB REFERENCES

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

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

MOOCS COURSE

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

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
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 it's 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.

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UNIT-III	POLYMERIC MATERIALS	Classes: 10

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.
Elastomers: Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokol rubber.
Conducting polymers: Characteristics and Classification with examples-mechanism of conduction in trans-polyacetylene and applications of conducting polymers.
Biodegradable polymers: Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

UNIT-IV	ENERGY SOURCES	Classes: 10

Introduction, Calorific value of fuel – HCV, LCV- Dulongs 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.

UNIT-V	ENGINEERING MATERIALS	Classes: 12

Cement: Portland cement, its composition, setting and hardening. Smart materials and their engineering applications
Shape memory materials- Poly L- Lactic acid. Thermoresponse materials- Polyacryl amides, Poly vinyl amides
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.

TEXT BOOKS

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

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

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

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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

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
ME208ES	B. Tech	1	0	4	3	40	60	100

COURSE OBJECTIVES

1. To develop the ability of visualization of different objects through technical drawings
2. To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products

COURSE OUTCOMES

At the end of the course, the student will be able to:

1. Apply computer aided drafting tools to create 2D and 3D objects
2. sketch conics and different types of solids
3. Appreciate the need of Sectional views of solids and Development of surfaces of solids
4. Read and interpret engineering drawings
5. 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

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UNIT-V	ISOMETRIC PROJECTIONS	Classes: 10

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.

TEXT BOOKS

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapoovan, Vikas: S. Chand and company Ltd.

REFERENCE BOOKS

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

WEB REFERENCES

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

E –TEXT BOOKS

1. http://rgpv-ed.blogspot.com/2009/09/development-of-surfaces.html
2. http://www.techdrawingtools.com/12/l1201.htm

MOOCS COURSE

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								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
EE206ES	**B. Tech**	**2**	**0**	**0**	**2**	**40**	**60**	**100**

COURSE OBJECTIVES

To learn
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
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.

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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

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition,2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition,2008.

REFERENCE BOOKS

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, 1stEdition, 2012.
4. Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic ElectricalEngineering", 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

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

1. https://easyengineering.net/basic-electrical-engineering-by-wadhwa/
2. https://easyengineering.net/objective-electrical-technology-by-mehta/

MOOCS COURSE

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								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
EC203ES	**B. Tech**	**2**	**0**	**0**	**2**	**40**	**60**	**100**

COURSE OBJECTIVES

To learn

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

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 Clampers.

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.

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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. 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 – 5thEdition, Oxford.
3. 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/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

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 PYTHON PROGRAMMING LABORATORY

I B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	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 sumof 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 Normaldistribution
4. The package numpy

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a) Creating a matrix of given order *m x n* containing *random numbers* in the range 1 to99999
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 matrixinverse

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) usingthe 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

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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

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	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 chemistryrequired 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 invarious conditions.
2. Able to perform methods such as conductometry, potentiometry and pH metry in order to findout 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 Potentiomentry.
IV. **pH Metry:** Determination of an acid concentration using pH meter.
V. Preparations:
   1. Preparation of Bakelite.
   2. Preparation Nylon – 6.

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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

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	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 seriescircuits
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of aSingle-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

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TEXT BOOKS

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition,2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition, 2008.

REFERENCE BOOKS

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, 1stEdition, 2012.
4. Abhijit Chakrabarthi, 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

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

1. https://easyengineering.net/basic-electrical-engineering-by-wadhwa/
2. https://easyengineering.net/objective-electrical-technology-by-mehta/

MOOCS COURSE

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

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	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

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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. 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 – 5thEdition, Oxford.
3. 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/tran_5.html
3. http://www.gvpcew.ac.in/LN-CSE-IT-22-32/ECE/2-Year/ECA-All-Units.pdf
4. http://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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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

NUMERICAL METHODS AND COMPLEX VARIABLES

II B.TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
MA301BS	B.Tech	3	1	0	4	40	60	100

COURSE OBJECTIVES

To learn

1. Expressing periodic function by Fourier series and a non-periodic function by Fourier transforms
2. Various numerical methods to find roots of polynomial and transcendental equations.
3. Concept of finite differences and to estimate the value for the given data using interpolation.
4. Evaluation of integrals using numerical techniques
5. Solving ordinary differential equations of first order using numerical techniques.
6. Differentiation and integration of complex valued functions.
7. Evaluation of integrals using Cauchy's integral formula and Cauchy's residue theorem.
8. Expansion of complex functions using Taylor's and Laurent's series.

COURSE OUTCOMES

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

1. Express any periodic function in terms of sine and cosine
2. Find the root of a given polynomial and transcendental equations.
3. Estimate the value for the given data using interpolation
4. Find the numerical solutions for a given first order ODE's
5. Analyze the complex function with reference to their analyticity, integration using Cauchy'sintegral and residue theorems
6. 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.

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UNIT-III	NUMERICAL METHODS-II	Classes: 12
Numerical integration: Trapezoidal rule and Simpson's $1/3^{rd}$ and $3/8^{th}$ 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		
UNIT-IV	**COMPLEX DIFFERENTIATION**	**Classes: 12**
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.		
UNIT-V	**COMPLEX INTEGRATION**	**Classes: 12**
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)		

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36^{th} Edition, 2010.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.

REFERENCE BOOKS

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, 9^{th} Edition, John Wiley & Sons, 2006.
4. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7^{th} Edition, Mc-GrawHill, 2004.

WEB REFERENCES

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

1. https://www.e-booksdirectory.com/details.php?ebook=10602
2. https://www.e-booksdirectory.com/details.php?ebook=4708

MOOCS COURSE

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

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
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 betweennegative 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 positivefeedback to sustained oscillations.

UNIT-I	BJT BIASING	Classes: 12

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

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

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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.
Transistor at High Frequency: Hybrid -πmodel of Common Emitter transistor model, fα, fβ and unitygain bandwidth, Gain-bandwidth product.

UNIT-IV	FEEDBACK AMPLIFIERS	Classes: 12

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.

UNIT-V	OSCILLATORS	Classes: 12

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.

TEXT BOOKS

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

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.

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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

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

NETWORK ANALYSIS AND SYNTHESIS

II B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
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.

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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. Chakrabarthy (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

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	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

Number systems, Complements of Numbers, Codes- Weighted and Non-weighted codes and its Properties, Parity check code and Hamming code.

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.

UNIT-II	MINIMIZATION OF BOOLEAN FUNCTIONS	Classes: 12

Minimization of Boolean functions: Karnaugh Map Method - Up to five Variables, Don't Care Map Entries, Tabular Method

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.

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UNIT-III	COMBINATIONAL AND SEQUENTIAL CIRCUITS	Classes: 12

Combinational Logic Circuits: Adders, Subtractors, Comparators, Multiplexers, Demultiplexers, Encoders, Decoders and Code converters, Hazards and Hazard Free Relations.

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.

UNIT-IV	REGISTERS, COUNTERS AND SEQUENTIAL MACHINES	Classes:12

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.

Sequential Machines: Finite State Machines, Synthesis of Synchronous Sequential Circuits-Serial Binary Adder, Sequence Detector, Parity-bit Generator, Synchronous Modulo N – Counters.

UNIT-V	FINITE STATE MACHINE	Classes: 12

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

TEXT BOOKS

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

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.

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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/

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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 SYSYTEMS

II B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
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

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

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.

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UNIT-III	SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS	Classes: 12

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.

UNIT-IV	LAPLACE TRANSFORMS AND Z-TRANSFORMS	Classes: 12

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.

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.

UNIT-V	SAMPLING THEOREM AND CORRELATION	Classes: 12

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.

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.

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. 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. Deergha Rao, Birkhauser, 2018.

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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

ANALOG CIRCUITS LAB

II B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC305PC	B.Tech	0	0	2	1	40	60	100

COURSE OBJECTIVES

1. To understand the importance of MULTISIM software.
2. To indentify 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. Perform an experiment to choose Q-point for a Transistor that operate in active region andobserve 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 byboth simulation and realization with hardware components.
3. Obtain the I/O Characteristics of CE, CB, CC amplifiers. Calculate h-parameters from theCharacteristics.
4. Design and Simulate a Common Drain Amplifier with voltage divider bias and determine theStability factor.
5. Obtain the Drain and Transfer characteristics of CD, CS amplifiers of JFET. Calculate gm, rdfrom 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 thefrequency response practically.
8. Design a two stage RC Coupled amplifier and prove that gain is increased and analyze theeffects of coupling capacitance.
9. Practically prove that the Darlington pair has high input impedance.

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10. Draw the high frequency response of common emitter transistor amplifier and calculate fα, fβ 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 withand without feedback.
13. Design an RC phase shift oscillator circuit and derive the gain condition for oscillationspractically 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 HillEducation.
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

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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

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC306PC	B. Tech	0	0	2	1	40	60	100

COURSE OBJECTIVES

To learn

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

COURSE OUTCOMES

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

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

LIST OF EXPERIMENTS

1. Realization of Logic circuit to generate r's Compliment using Logic Gates.
2. Realization of given Boolean function using universal gates and minimizing the same.Compare thegate count before and after minimization.
3. Design and realize Full Adder circuit using gates/universal gates. Implement Full Subtractor usingfull 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 vise versa.
10. Verification of truth tables of flipflops using different clocks (level triggering, positive and negativeedge triggering) also converts the given flipflop from one type to other.

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11. Designing of Universal n-bit shift register using flipflops and Multiplexers. Draw the timing diagramof 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.

*Design a sequence detector to detect a given sequence and verify practically
*Design a serial subtractor for 4 bit binary numbers

TEXT BOOKS

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.

REFERENCE BOOKS

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.

WEB REFERENCES

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

BASIC SIMULATION LABORATORY

II B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC307ES	B.Tech	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.

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LIST OF EXPERIMENTS

1. Basic Operations onMatrices.
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 AveragePower.
4. Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts ofSignal.
5. Convolution for Signals andsequences.
6. Auto Correlation and Cross Correlation for Signals andSequences.
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 realiazability and stabilityproperties.
9. Gibbs PhenomenonSimulation.
10. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
11. Waveform Synthesis using LaplaceTransform.
12. Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for the given transferfunction.
13. Generation of Gaussian noise (Real and Complex), Computation of its mean, M.S. Value and its Skew, Kurtosis, and PSD, Probability DistributionFunction.
14. Verification of SamplingTheorem.
15. Removal of noise by Autocorrelation / Crosscorrelation.
16. Extraction of Periodic Signal masked by noise usingCorrelation.
17. Verification of Weiner-KhinchineRelations.
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. Deergha 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

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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

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
*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

- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion

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- 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

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

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

1. http://www.wdl.org/en/item/2672/
2. https://nptel.ac.in/courses/109103135/24

E -TEXT BOOKS

1. https://iasexamportal.com/ebook/the-constitution-of-india
2. https://www.india.gov.in/my-government/documents/e-books

MOOCS COURSE

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

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
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

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, *Random Variable*- 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 theirProperties.

UNIT-II	OPERATIONS ON SINGLE & MULTIPLE RANDOM VARIABLES – EXPECTATIONS	Classes: 9

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 RandomVariable.

Vector Random Variables, Joint Distribution Function and its Properties, Marginal

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Distribution Functions, Conditional Distribution and Density – Point Conditioning, 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 RandomVariables.

UNIT-III	RANDOM PROCESSES – TEMPORAL CHARACTERISTICS	Classes: 9

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.

UNIT-IV	RANDOM PROCESSES – SPECTRAL CHARACTERISTICS	Classes: 9

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.

UNIT-V	NOISE SOURCES & INFORMATION THEORY	Classes: 9

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.

TEXT BOOKS

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

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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

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
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 PoyntingTheorem, and apply them for practical problems.
5. To determine the basic Transmission Line Equations and telephone lineparameters 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 usethem forsolving engineering problems knowthe 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 andtransmission coefficients for UPW propagation, distinguish between Brewsterand 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 andHWTs, and design the same for effective impedance transformation. Study the Smith Chart profile and stub matching features.

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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, λ/4, λ/2, λ/8 Lines, Reflection Coefficient, VSWR Smith Chart – Configuration and Applications, Single Stub Matching

TEXT BOOKS

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., OxfordUniversity Press, Aisan Edition, 2015.

REFERENCE BOOKS

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. JD. Kraus -Electromagnetics with Applications ,5th Ed., TMH
3. Umesh Sinha, Satya Prakashan -Transmission Lines and Networks, (Tech.

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IndiaPublications), New Delhi, 2001.
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

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC403PC	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

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.

COURSEOUTCOMES

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

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 NoiseRatio (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

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

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UNIT-II	ANGLE MODULATION	Classes: 12

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 andde-emphasis.

UNIT-III	TRANSMITTERS AND RECEIVERS	Classes: 12

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.

UNIT-IV	PULSE MODULATION	Classes: 12

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.

UNIT-V	DIGITAL MODULATION TECHNIQUES	Classes: 12

Digital Modulation Techniques: ASK- Modulator, Coherent ASK Detector, FSK- Modulator, Non- Coherent FSK Detector, BPSK- Modulator, Coherent BPSK Detection. Principles of QPSK, Differential PSK andQAM.
Baseband Transmission and Optimal Reception of Digital Signal: A Baseband Signal Receiver, Probability of Error, Optimum Receiver, Coherent Reception, ISI, Eye Diagrams.

TEXT BOOKS

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

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, TMH2004
5. Analog and Digital Communication – K. Sam Shanmugam, Willey,2005

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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

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC404PC	B. Tech	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 convertersand**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 1st 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.

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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

1. Ramakanth A. Gayakwad - Op-Amps & Linear ICs, PHI, 2003.
2. Floydand Jain- Digital Fundamentals, 8th Ed., PearsonEducation,2005.

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. 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., PearsonEducation India, 2009.

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=-zAe0P33BAcC

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

II B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC405PC	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. Learn the concepts of high frequency analysis of transistors
2. To give understanding of various types of amplifier circuits such as small signal,
3. To give understanding of cascaded
4. To give understanding large signal and tuned amplifiers.
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 multistage amplifiers.
2. Understand the concepts of High Frequency Analysis of Transistors.
3. Utilize the Concepts of negative feedback to improve the stability of amplifiers
4. Design positive feedback to generate sustained oscillations
5. 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.

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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, Frequencydivision 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

1. Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw HillEducation.
2. J. Millman, H. Taub and Mothiki S. PrakashRao - Pulse, Digital and Switching Waveforms –2nd Ed., TMH, 2008,

REFERENCE BOOKS

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.

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

ANALOG AND DIGITAL COMMUNICATIONS LAB

II B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC406PC	B.Tech	0	0	2	1	40	60	100

COURSE OBJECTIVES

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

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

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

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

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13. Binary Phase Shift Keying: Generation and Detection
14. Generation and Detection (i) DPSK (ii)QPSK
15. Generate FSK modulated signal using PLL

TEXT BOOKS

1. Communication Systems by Simon Haykins John Wiley & Sons, 4th Edition.
2. Electronics & Communication System – George Kennedy and Bernard Davis, McGraw Hill Education 2004.

REFERENCE BOOKS

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. Communication theory, thomas,2 edition, McGraw-Hill Education
3. Communication Systems, 2E, R. P. Singh, S. D. Sapre, McGraw-Hill Education, 2008.
4. Analog and Digital Communication – K. Sam Shanmugam, Willey, 2005
5. Electronics Communication Systems- Wayne Tomasi, 6th Edition, Person 2009.

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/
4. https://nptel.ac.in/courses/117/105/117105143/

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 LAB

II B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
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 convertersand**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 conditionpractically.
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 anddraw the output waveform.
7. Construct Mono-stableMultivibratorusingIC555 and draw its output waveform.
8. Construct Astable Multivibrator using IC555 and draw its output waveform and also find its dutycycle.

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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 VoltageRegulatorusingIC723, 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 itsefficiency.
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 usingIC74163 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

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

COURSE OBJECTIVES

1. To understand the importance of MULTISIM software.
2. To indentify 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 waveformsfind its efficiency
2. Design class B power amplifier and draw the input and output waveforms, find 2nd order andabove 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 anddraw the wave forms at base and collector of transistors.
7. Design an Astable Multivibrator and draw the wave forms at base and collector oftransistors.
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
11. Design a Miller sweep circuit using BJT and draw its output time base waveform.

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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

TEXT BOOKS

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

REFERENCE BOOKS

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

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

GENDER SENSITIZATION LAB

II B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
*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 Attitudestowards Gender-Construction of Gender-Socialization: Making Women, Making Men- Preparing for Womanhood. Growing up Male. First lessons in Caste.

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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." "Sharethe Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. -Gender Development Issues-Gender, Governance and Sustainable Development-Gender andHuman 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 withEveryday Harassment- Further Reading: "*Chupulu".* Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. RebuildingLives. 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 andPopular 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 yeaR2215.

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-abdulal/

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.

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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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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MICROCONTROLLERS

III B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC501PC	B.Tech	3	1	0	4	40	60	100

COURSE OBJECTIVES

1. To understand the structure of a computer and its operations.
2. To understand the RTL and Micro-level operations and control in a computer.
3. Understanding the concepts of I/O and memory organization and operating systems.

COURSEOUTCOMES

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

1. Known the internal architecture, organization and assembly language programming of 8086 processors.
2. Known the internal architecture, organization and assembly language programming of 8051/controllers
3. Learn the interfacing techniques to 8086 and 8051 based systems.
4. Known the internal architecture of ARM processors and basic concepts of advanced ARM processors.
5. Understand about advanced processors and their architecture.

UNIT-I	8086 ARCHITECTURE	Classes: 12

8086 Architecture- Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Architecture of 8086, Signal descriptions of 8086, interrupts of 8086.

Instruction Set and Assembly Language Programming of 8086: Instruction formats, Addressing modes, Instruction Set, Assembler Directives, Macros, and Simple Programs involving Logical, Branch and Call Instructions, Sorting, String Manipulations.

UNIT-II	INTRODUCTION TO MICROCONTROLLERS	Classes: 12

Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051.

8051 Real Time Control: Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters

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UNIT-III	I/O AND MEMORY INTERFACE	Classes: 12

LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051.

Serial Communication and Bus Interface: Serial Communication Standards, Serial Data Transfer Scheme, On board Communication Interfaces-I2C Bus, SPI Bus, UART; External Communication Interfaces-RS232,USB.

UNIT-IV	ARM ARCHITECTURE	Classes: 12

ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table, ARM instruction set – Data processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions.

UNIT-V	ADVANCED ARM PROCESSORS	Classes: 12

Introduction to CORTEX Processor and its architecture, OMAP Processor and its Architecture.

TEXT BOOKS

1. A. K. Ray and K. M. Bhurchandani -Advanced Microprocessors and Peripherals, TMH, 2nd Edition 2006.
2. Andrew N SLOSS, Dominic SYMES, Chris WRIGHT -ARM System Developers guide, Elsevier, 2012

REFERENCE BOOKS

1. Dr. B. Hari Krishna, Mrs. G. Udaya Sree, Mr. D. Basava,"Microprocessors and Microcontrollers", Spectrum University Press 2022.
2. Kenneth. J. Ayala-The 8051 Microcontroller, Cengage Learning, 3rd Ed, 2004.
3. D. V. Hall -Microprocessors and Interfacing, TMGH, 2nd Edition, 2006.
4. K. Uma Rao, Andhe Pallavi-The 8051 Microcontrollers, Architecture and Programming and Applications, Pearson, 2009.
5. Donald Reay-Digital Signal Processing and Applications with the OMAP- L138 Experimenter, WILEY 2012.

WEB REFERENCES

1. https://nptel.ac.in/noc/individual_course.php?id=noc18-ec03
2. https://nptel.ac.in/noc/individual_course.php?id=noc19-ee1
3. http://www.infocobuild.com/education/audio-video-courses/electronics/MicroprocessorsMicrocontrollers-IIT-Kharagpur/lecture-49.html

E -TEXT BOOKS

1. Advanced Microprocessors and Peripherals – A. K. Ray and K. M. Bhurchandani, TMH, 2nd Edition2006.
2. ARMSystemDevelopersguide,AndrewNSLOSS,DominicSYMES,ChrisWRIGHT,Elsevier, 2012

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MOOCS COURSE

1. https://onlinecourses.nptel.ac.in/noc18_ec03
2. https://www.youtube.com/watch?v=liRPtvj7bFU
3. https://www.mooc-list.com/course/introduction-arm-ost
4. https://www.mooc-list.com/tags/microprocessors
5. https://www.mooc-list.com/tags/microcontroller
6. https://freevideolectures.com/course/3018/microprocessors-and-microcontrollers
7. http://e-box.co.in/micro-processor-and-micro-controller.shtml
8. https://ieeexplore.ieee.org/document/7020281
9. https://ict.iitk.ac.in/product/microprocessors-and-microcontrollers/
10. https://www.classcentral.com/course/nptel-microprocessors-and-microcontrollers-9894

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

IOT ARCHITECTURES AND PROTOCOLS

III B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC502PC	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To provide the basic knowledge on IoT.
2. To explain the different components and Architectures from M2M to IoT.
3. To provide knowledge on different protocols of IoT.
4. To impart knowledge on implementations of different protocols of IoT.

COURSEOUTCOMES

After completion of this course the student will able to

1. Explore the Evolution of IoT, its Growth and Applications.
2. Know the components of IoT and Compare the various architectures of IoT.
3. Acquire the knowledge on data management of IoT.
4. Establish the knowledge on various IoT protocols like Data link, Network, Transport, Session, Service layers.
5. Understand about Service Layer protocols and Security.

UNIT-I	IOT INTRODUCTION	Classes: 12

Introduction and definition of IoT, Evolution of IoT, IoT growth, Application areas of IoT, Characteristics of IoT, IoT stack, Enabling technologies, IoT levels, IoT sensing and actuation, Sensing types, Actuator types.

UNIT-II	IOT AND M2M	Classes: 12

M2M to IoT – A Basic Perspective– Introduction, Differences and similarities between M2M and IoT, SDN and NFV for IoT,M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, international driven global value chain and global information monopolies.

IOT Architecture: IoT Architecture components, Comparing IoT Architectures, A simplified IoT Architecture, core IoT functional stack, IoT data management and compute stack.

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UNIT-III	IOT DATA LINK LAYER AND NETWORK LAYER PROTOCOLS:	Classes: 12
PHY/MAC Layer (3GPP MTC, IEEE 802.11, IEEE 802.15), Wireless HART, Z Wave, Bluetooth Low Energy, Zigbee Smart Energy, DASH7 - Network Layer-IPv4, IPv6, 6LoWPAN, 6TiSCH, ND, DHCP, ICMP, RPL, CORPL, CARP		
UNIT-IV	**TRANSPORT AND SESSION LAYER PROTOCOLS:**	**Classes: 12**
Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS) – Session Layer HTTP, CoAP, XMPP, AMQP, MQTT		
UNIT-V	**SERVICE LAYER PROTOCOLS AND SECURITY**	**Classes: 12**
Service Layer -oneM2M, ETSI M2M, OMA, BBF – Security in IoT Protocols – MAC 802.15.4 6LoWPAN, RPL, Application Layer.		

TEXT BOOKS

1. Sudip Misra, Anandarup Mukherjee, Arijit Roy -Introduction to IOT, Cambridge University Press.
2. David Hanes, Gonzalo salgueiro, Patrick Grossetete, Rob barton, Jerome henry-IoT Fundamentals Networking Technologies, Protocols and Usecases for IoT", Cisco Press.

REFERENCE BOOKS

1. Cunopfister-Getting started with the internet of things, O Reilly Media, 2011
2. Francis daCosta,-Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1 st Edition, Apress Publications.
3. Arshdeep Bahga, Vijay Madisetti -Internet of Things A Hands-on approach, Universities Press
4. Shriram K Vasudevan, RMD Sundaram, Abhishek S Nagarajan-Internet of things, John Wiley and Sons.
5. Massimo Banzi, Michael Shiloh Make: Getting Started with the Arduino, Shroff Publisher/Maker Media Publishers

WEB REFERENCES

1. https://onlinelibrary.wiley.com/doi/abs/10.1002/cpe.4946
2. https://dl.acm.org/doi/abs/10.1145/2755567.2755569
3. https://www.sciencedirect.com/science/article/pii/S2542660518300428
4. https://www.mdpi.com/2078-2489/12/2/87

E -TEXT BOOKS

1. https://aitskadapa.ac.in/e-books/CSE/IOT/Internet%20of%20Things_%20Architectures,%20Protocols%20and%20Standards%20(%20PDFDrive%20).pdf
2. https://pg.its.edu.in/sites/default/files/KCA043%20Internet%20of%20things%20-IoT%20by%20Raj%20Kamal%20Text%20Book.pdf
3. https://core.ac.uk/download/pdf/132530214.pdf

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MOOCS COURSE
1. https://onlinecourses.nptel.ac.in/noc22_cs53/preview 2. https://www.youtube.com/watch?v=-RHYCpsn8TA 3. http://digimat.in/nptel/courses/video/106105166/L02.html 4. https://www.youtube.com/watch?v=FRxRT0DjE7A

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CONTROL SYSTEMS

III B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC503PC	B.Tech	3	1	0	4	40	60	100

COURSE OBJECTIVES

1. To understand the different ways of system representations such as Transfer function representation and state space representations and to assess the system dynamic response
2. To assess the system performance using time domain analysis and methods for improving it
3. To assess the system performance using frequency domain analysis and techniques for improving the performance
4. To design various controllers and compensators to improve system performance

COURSEOUTCOMES

At the end of this course, students will demonstrate the ability to

1. List the basic elements and structures of feedback control systems with reduction and signal flow graph techniques
2. Demonstrate the errors existing in the time domain analysis to correlate the pole-zero configurations.
3. Analyze control system performance in the frequency domain in terms to achieve the desired performance
4. Investigate the stability of the control system and to collaborate stability to the given control system and Design simple feedback controllers.
5. Describe state space and linear models and their transfer function representation.

UNIT-I	INTRODUCTION TO CONTROL PROBLEM	Classes: 12

Industrial Control examples. Mathematical models of physical systems. Control hardware and their models. Transfer function models of linear time-invariant systems. Feedback Control: Open-Loop and Closed-loop systems. Benefits of Feedback. Block diagram algebra.

UNIT-II	TIME RESPONSE ANALYSIS OF STANDARD TEST SIGNALS	Classes: 12

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Time response of first and second order systems for standard test inputs. Application of initial and final value theorem. Design specifications for second- order systems based on the time-response. Concept of Stability. Routh-Hurwitz Criteria. Relative Stability analysis. Root-Locus technique. Construction of Root-loci.

UNIT-III	FREQUENCY-RESPONSE ANALYSIS	Classes: 12

Relationship between time and frequency response, Polar plots, Bode plots. Nyquist stability criterion. Relative stability using Nyquist criterion – gain and phase margin. Closed-loop frequency response.

UNIT-IV	INTRODUCTION TO CONTROLLER DESIGN	Classes: 12

Stability, steady-state accuracy, transient accuracy, disturbance rejection, insensitivity and robustness of control systems. Root-loci method of feedback controller design. Design specifications in frequency-domain. Frequency-domain methods of design. Application of Proportional, Integral and Derivative Controllers, Lead and Lag compensation in designs. Analog and Digital implementation of controllers.

UNIT-V	STATE VARIABLE ANALYSIS AND CONCEPTS OF STATE VARIABLES	Classes: 12

State space model. Diagonalization of State Matrix. Solution of state equations. Eigen values and Stability Analysis. Concept of controllability and observability. Pole-placement by state feedback. Discrete-time systems. Difference Equations. State-space models of linear discrete-time systems. Stability of linear discrete-time systems.

TEXT BOOKS

1. M. Gopal, -Control Systems: Principles and Design, McGraw Hill Education, 1997.
2. B. C. Kuo, -Automatic Control System, Prentice Hall, 1995.

REFERENCE BOOKS

1. Mr. G. Ramesh, Mr. K. Nishakar, Mr. Ch. Srinivas, Mr. T. Naveen, “Control Systems”, Spectrum Techno Press 2022.
2. K. Ogata=Modern Control Engineering, Prentice Hall, 1991.
3. I. J. Nagrath and M. Gopal-Control Systems Engineering, New Age International, 2009.

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1. www.nptelvideos.com/video.php?id=1417&c=14
2. https://nptel.ac.in/courses/108/101/108101037/
3. https://nptel.ac.in/courses/108/102/108102043/

E -TEXT BOOKS

1. https://www.amazon.in/Control-Systems-Kumar/dp/8120349393
2. https://www.flipkart.com/control-systems-engineering/p/itmey3mbkcsytumg

MOOCS COURSE

1. https://swayam.gov.in/nd1_noc19_ee42/preview
2. https://onlinecourses.nptel.ac.in/noc20_ee90/preview

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

III B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
BE504MS	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To learn the basic business types, impact of the economy on Business and Firms specifically.
2. To analyze the Business from the Financial Perspective.

COURSEOUTCOMES

The students will understand

1. The various Forms of Business and the impact of economic variables on the Business.
2. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt.
3. The firm's financial position by analysing
4. The Financial Statements of a Company.

UNIT-I	INTRODUCTION TO BUSINESS AND ECONOMICS	Classes: 12

Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.

Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT-II	DEMAND AND SUPPLY ANALYSIS	Classes: 12

Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

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UNIT-III	PRODUCTION, COST, MARKET STRUCTURES & PRICING	Classes: 12

Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.

Cost analysis: Types of Costs, Short run and Long run Cost Functions.

Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, Monopolistic Competition.

Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, Cost Volume Profit Analysis.

UNIT-IV	FINANCIAL ACCOUNTING	Classes: 12

Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts.

UNIT-V	FINANCIAL ANALYSIS THROUGH RATIOS	Classes: 12

Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems).

Introduction to Fund Flow and Cash Flow Analysis (simple problems).

TEXT BOOKS

1. D.D. Chaturvedi, S.L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata McGraw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata McGraw Hill Education Pvt. Ltd. 2012.

REFERENCE BOOKS

1. Mrs. K. Sudha, Mr. K. Sathish, Mr. A. Sarveshwara Reddy, " Business Economics and Financial Analysis", Spectrum Publications 2022.
2. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
3. S.N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013.

WEB REFERENCES

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2. https://nptel.ac.in/courses/110106050/39
3. https://nptel.ac.in/courses/110106050/38

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E -TEXT BOOKS
1. https://www.sciencedirect.com/book/9780750644549/business-economics 2. http://www.freebookcentre.net/Business/Economics-Books.html
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1. https://nptel.ac.in/courses/110106050/ 2. https://nptel.ac.in/courses/110106050/11

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COMPUTER ORGANIZATION & OPERATING SYSTEMS (PE-I)

III B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC511PE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To understand the structure of a computer and its operations.
2. To understand the RTL and Micro-level operations and control in a computer.
3. Understanding the concepts of I/O and memory organization and operating systems.

COURSEOUTCOMES

After completion of this course the student will able to

1. Visualize the organization of different blocks in a computer.
2. Utilize the micro-level operations to control different units in a computer.
3. Implement Operating systems in a computer.

UNIT-I BASIC STRUCTURE OF COMPUTERS — Classes: 12

Computer Types, Functional Unit, Basic operational Concepts Bus Structures, Software, Performance, Multiprocessors and Multi Computers, Data Representation, Fixed Point Representation, Floating –Point Representation.

Register Transfer Language and Micro Operations: Register Transfer Language, Register Transfer Bus and Memory Transfers, Arithmetic Micro Operations, Logic Micro Operations, Shift Micro Operations, Arithmetic Logic Shift Unit, Instruction Codes, Computer Registers Computer Instructions – Instruction Cycle, Memory – Reference Instructions, Input – Output and Interrupt, STACK Organization, Instruction Formats, Addressing Modes, DATA Transfer and Manipulation, Program Control, Reduced Instruction Set Computer.

UNIT-II MICRO PROGRAMMED CONTROL — Classes: 12

Control Memory, Address Sequencing, Microprogram Examples, Design of Control Unit, Hard Wired Control, Microprogrammed Control

The Memory System: Basic Concepts of Semiconductor RAM Memories, Read-Only Memories, Cache Memories Performance Considerations, Virtual Memories Secondary Storage, Introduction to RAID.

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UNIT-III	INPUT-OUTPUT ORGANIZATION	Classes: 12

Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer Modes, Priority Interrupt, Direct Memory Access, Input –Output Processor (IOP), Serial Communication; Introduction to Peripheral Components, Interconnect (PCI) Bus, Introduction to Standard Serial Communication Protocols like RS232, USB, IEEE 1394.

UNIT-IV	OPERATING SYSTEMS OVERVIEW	Classes: 12

Overview of Computer Operating Systems Functions, Protection and Security, Distributed Systems, Special Purpose Systems, Operating Systems Structures-Operating System Services and Systems Calls, System Programs, Operating Systems Generation

Memory Management: Swapping, Contiguous Memory Allocation, Paging, Structure of The Page Table, Segmentation, Virtual Memory, Demand Paging, Page-Replacement Algorithms, Allocation of Frames, Thrashing Case Studies - UNIX, Linux, Windows

Principles of Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

UNIT-V	FILE SYSTEM INTERFACE	Classes: 12

The Concept of a File, Access Methods, Directory Structure, File System Mounting, File Sharing, Protection.

File System Implementation: File System Structure, File System Implementation, Directory Implementation, Allocation Methods, Free-Space Management.

TEXT BOOKS

1. Carl Hamacher, Zvonks Vranesic, Safea Zaky - Computer Organization, 5th Edition, McGraw Hill.
2. M. Moris Mano -Computer Systems Architecture, 3rd Edition, Pearson
3. Abraham Silberchatz, Peter B. Galvin, Greg Gagne -Operating System Concepts, 8th Edition, John Wiley.

REFERENCE BOOKS

1. William Stallings- Computer Organization and Architecture, 6th Edition, Pearson
2. Andrew S. Tanenbaum -Structured Computer Organization, 4th Edition, PHI
3. Sivaraama Dandamudi - Fundamentals of Computer Organization and Design, Springer Int. Edition.
4. Stallings -Operating Systems – Internals and Design Principles, 6th Edition, Pearson Education,2009.
5. Modern Operating Systems, Andrew S Tanenbaum 2nd Edition, PHI.
6. Principles of Operating Systems, B.L. Stuart, Cengage Learning, India Edition.

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E -TEXT BOOKS
1. https://www.smartzworld.com/notes/computer-organization-and-operating-systems-notes-pdf-coos-notes-pdf/
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1. https://onlinecourses.swayam2.ac.in/cec20_cs06/preview 2. https://onlinecourses.nptel.ac.in/noc21_cs44/preview 3. https://www.computerscience.org/resources/online-courses

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

DATA COMMUNICATIONS AND COMPUTER NETWORKS (PE-I)

III B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC512PE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To introduce the Fundamentals of data communication networks
2. To demonstrate the Functions of various protocols of Data link layer.
3. To demonstrate Functioning of various Routing protocols.
4. To introduce the Functions of various Transport layer protocols.
5. To understand the significance of application layer protocols

COURSEOUTCOMES

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

1. Know the Categories and functions of various Data communication Networks
2. Design and analyze various error detection techniques.
3. Demonstrate the mechanism of routing the data in network layer
4. Know the significance of various Flow control and Congestion control Mechanisms
5. Know the Functioning of various Application layer Protocols.

UNIT-I	INTRODUCTION TO DATA COMMUNICATIONS:	Classes: 12

Components, Data Representation, Data Flow, Networks- Distributed Processing, Network Criteria, Physical Structures, Network Models, Categories of Networks Interconnection of Networks, The Internet - A Brief History, The Internet Today, Protocol and Standards - Protocols, Standards, Standards Organizations, Internet Standards. Network Models, Layered Tasks,OSI model, Layers in OSI model, TCP/IP Protocol Suite, Addressing Introduction, Wireless Links and Network Characteristics, WiFi: 802.11 Wireless LANs - The 802.11 Architecture,

UNIT-II	DATA LINK LAYER	Classes: 12

Links, Access Networks, and LANs- Introduction to the Link Layer, The Services Provided by the Link Layer, Types of errors, Redundancy, Detection vs Correction, Forward error correction Versus Retransmission Error-Detection and Correction Techniques, Parity Checks, Check summing Methods, Cyclic Redundancy Check (CRC) , Framing, Flow Control and Error Control protocols , Noisy less Channels and Noisy Channels, HDLC,

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Multiple Access Protocols, Random Access ,ALOHA, Controlled access, Channelization Protocols. 802.11 MAC Protocol, IEEE 802.11 Frame

UNIT-III	THE NETWORK LAYER	Classes: 12

Introduction, Forwarding and Routing, Network Service Models, Virtual Circuit and Datagram Networks-Virtual-Circuit Networks, Datagram Networks, Origins of VC and Datagram Networks, Inside a Router-Input Processing, Switching, Output Processing, Queuing, The Routing Control Plane, The Internet Protocol (IP):Forwarding and Addressing in the Internet- Datagram format, Ipv4 Addressing, Internet Control Message Protocol(ICMP), IPv6

UNIT-IV	TRANSPORT LAYER	Classes: 12

Introduction and Transport Layer Services : Relationship Between Transport and Network Layers, Overview of the Transport Layer in the Internet, Multiplexing and Demultiplexing, Connectionless Transport: UDP -UDP Segment Structure, UDP Checksum, Principles of Reliable Data Transfer-Building a Reliable Data Transfer Protocol, Pipelined Reliable Data Transfer Protocols, Go- Back-N(GBN), Selective Repeat(SR), Connection Oriented Transport: TCP - The TCP Connection, TCP Segment Structure, Round-Trip Time Estimation and Timeout, Reliable Data Transfer, Flow Control, TCP Connection Management, Principles of Congestion Control - The Cause and the Costs of Congestion, Approaches to Congestion Control

UNIT-V	APPLICATION LAYER	Classes: 12

Principles of Networking Applications – Network Application Architectures, Processes Communicating, Transport Services Available to Applications, Transport Services Provided by the File Transfer: FTP,- FTP Commands and Replies, Electronic Mail in the Internet-STMP, Comparison with HTTP, DNS-The Internet's Directory Service – Service Provided by DNS, Overview of How DNS Works, DNS Records and messages.

TEXT BOOKS

1. Kurose James F, Keith W- Computer Networking A Top-Down Approach, 6th Edition, Pearson.
2. Behrouz A. Forouzan - Data Communications and Networking, 4th Edition, McGraw-Hill Education.

REFERENCE BOOKS

1. Bhusan Trivedi - Data communication and Networks, Oxford university press, 2016
2. Andrew S Tanenbaum - Computer Networks, 4th Edition, Pearson Education
3. W. A. Shay - Understanding Communications and Networks, 3rd Edition, Cengage Learning.

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1. https://math.dartmouth.edu/archive/m19f03/public_html/ 2. https://nptel.ac.in/courses/106/106/106106094/ 3. https://www.freetechbooks.com/communication-networks-t1026.html
E -TEXT BOOKS
1. Data Communications and Network, Bhusan Trivedi, Oxford university press, 2016
MOOCS COURSE
1. https://www.edx.org/learn/datacommuncationnetworks 2. https://www.udemy.com/course/datacommunicationnetwoorks/

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION
(PE-I)

III B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC513PE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. It provides an understanding of various measuring system functioning and metrics for performance analysis.
2. Provides understanding of principle of operation, working of different electronic instruments viz. signal generators, signal analyzers, recorders and measuring equipment.
3. Understanding the concepts of various measuring bridges and their balancing conditions.
4. Provides understanding of use of various measuring techniques for measurement of different physical parameters using different classes of transducers.

COURSEOUTCOMES

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

1. **Identify** the various electronic instruments based on their specifications for carrying out a particular task of measurement.
2. **Analyze** various types of signal generators, signal analyzers for generating and analyzing various real-time signals.
3. **Understand** the working principles of Oscilloscopes and Special Purpose Oscilloscopes.
4. **Select** appropriate passive or active transducers for measurement of physical phenomenon.
5. **Measure** various physical parameters by appropriately selecting the transducers, discuss different types of bridges.

UNIT-I	BLOCK SCHEMATICS OF MEASURING SYSTEMS	Classes: 12

Performance Characteristics, Static Characteristics, Accuracy, Precision, Resolution, Types of Errors, Gaussian Error, Root Sum Squares formula, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag; Measuring Instruments: DC Voltmeters, D' Arsonval Movement, DC Current Meters, AC Voltmeters and Current Meters, Ohmmeters, Multimeters, Meter Protection, Extension of Range, True RMS Responding Voltmeters, Specifications of Instruments.

UNIT-II	SIGNAL ANALYZERS	Classes: 12

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AF, HF Wave Analyzers, Harmonic Distortion, Heterodyne wave Analyzers, Spectrum Analyzers, Power Analyzers, Capacitance-Voltage Meters, Oscillators. Signal Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary Waveform Generator, Video Signal Generators, and Specifications

UNIT-III	OSCILLOSCOPES	Classes: 12

CRT, Block Schematic of CRO, Time Base Circuits, Lissajous Figures, CRO Probes, High Frequency CRO Considerations, Delay lines, Applications: Measurement of Time, Period and Frequency Specifications.
Special Purpose Oscilloscopes: Dual Trace, Dual Beam CROs, Sampling Oscilloscopes, Storage Oscilloscopes, Digital Storage CROs.

UNIT-IV	TRANSDUCERS	Classes: 12

Classification, Strain Gauges, Bounded, unbounded; Force and Displacement Transducers, Resistance Thermometers, Hotwire Anemometers, LVDT, Thermocouples, Synchros Special Resistance Thermometers, Digital Temperature sensing system, Piezoelectric Transducers, Variable Capacitance Transducers, Magneto Strictive Transducers, gyroscopes, accelerometers.

UNIT-V	BRIDGES	Classes: 12

Wheat Stone Bridge, Kelvin Bridge, and Maxwell Bridge.
Measurement of Physical Parameters: Flow Measurement, Displacement Meters, Liquid level Measurement, Measurement of Humidity and Moisture, Velocity, Force, Pressure – High Pressure, Vacuum level, Temperature -Measurements, Data Acquisition Systems.

TEXT BOOKS

1. Modern Electronic Instrumentation and Measurement Techniques: A.D. Helbincs, W. D.Cooper: PHI 5th Edition 2003.
2. Electronic Instrumentation: H. S. Kalsi – TMH, 2nd Edition 2004.

REFERENCE BOOKS

1. Dr. S. V. S. Ramakishnam Raju, Mrs. K. anitha, Dr. Sanjay Kumar Suman, Mrs. P. Kiranmayee, “Electronic Measurements and Instrumentation”, Sunrise International Publishers 2022.
2. Electrical and Electronic Measurement and Measuring Instruments – A K Sawhney, Dhanpat Rai & Sons, 2013.
3. Electronic Instrumentation and Measurements – David A. Bell, Oxford Univ. Press, 1997.
4. Industrial Instrumentation: T.R. Padmanabham Springer 2009.
5. Electronic Measurements and Instrumentation – K. Lal Kishore, Pearson Education 2010.

WEB REFERENCES

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2. https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-ee44/
3. https://www.btechguru.com/GATE--electrical-engineering--electrical-and-electronic-measurements-video-lecture--33--216.html
4. http://www.nptelvideos.in/2012/11/industrial-instrumentation.html

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E -TEXT BOOKS
1. http://ads.baa.uk.com/measurements_and_instrumentation_gnanavadivel.pdf (Authors:U.A.Bakshi, A.V.Bakshi) **2.** https://books.askvenkat.org/tag/electronic-measurements-and-instrumentation-by-kalsi-pdf-free-download
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1. https://onlinecourses.nptel.ac.in/noc19_ee44/preview 2. https://www.mooc-list.com/tags/electrical-instruments 3. https://www.coursera.org/lecture/quantitative-methods/4-02-measurement-structure-lR7MV

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MICROCONTROLLERS LABORATORY

III B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC505PC	B.Tech	0	0	2	1	40	60	100

COURSE OBJECTIVES

1. Introduce ALP concepts and features
2. Write ALP for arithmetic and logical operations in 8086 and 8051
3. Differentiate Serial and Parallel Interface
4. Interface different I/Os with Microprocessors

COURSE OUTCOMES

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

1. Write assembly language programs and implement on 8086.
2. Write assembly language programs and implement on 8051
3. Interface the I/O devices with 8051 micro controllers
4. Perform experiments on Cortex-M3 development boards using GNU tool- chain

LIST OF EXPERIMENTS

Cycle 1: Using 8086 Processor Kits and/or Assembler

Assembly Language Programs to 8086 to Perform

1. Arithmetic, Logical, String Operations on 16 Bit and 32-Bit Data.
2. Bit level Logical Operations, Rotate, Shift, Swap and Branch Operations.

Cycle 2: Using 8051 Microcontroller Kit

Introduction to IDE

1. Assembly Language Programs to Perform Arithmetic (Both Signed and Unsigned) 16 Bit Data Operations, Logical Operations (Byte and Bit Level Operations), Rotate, Shift, Swap and Branch Instructions
2. Time delay Generation Using Timers of 8051.
3. Serial Communication from / to 8051 to / from I/O devices.
4. Program Using Interrupts to Generate Square Wave 10 KHZ Frequency on P2.1 Using Timer 0 8051 in 8 bit Auto reload Mode and Connect a 1 HZ Pulse to INT1 pin and Display on Port 0. Assume Crystal Frequency as 11.0592 MHZ

Cycle 3: Interfacing I/O Devices to 8051

1. 7 Segment Display to 8051.
2. Matrix Keypad to 8051.
3. Sequence Generator Using Serial Interface in 8051.
4. 8-bit ADC Interface to 8051.
5. Triangular Wave Generator through DAC interfaces to 8051.

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Cycle 4: Experiments to be carried out on Cortex-M3 development boards and using GNU tool- chain

1. Blink an LED with software delay, delay generated using the SysTick timer.
2. System clock real time alteration using the PLL modules.
3. Control intensity of an LED using PWM implemented in software and hardware.
4. Control an LED using switch by polling method, by interrupt method and flash the LED once every five switch presses.

TEXT BOOKS

1. Advanced Microprocessors and Peripherals – A. K. Ray and K. M. Bhurchandani, TMH, 2nd Edition2006.
2. ARMSystemDevelopersguide,AndrewNSLOSS,DominicSYMES,ChrisWRIGHT ,Elsevier, 2012

REFERENCE BOOKS

1. Kenneth. J. Ayala-The 8051 Microcontroller, Cengage Learning, 3rd Ed, 2004.
2. D. V. Hall -Microprocessors and Interfacing, TMGH, 2nd Edition, 2006.
3. K. Uma Rao, Andhe Pallavi-The 8051 Microcontrollers, Architecture and Programming and Applications, Pearson, 2009.
4. Donald Reay-Digital Signal Processing and Applications with the OMAP- L138 Experimenter, WILEY 2012.

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1. https://nptel.ac.in/noc/individual_course.php?id=noc18-ec03
2. https://nptel.ac.in/noc/individual_course.php?id=noc19-ee1
3. http://www.infocobuild.com/education/audio-video-courses/electronics/MicroprocessorsMicrocontrollers-IIT-Kharagpur/lecture-49.html

E -TEXT BOOKS

1. Advanced Microprocessors and Peripherals – A. K. Ray and K. M. Bhurchandani, TMH, 2nd Edition2006.
2. ARMSystemDevelopersguide,AndrewNSLOSS,DominicSYMES,ChrisWRIGHT,Elsevier, 2012

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1. https://onlinecourses.nptel.ac.in/noc18_ec03
2. https://www.youtube.com/watch?v=liRPtvj7bFU
3. https://www.mooc-list.com/course/introduction-arm-ost
4. https://www.mooc-list.com/tags/microprocessors
5. https://www.mooc-list.com/tags/microcontroller
6. https://freevideolectures.com/course/3018/microprocessors-and-microcontrollers
7. http://e-box.co.in/micro-processor-and-micro-controller.shtml
8. https://ieeexplore.ieee.org/document/7020281
9. https://ict.iitk.ac.in/product/microprocessors-and-microcontrollers/
10. https://www.classcentral.com/course/nptel-microprocessors-and-microcontrollers-9894

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

IoT ARCHITECTURE AND PROTOCOLS LABORATORY

III B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC509PC	B.Tech	0	0	2	1	40	60	100

COURSE OBJECTIVES

1. To provide the basic knowledge on IoT.
2. To explain the different components and Architectures from M2M to IoT.
3. To provide knowledge on different protocols of IoT.
4. To impart knowledge on implementations of different protocols of IoT.

COURSE OUTCOMES

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

1. Utilize the different sensors like room temperature, DHT, Humidity etc.,
2. Interface the sensors and processor for transmission of data.
3. Capture the images and process it on Arduino/NodeMCU/Raspberry Pi.
4. know the utilization of various protocols like I2c, UART communication etc.,

LIST OF EXPERIMENTS

1. Demonstrate blinking of an LED at every 5 seconds and to control the brightness of an LED.
2. Read Humidity and Room Temperature using DHT sensor and display the readings.
3. Send the recorded values of Temperature/Humidity to the output device via GSM module using Arduino/NodeMCU/Raspberry Pi.
4. Demonstrate Interfacing NodeMCU/Raspberry Pi with the public Cloud using (using thingspeak) protocol.
5. Demonstrate Switching lights on /off remotely using Arduino/NodeMCU/Raspberry Pi.
6. Voice-based Home Automation for switching lights on/off using Google Assistant, IFTTT and MQTT.
7. Interfacing DHT11 sensor with Raspberry pi/equivalent and upload temperature and Humidity values to the cloud.
8. Design an obstacle detection unit using ultrasonic sensor.
9. Capture images from web camera using Raspberry Pi/equivalent and apply filters in Increase image quality.
10. Access a remote computer from Raspberry Pi and display the remote screen.

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11. Design an automatic water sprinkler based on soil moisture using Arduino/NodeMCU/Raspberry Pi.
12. Design an RFID based attendance system using Arduino/NodeMCU/Raspberry Pi.
13. Write an arduino program to demonstrate interrupts
14. Write an arduino program to demonstrate UART communication protocol
15. Write an arduino program to demonstrate I2C communication protocol
16. Write an arduino program to demonstrate SPI communication protocol

TEXT BOOKS

1. "The Internet 'of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)
2. “Make sensors”: Terokarvinen, kemo, karvinen and villey valtokari, 1st edition, maker media, 2014.
3. "Internet of Things: A Hands-on Approach", by Arshdeep Bahga and Vijay Madisetti

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1. https://link.springer.com/chapter/10.1007/978-3-030-41110-7_1
2. https://en.wikipedia.org/wiki/Internet_of_things
3. https://www.oracle.com/in/internet-of-things/what-is-iot/

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1. https://www.routledge.com/Fundamentals-of-Internet-of-Things/Kumar/p/book/9781032126449
2. https://www.tableau.com/learn/articles/internet-of-things-books
4. https://insights.btoes.com/top-10-internet-of-things-iot-books

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1. https://www.mooc-list.com/tags/iot
2. https://www.my-mooc.com/en/categorie/internet-of-things
3. https://www.coursera.org/specializations/iot
3. https://onlinecourses.nptel.ac.in/noc19_cs65/preview

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ADVANCED COMMUNICATIONS LABORATORY

III B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC506PC	B.Tech	0	0	2	1	40	60	100

COURSE OUTCOMES

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

1. understand the features of Network and Spectrum analyzer
2. Design and simulate the modulation techniques using MATLAB
3. verify the output using modulation kits

LIST OF EXPERIMENTS

Note: Minimum Eight experiments should be conducted:

1. Study the features of spectrum analyzer
2. Generation of MSK waveform using MATLAB
3. DQPSK Modulation and Demodulation techniques using MATLAB
4. Plotting eye diagram for baseband signal using MATLAB.
5. Plotting Constellation Diagram of QAM using MATLAB and verify using kit.
6. OFDM generation and detection using Simulink and verify using kit.
7. Generation of different types of signals using MATLAB.
8. Modulation analysis on digital modulated single carrier signals using MATLAB.
9. Reading analog and digital sensors data using UART.
10. Collecting sensor values of remote nodes using RIME broadcasting.

TEXT BOOKS

1. Communication Systems by Simon Haykins John Wiley & Sons, 4th Edition.
2. Electronics & Communication System – George Kennedy and Bernard Davis, McGraw Hill Education 2004.

REFERENCE BOOKS

1. Communication theory, thomas,2 edition, McGraw-Hill Education
2. Communication Systems, 2E, R. P. Singh, S. D. Sapre, McGraw-Hill Education, 2008.
3. Analog and Digital Communication – K. Sam Shanmugam, Willey, 2005.
4. Electronics Communication Systems- Wayne Tomasi, 6th Edition, Person 2009.

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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/
4. https://nptel.ac.in/courses/117/105/117105143/

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

INTELLECTUAL PROPERTY RIGHTS

III B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
*IP510MC	B.Tech	3	0	0	0	100	-	100

COURSE OBJECTIVES

1. Significance of intellectual property and its protection
2. Introduce various forms of intellectual property

COURSEOUTCOMES

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

1. Distinguish and Explain various forms of IPRs.
2. Identify criteria to fit one's own intellectual work in particular form of IPRs.
3. Apply statutory provisions to protect particular form of IPRs.
4. Appraise new developments in IPR laws at national and international level

UNIT-I	INTRODUCTION TO INTELLECTUAL PROPERTY	Classes: 12

Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT-II	TRADE MARKS	Classes: 12

Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

UNIT-III	LAW OF COPYRIGHTS	Classes: 12

Fundamental of copyright law, originality of material, rights of reproduction, rights to perform the work publicly, copyright ownership issues, copyright registration, notice of copyright, International copyright law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT-IV	TRADE SECRETS	Classes: 12

Trade secret law, determination of trade secret status, liability for misappropriations of trade secrets, protection for submission, trade secret litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

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UNIT-V	NEW DEVELOPMENT OF INTELLECTUAL PROPERTY	Classes: 12

New developments in trade mark law; copyright law, patent law, intellectual property audits. International overview on intellectual property, international – trade mark law, copyright law, international patent law, and international development in trade secrets law.

TEXT BOOKS

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.

REFERENCE BOOKS

1. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd.

WEB REFERENCES

1. http://libgen.rs/book/index.php?md5=C4A6559ECCAEFC767CE71BD91A1BAD41
2. http://libgen.rs/book/index.php?md5=6463CAD16544B347B19335FB19D6917C

E -TEXT BOOKS

1. http://libgen.rs/book/index.php?md5=13C4B3A45B1C95B4A388F94729CCCFBC
2. https://maklaw.in/intellectual-property-rights/?gclid=EAIaIQobChMIsprsv_WI7QIVilVgCh29HwPzEAAYASAAEgK5YvD_BwE

MOOCS COURSE

1. https://nptel.ac.in/courses/110/105/110105139/
2. https://nptel.ac.in/courses/109/106/109106137/

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ANTENNAS AND WAVE PROPAGATION

III B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC601PC	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To understand the concept of radiation, antenna definitions and significance of antenna parameters, to derive and analyze the radiation characteristics of thin wire dipole antennas and solve numerical problems.
2. To analyze the characteristics and design relations of UHF, VHF and Microwave Antennas.
3. To identify the antenna array requirements, to determine the characteristics of ULAs and estimate the patterns of BSA, EFA, and Binomial Arrays.
4. To understand the concepts and set-up requirements for microwave measurements, and
5. familiarize with the procedure to enable antenna measurements.
6. To define and distinguish between different phenomenon of wave propagation (ground wave, space wave and sky wave), their frequency dependence, and estimate their characteristics, identifying their profiles and parameters involved.

COURSEOUTCOMES

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

1. Explain the mechanism of radiation, definitions of different antenna characteristic parameters and establish their mathematical relations.
2. Characterize the antennas based on frequency, configure the geometry and establish the radiation patterns of VHF, UHF and Microwave antennas and also antenna arrays.
3. Specify the requirements for microwave measurements and arrange a setup to carry out the antenna far zone pattern and gain measurements in the laboratory.
4. Classify the different wave propagation mechanisms, determine the characteristic features of
5. Different wave propagations, and estimate the parameters involved.

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UNIT-I	ANTENNA BASICS	Classes: 12

Basic Antenna Parameters – Patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain-Resolution, Antenna Apertures, Effective Height.

Fields from Oscillating Dipole, Field Zones, Front - to-back Ratio, Antenna Theorems, Radiation, Retarded Potentials – Helmholtz Theorem

Thin Linear Wire Antennas – Radiation from Small Electric Dipole, Quarter Wave Monopole and Half Wave Dipole – Current Distributions, Field Components, Radiated Power, Radiation Resistance, Beam Width, Directivity, Effective Area and Effective Height, Natural Current Distributions, Far Fields and Patterns of Thin Linear Centre-fed Antennas of Different Lengths. Loop Antennas - Small Loop, Comparison of Far Fields of Small Loop and Short Dipole, Radiation Resistances and Directivities of Small Loops (Qualitative Treatment).

UNIT-II	ANTENNA ARRAYS	Classes: 12

Point Sources – Definition, Patterns, arrays of 2 Isotropic Sources - Different Cases, Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, Endfire Arrays, EFA with Increased Directivity, Derivation of their Characteristics and Comparison, BSAs with Non-uniform Amplitude Distributions – General Considerations and Binomial Arrays.

Antenna Measurements: Introduction, Concepts - Reciprocity, Near and Far Fields, Coordinate System, Sources of Errors. Patterns to be Measured, Directivity Measurement, Gain Measurements (by Comparison, Absolute and 3-Antenna Methods)

UNIT-III	VHF, UHF AND MICROWAVE ANTENNAS - I	Classes: 12

Arrays with Parasitic Elements, Yagi-Uda Array, Folded Dipoles and their Characteristics, Helical Antennas – Helical Geometry, Helix Modes, Practical Design Considerations for Monofilar Helical Antenna in Axial and Normal Modes, Horn Antennas – Types, Fermat's Principle, Optimum Horns, Design Considerations of Pyramidal Horns.

UNIT-IV	VHF, UHF AND MICROWAVE ANTENNAS - II	Classes: 12

Microstrip Antennas – Introduction, Features, Advantages and Limitations, Rectangular Patch Antennas – Geometry and Parameters, Characteristics of Microstrip Antennas. Reflector Antennas – Introduction, Flat Sheet and Corner Reflectors, Paraboloidal Reflectors – Geometry, Pattern Characteristics, Feed Methods, Reflector Types – Related Features.

UNIT-V	WAVE PROPAGATION	Classes: 12

Definitions, Categorizations and General Classifications, Different Modes of Wave Propagation, Ray/Mode Concepts,

Ground Wave Propagation –Plane Earth Reflections, Space and Surface Waves, Wave Tilt, Curved Earth Reflections.

Space Wave Propagation –Field Strength Variation with Distance and Height, Effect of Earth's Curvature, Absorption, Super Refraction, M-Curves and Duct Propagation, Scattering Phenomena, Troposphere Propagation.

Sky Wave Propagation –Structure of Ionosphere, Refraction and Reflection of Sky Waves by Ionosphere, Ray Path, Critical Frequency, MUF, LUF, OF, Virtual Height and Skip Distance, Relation between MUF and Skip Distance, Multi-hop Propagation.

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TEXT BOOKS

1. J.D. Kraus, R.J. Marhefka and Ahmad S. Khan -Antennas and Wave Propagation, 4th ed., (Special Indian Edition), TMH, New Delhi, 2010.
2. E.C. Jordan and K.G. Balmain -Electromagnetic Waves and Radiating Systems, PHI, 2nd ed., 2000.

REFERENCE BOOKS

1. Dr. S. Ravi Kumar, Dr. M. Thirupathi, Mr. R. P. Pavan Kumar, Dr. S. V. S. Ramakrishnam Raju," Antennas and Wave Propagation" Seven Hills publications 2022.
2. C.A. Balanis - Antenna Theory, 3rd Edition. John Wiley & Sons, 2005.
3. K.D. Prasad, Satya Prakashan - Antennas and Wave Propagation, Tech India Publications, New Delhi, 2001.
4. Keith henney - Radio Engineering Handbook, 3rd edition TMH.
5. John Leonidas Volakis -Antenna Engineering Handbook, 3rd edition, 2007

WEB REFERENCES

1. https://lecturenotes.in/subject/263/antenna-and-wave-propagation-awp
2. https://www.tutorialspoint.com/antenna_theory/antenna_theory_types_of_propagatic .htm

E -TEXT BOOKS

1. https://books.google.co.in/books/about/Antennas_and_Wave_Propagation.html?id=icy-_fN8vVsC
2. https://books.google.com/books/about/Antenna_and_Wave_Propagation.html?id=g6VrngEACAAJ

MOOCS COURSE

1. https://www.classcentral.com/course/swayam-antennas-7924
2. https://training.uark.edu/antenna
3. https://www.thetechnologyacademy.com/online-course/rf502-rf-and-microwave-antenna-basics
4. https://www.udemy.com/topic/antenna
5. https://www.coursera.org/lecture/satellite-communications/antennas-BQhQ6

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

DIGITAL SIGNAL PROCESSING

III B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC602PC	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To provide background and fundamental material for the analysis and processing of digital signals.
2. To understand the fast computation of DFT and appreciate the FFT processing.
3. To study the designs and structures of digital (IIR and FIR) filters and analyze and synthesize for a given specifications.
4. To acquaint in Multi-rate signal processing techniques and finite word length effects.

COURSEOUTCOMES

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

1. To **Understand** the operations on signals and characteristics of Linear Shift Invariant system and Multi rate DSP Techniques.
2. To **Build** the relationship among Z-Transform, DFT, FFT and various Transforms.
3. To **Design** of infinite impulse response filters for a given specification.
4. To **Evaluate** the Performance of finite impulse response filter.
5. To A**nalyze** the finite length word effects and to realize Digital Filters.

UNIT-I	INTRODUCTION TO DIGITAL SIGNAL PROCESSING	Classes: 12

Introduction: Discrete Time Signals & Sequences, conversion of continuous to discrete signal, Normalized Frequency, Linear Shift Invariant Systems, Stability, and Causality, linear differential equation to difference equation, Linear Constant Coefficient Difference Equations, Frequency Domain Representation of Discrete Time Signals and Systems Multirate Digital Signal Processing: Introduction, Down Sampling, Decimation, Up sampling, Interpolation, Sampling Rate Conversion.

UNIT-II	DISCRETE FOURIER SERIES	Classes: 12

Fourier Series, Fourier Transform, Laplace Transform and Z-Transform relation, DFS Representation of Periodic Sequences, Properties of Discrete Fourier Series, Discrete Fourier Transforms: Properties of DFT, Linear Convolution of Sequences using DFT, Computation of DFT: Over-Lap Add Method, Over-Lap Save Method, Relation between DTFT, DFS, DFT and Z- Transform.

Fast Fourier Transforms: Fast Fourier Transforms (FFT) - Radix-2 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Inverse FFT.

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UNIT-III	IIR DIGITAL FILTERS	Classes: 12
Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital Filters from Analog Filters, Step and Impulse Invariant Techniques, Bilinear Transformation Method, Spectral Transformations.		
UNIT-IV	**FIR DIGITAL FILTERS**	**Classes: 12**
Characteristics of FIR Digital Filters, Frequency Response. Design of FIR Filters: Fourier Method, Digital Filters using Window Techniques, Frequency Sampling Technique, Comparison of IIR & FIR filters		
UNIT-V	**REALIZATION OF DIGITAL FILTERS**	**Classes: 12**
Applications of Z – Transforms, Solution of Difference Equations of Digital Filters, System Function, Stability Criterion, Frequency Response of Stable Systems, Realization of Digital Filters – Direct, Canonic, Cascade and Parallel Forms. Finite Word Length Effects: Limit cycles, Overflow Oscillations, Round-off Noise in IIR Digital Filters, Computational Output Round Off Noise, Methods to Prevent Overflow, Trade Off Between Round Off and Overflow Noise, Measurement of Coefficient Quantization Effects through Pole-Zero Movement, Dead Band Effects.		

TEXT BOOKS

1. A. V. Oppenheim and R.W. Schaffer - Discrete Time Signal Processing, PHI, 2009
2. John G. Proakis, Dimitris G. Manolakis - Digital Signal Processing, Principles, Algorithms, and Applications, Pearson Education / PHI, 2007.

REFERENCE BOOKS

1. Mr. N. Vishwanath, Mr. G. Ramesh Reddy, Mr. D. Thirupathi, Dr. B. Hari Krishna, "Digital Signal processing"
2. Li Tan - Digital Signal Processing – Fundamentals and Applications, Elsevier, 2008
3. Robert J. Schilling, Sandra L. Harris - Fundamentals of Digital Signal Processing using MATLAB, Thomson, 2007
4. S. Salivahanan, A. Vallavaraj and C. Gnanapriya - Digital Signal Processing, TMH, 2009
5. Emmanuel C. Ifeachor and Barrie W. Jervis - Digital Signal Processing - A Practical approach,2nd Edition, Pearson Education, 2009

WEB REFERENCES

1. ttps://freevideolectures.com/course/2339/digital-signal-processing-iitkharagpur/17
2. http://study.aisectonline.com/DisplaySub2SubProgramme.aspx?Sub2Cat=10141
3. https://nptel.ac.in/noc/individual_course.php?id=noc18-ee30
   http://www.infocobuild.com/education/audio-video-courses/electronics/DiscreteTimeSignalProcessing-IIT-Kharagpur/lecture-06.html

E -TEXT BOOKS

1. https://www.google.co.in/books/edition/DIGITAL_SIGNAL_PROCESSING/cLAbjlSN7qQC?hl=en&gbpv=1&dq=inauthor:%22NAGOORKANI%22&printsec=frontcover
2. https://fmipa.umri.ac.id/wp-content/uploads/2016/03/Andreas-Intoniou-Digital-signal-processing.9780071454247.31527.pdf
3. https://www.riverpublishers.com/pdf/ebook/RP_E9788792982032.pdf

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MOOCS COURSE
1. https://nptel.ac.in/courses/108105055/10 2. http://freevideolectures.com/Course/2339/Digital-ztransforms-IITKharagpur 3. http://study.aisectonline.com/Login.aspx?CID=CoursesSelect.aspx?courseid=11589#https://www.youtube.com/watch?v=V-kLaH4139o 4. https://cosmolearning.org/video-lectures/digital-filter-design-12020/

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CMOS VLSI DESIGN

III B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC603PC	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. Give exposure to different steps involved in the fabrication of ICs.
2. Explain electrical properties of MOS and BiCMOS devices to analyze the behavior of inverters designed with various loads.
3. Give exposure to the design rules to be followed to draw the layout of any logic circuit.
4. Provide design concepts to design building blocks of data path of any system using gates.
5. Understand basic programmable logic devices and testing of CMOS circuits.

COURSEOUTCOMES

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

1. Understand the steps involved in fabrication of IC's using MOS, CMOS, BiCMOS transistors, studying electrical behavior of MOS transistors and implementation of basic circuits
2. Experiment with VLSI design flow using Stick diagrams, Design rules and Layouts
3. Design the gate level circuits using gates
4. Analyze the steps to design various circuits using data path sub systems and memories.
5. Evaluate different types of PLD's and test the CMOS circuits.

UNIT-I	INTRODUCTION	Classes: 12

Introduction to IC Technology – MOS, PMOS, NMOS, CMOS &BiCMOS
Basic Electrical Properties: Basic Electrical Properties of MOS and BiCMOS Circuits: Ids-Vds relationships, MOS transistor threshold Voltage, gm, gds, Figure of merit; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT-II	VLSI CIRCUIT DESIGN PROCESSES	Classes: 12

VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits.

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UNIT-III	GATE LEVEL DESIGN	Classes: 12
Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Time delays, Driving large capacitive loads, Wiring capacitance, Fan – in, Fan – out.		
UNIT-IV	**DATA PATH SUBSYSTEMS**	**Classes: 12**
Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters. Array Subsystems: SRAM, DRAM, ROM, Serial Access Memories.		
UNIT-V	**PROGRAMMABLE LOGIC DEVICES**	**Classes: 12**
Design Approach – PLA, PAL, Standard Cells FPGAs, CPLDs. CMOS Testing: CMOS Testing, Test Principles, Design Strategies for test, Chip level Test Techniques.		

TEXT BOOKS

1. Kamran Eshraghian, Eshraghian Dougles and A. Pucknell - Essentials of VLSI circuits and systems, PHI, 2005
2. Neil H. E Weste, David Harris, Ayan Banerjee - CMOS VLSI Design – A Circuits and Systems Perspective, 3rd Edition, Pearson, 2009.

REFERENCE BOOKS

1. Dr. B. Hari Krishna, Mrs. Sunita Arvind Rathod, Mr. L. Chandra Shekhar, Mr. G. Ramesh, “VLSI Design”, Sun Techno publishers 2022.
2. Ming-BO Lin - Introduction to VLSI Systems: A Logic, Circuit and System Perspective, CRC Press, 2011.
3. John. P. Uyemura - CMOS logic circuit Design, Springer, 2007.
4. Wayne Wolf - Modern VLSI Design, 3rd Edition, Pearson Education, 1997.
5. K. Lal Kishore, V. S. V. Prabhakar -VLSI Design, I.K International, 2009.

WEB REFERENCES

1. https://books.google.co.in/books/about/Basic_VLSI_Design.html?id=FCJTAAAAMAAJ
2. https://docs.google.com/file/d/0Bxo5NRLCo5Sqbmt5V1NDd3Q4MTg/view?resourcekey=0-BsHQYeJB6BOa-wMTll_v9A

E -TEXT BOOKS

1. VLSI DESIGN by Wayne wolf
2. Basic VLSI Design-Eshraghian Dougles and A.Pucknell

MOOCS COURSE

1. https://nptel.ac.in/courses/117/101/117101058/
2. https://nptel.ac.in/courses/117/106/117106093/

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ARTIFICIAL INTELLIGENCE

(PE-II)

III B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC611PE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

The objectives of the course are to:

1. To impart knowledge about Artificial Intelligence.
2. To give understanding of the main abstractions and reasoning for intelligent systems.
3. To enable the students to understand the basic principles of Artificial Intelligence in various applications.

COURSEOUTCOMES:

Upon completing this course, the students will be able to

1. Understand the basics of the theory and about intelligent agents.
2. Capable of using heuristic searches, aware of knowledge based systems and expert systems.
3. Apply AI techniques to real-world problems to develop intelligent systems.
4. Select appropriately from a range of techniques when implementing intelligent systems.

UNIT-I	INTRODUCTION	Classes: 12

Definition – foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation

UNIT-II	PROBLEM SOLVING METHODS	Classes: 12

Problem solving Methods – Search Strategies- Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A* ,AO* Algorithms, Problem reduction, Game Playing-Adversial search, Games, mini-max algorithm, optimal decisions in multiplayer games, Problem in Game playing, Alpha-Beta pruning, Evaluation functions.

UNIT-III	KNOWLEDGE REPRESENTATION	Classes: 12

Predicate Logic – Prolog Programming – Unification – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation – Ontological Engineering-Categories

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and Objects– Events – Mental Events and Mental Objects – Reasoning Systems for Categories – Reasoning with Default Information

UNIT-IV	KNOWLEDGE ACQUISITION	Classes: 12

Introduction to Learning, Rule Induction, Learning from observation Inductive learning, Decision trees, Explanation based learning, Statistical Learning methods, Reinforcement Learning. Learning Using neural Networks, Probabilistic Learning Natural Language Processing.

UNIT-V	EXPERT SYSTEMS	Classes: 12

Introduction, basic concepts, structure of expert systems, the human element in expert systems how expert systems works, problem areas addressed by expert systems, expert systems success factors, types of expert systems, expert systems and the internet interacts web, model-based reasoning, case-based reasoning, explanation & meta knowledge inference with uncertainty representing uncertainty.

TEXT BOOKS

1. S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", Second Edition, Pearson Education
2. David Poole, Alan Mackworth, Randy Goebel," Computational Intelligence: a logical approach", Oxford University Press.

REFERENCE BOOKS

1. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education.
2. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers.

WEB REFERENCES

1. https://link.springer.com/chapter/10.1007/3-540-44831-4_3
2. https://www.tandfonline.com/doi/abs/10.1080/10494820.2021.1875001
3. https://www.worldscientific.com/doi/abs/10.1142/S0218213014400090

E -TEXT BOOKS

1. https://books.google.co.in/books?hl=en&lr=&id=ov_iBQAAQBAJ&oi=fnd&pg=PP1&dq=artificial+intelligence++E+TEXT+BOOKS&ots=LDEjF-nWYa&sig=EkqtyNmWktDNnffKDJdSc1jp7F0
2. https://books.google.co.in/books?hl=en&lr=&id=geFHDwAAQBAJ&oi=fnd&pg=PR5&dq=artificial+intelligence++E+TEXT+BOOKS&ots=3G2w29cz0p&sig=72jT0BdrkBDBXgfcbsmr70c0JOo
3. http://www.cse.yorku.ca/~tsotsos/Homepage%20of%20John%20K_files/teai-92.PDF
4. https://books.google.co.in/books?hl=en&lr=&id=VHVQtGIECgwC&oi=fnd&pg=PP1&dq=artificial+intelligence++E+TEXT+BOOKS&ots=4TyhnESQrp&sig=_hJdLt1AqsW-yT0sJa9J-DNnpXE

MOOCS COURSE

1. https://archive.nptel.ac.in/courses/106/105/106105152/
2. https://www.digimat.in/nptel/courses/video/106105152/L01.html
3. https://archive.nptel.ac.in/courses/106/106/106106139/
4. https://www.youtube.com/watch?v=fC7V8QsPBec

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MOBILE COMMUNICATIONS AND NETWORKS

(PE-II)

III B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC612PE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To provide the student with an understanding of the cellular concept, frequency reuse, hand- off strategies.
2. To provide the student with an understanding of Co-channel and Non-Co-Channel interferences.
3. To give the student an understanding of cell coverage for signal and traffic, diversity techniques and channel assignment
4. To give the student an understanding types of handoff.
5. To understand challenges and application of Adhoc wireless Networks.

COURSEOUTCOMES

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

1. Known the evolution of cellular and mobile communication system.
2. Explore the Co-Channel and Non-Co-Channel interferences.
3. Known how to overcome the different fading effects?
4. Familiar with cell coverage for signal and traffic, diversity, techniques, frequency management, Channel assignment and types of handoff.
5. Demonstrate the difference between cellular and Adhoc Networks and design goals of MAC Layer protocol.

UNIT-I	INTRODUCTION TO CELLULAR MOBILE RADIO SYSTEMS	Classes: 12

Limitations of Conventional Mobile Telephone Systems. Basic Cellular Mobile System, First, Second, Third and Fourth Generation Cellular Wireless Systems. Uniqueness of Mobile Radio Environment-Fading-Tie Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time.

Fundamentals of Cellular Radio System Design: Concept of Frequency Reuse, Co-Channel Interference, Co-Channel Interference Reduction Factor, Desired C/I from a Normal Case in a Omni Directional Antenna System, System Capacity Improving Coverage and Capacity in Cellular Systems- Cell Splitting, Sectoring, Microcell Zone Concept.

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UNIT-II	CO-CHANNEL INTERFERENCE	Classes: 12

Measurement of Real Time Co-Channel Interference, Design of Antenna System, Antenna Parameters and their effects, diversity techniques-space diversity, polarization diversity, frequency diversity, time diversity.

Non-Co-Channel Interference: Adjacent Channel Interference, Near end far end interference, cross talk, effects on coverage and interference by power decrease, antenna height decrease, effects of cell site components.

UNIT-III	CELL COVERAGE FOR SIGNAL AND TRAFFIC	Classes: 12

Signal Reflections in flat and Hilly Terrain, effects of Human Made Structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long-distance propagation, path loss from a point to point prediction model in different conditions, merits of lee model.

Frequency Management and Channel Assignment: Numbering and Grouping, Setup Access and Paging Channels, Channel Assignments to Cell Sites and Mobile Units.

UNIT-IV	HANDOFFS AND DROPPED CALLS	Classes: 12

Handoff Initiation, types of Handoff, Delaying Handoff, advantages of Handoff, Power Difference Handoff, Forced Handoff, Mobile Assisted and Soft Handoff, Intersystem handoff, Introduction to Dropped Call Rates and their Evaluation.

UNIT-V	AD HOC WIRELESS NETWORKS:	Classes: 12

Introduction, Cellular and Ad Hoc wireless Networks, Applications and Ad Hoc Wireless Networks, Issues in Ad Hoc Wireless Networks, Ad Hoc Wireless Internet, MAC Protocols for Ad Hoc Wireless, Introduction, issues in designing AMAC Protocol for Ad Hoc wireless Networks, Design Goals of AMAC protocol for Ad Hoc Wireless Networks, Classification of MAC Protocols.

TEXT BOOKS

1. W.C.Y. Lee - Mobile Cellular Telecommunications, 2nd edition, Mc Graw Hill, 1989.
2. Theodore. S. Rapport - Wireless Communications, 2nd edition, Pearson Education, 2002.

REFERENCE BOOKS

1. C. Siva ram Murthy and B.S. Manoj - Ad Hoc Wireless Networks: Architectures and Protocols, PHI, 2004.
2. Simon Haykin, Michael Moher - Modern Wireless Communications, Pearson Education, 2005.
3. Vijay Garg - Wireless Communications and Networking, Elsevier Publications, 2007.
4. Andrea Goldsmith -Wireless Communications-, Cambridge University Press, 2005.

WEB REFERENCES

1. https://www.cse.wustl.edu/~jain/refs/wir_refs.htm
2. https://ieeexplore.ieee.org/document/8613272
3. https://www.inderscience.com/jhome.php?jcode=ijmc
4. https://www.sciencedirect.com/journal/digital-communications-and-networks

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E -TEXT BOOKS
1. https://www.tarc.edu.my/files/library/003BB4C0-D93D-46D2-836E-B58687AF94D6.pdf 2. https://www.bol.com/be/nl/p/mobile-telecommunications-networks/9200000035778265/
MOOCS COURSE
1. https://www.mooc-list.com/tags/mobile-communications 2. https://www.coursera.org/learn/wireless-communications 3. https://www.quora.com/Which-is-best-online-course-for-wireless-communication-Something-like-Coursera-or-edX

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

EMBEDDED SYSTEM DESIGN

(PE-II)

III B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC613PE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To provide an overview of Design Principles of Embedded System.
2. To provide clear understanding about the role of firmware.
3. To understand the necessity of operating systems in correlation with hardware systems.
4. To learn the methods of interfacing and synchronization for tasking.

COURSEOUTCOMES

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

1. Familiarize the selection procedure of Processors in the embedded domain.
2. Design Procedure for Embedded Firmware.
3. Visualize the role of Real time Operating Systems in Embedded Systems.
4. Evaluate the Correlation between task synchronization and latency issues

UNIT-I	INTRODUCTION TO EMBEDDED SYSTEMS	Classes: 12

Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

UNIT-II	TYPICAL EMBEDDED SYSTEM	Classes: 12

Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

UNIT-III	EMBEDDED FIRMWARE	Classes: 12

Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

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UNIT-IV	RTOS BASED EMBEDDED SYSTEM DESIGN	Classes: 12
Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.		
UNIT-V	**TASK COMMUNICATION**	**Classes: 12**
Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, Methods to Choose an RTOS.		

TEXT BOOKS

1. Shibu K.V - Introduction to Embedded Systems, Mc Graw Hill.

REFERENCE BOOKS

1. Dr. B. Hari Krishna, Mrs. G. Udaya Sri, Mr. K. Nagavenkateshwar Rao, Mr. G. poshamallu,"Embedded System Design", Amaravathi publications 2023.
2. Raj Kamal - Embedded Systems, TMH.
3. Frank Vahid, Tony Givargis - Embedded System Design, John Wiley.
4. Lyla - Embedded Systems, Pearson, 2013
5. David E. Simon - An Embedded Software Primer, Pearson Education.

WEB REFERENCES

1. http://laboratorios.fi.uba.ar/lse/seminario/bibliografia-y-referencias.html?hl=en
2. https://ptolemy.berkeley.edu/projects/chess/eecs149/references.html
3. https://www.sanfoundry.com/best-reference-books-embedded-systems/
4. https://www.embeddedrelated.com/books-11/nf/all/all.php

E -TEXT BOOKS

1. https://www.e-booksdirectory.com/details.php?ebook=5392
2. https://books.google.co.in/books/about/Embedded_Systems_World_Class_Designs html?id=-U_Kt_8EpuwC&redir_esc=y

MOOCS COURSE

1. https://www.mooc-list.com/tags/embedded-systems
2. https://onlinecourses.nptel.ac.in/noc20_cs14/preview

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

DIGITAL SIGNAL PROCESSING LABORATORY

III B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC604PC	B.Tech	0	0	2	1	40	60	100

COURSE OBJECTIVES

1. To provide background and fundamentals of MATLAB tool for the analysis and processing of signals and to generate various continuous and discrete time signals.
2. To study the designs and structures of digital (IIR and FIR) filters from analysis to synthesis for a given specifications.
3. To familiarize the relationships between continuous-time and discrete-time signals and systems.
4. To verify the Circular Convolution, Noise removal and DTMF filtering.
5. To analyze the FFT algorithm, multi-rate signal processing techniques.

COURSE OUTCOMES

Upon successful completion of the course, the student is able

1. **Understand** Basics of MATLAB syntax, functions and programming and find the generation Various Signals and Sequences in MATLAB, including the operations on Signals and Sequences.
2. **Explain** the Convolution and Correlation between Signals and sequences, Verification of noise removal in a signal
3. **Analyze** the Fourier Transform of a given signal and plotting its magnitude and phase spectrum
4. **Remember** for impulse response of finite and infinite
5. **Construct** the multi rate signal processing and Identify Spectrograms and DTMF Filtering.

LIST OF EXPERIMENTS

The Programs shall be implemented in Software (Using MATLAB / Lab View / C Programming/ Equivalent) and Hardware (Using TI / Analog Devices / Motorola / Equivalent DSP processors).

Note: - Minimum of 12 experiments has to be conducted.

List of Experiments:

1. Generation of Sinusoidal Waveform / Signal based on Recursive Difference Equations
2. Histogram of White Gaussian Noise and Uniformly Distributed Noise.

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3. To find DFT / IDFT of given DT Signal
4. To find Frequency Response of a given System given in Transfer Function/ Differential equation form.
5. Obtain Fourier series coefficients by formula and using FET and compare for half sine wave.
6. Implementation of FFT of given Sequence
7. Determination of Power Spectrum of a given Signal(s).
8. Implementation of LP FIR Filter for a given Sequence/Signal.
9. Implementation of HP IIR Filter for a given Sequence/Signal
10. Generation of Narrow Band Signal through Filtering
11. Generation of DTMF Signals
12. Implementation of Decimation Process
13. Implementation of Interpolation Process
14. Implementation of I/D Sampling Rate Converters
15. Impulse Response of First order and Second Order Systems.

TEXT BOOKS

1. Discrete Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, PHI, 2009
2. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.

REFERENCE BOOKS

1. Digital Signal Processing – Fundamentals and Applications – Li Tan, Elsevier, 2008
2. Fundamentals of Digital Signal Processing using MATLAB – Robert J. Schilling, Sandra L. Harris, Thomson, 2007
3. Digital Signal Processing – S. Salivahanan, A. Vallavaraj and C. Gnanapriya, TMH, 2009
4. Digital Signal Processing - A Practical approach, Emmanuel C. Ifeachor and Barrie W. Jervis, 2nd Edition, Pearson Education, 2009

WEB REFERENCES

1. https://freevideolectures.com/course/2339/digital-signal-processing-iitkharagpur/17
2. http://study.aisectonline.com/DisplaySub2SubProgramme.aspx?Sub2Cat=10141
3. https://nptel.ac.in/noc/individual_course.php?id=noc18-ee30
4. http://www.infocobuild.com/education/audio-video-courses/electronics/DiscreteTimeSignalProcessing-IIT-Kharagpur/lecture-06.html

E -TEXT BOOKS

1. https://www.google.co.in/books/edition/DIGITAL_SIGNAL_PROCESSING/cLAbjlSN7qQC?hl=en&gbpv=1&dq=inauthor:%22NAGOORKANI%22&printsec=frontcover
2. https://fmipa.umri.ac.id/wp-content/uploads/2016/03/Andreas-Intoniou-Digital-signal-processing.9780071454247.31527.pdf
3. https://www.riverpublishers.com/pdf/ebook/RP_E9788792982032.pdf

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MOOCS COURSE
1. https://nptel.ac.in/courses/108105055/10 2. http://freevideolectures.com/Course/2339/Digital-ztransforms-IITKharagpur 3. http://study.aisectonline.com/Login.aspx?CID=CoursesSelect.aspx?courseid=11589#https://www.youtube.com/watch?v=V-kLaH4139o 4. https://cosmolearning.org/video-lectures/digital-filter-design-12020/

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CMOS VLSI DESIGN LABORATORY

III B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC605PC	B.Tech	0	0	2	1	40	60	100

COURSE OBJECTIVES

1. To learn Hardware Descriptive Language (Verilog/VHDL)
2. To learn the fundamental principles of VLSI circuit design in digital domain
3. To familiarize implementation of logical modules on FPGAs
4. To understand basic programmable logic devices and testing of CMOS circuits using FPGA.
5. To build and test digital circuits, including the use of CAD tools. Behavioral, register- transfer, logic, and physical-level structured VLSI design using CAD tools and hardware description languages

COURSE OUTCOMES

Upon successful completion of the course, the student is able

1. An ability to design CMOS logic circuits. Simulate circuits within a CAD tool and compare to design specifications.
2. Design, implement, and simulate circuits using VHDL.
3. Write machine language programs and assembly language programs for the simple computer.
4. To learn by using Xilinx Foundation tools and Hardware Description Language (VHDL).

To analyze the results of logic and timing simulations and to use these simulation results to debug digital systems.

LIST OF EXPERIMENTS

Note: Any SIX of the following experiments from each part are to be conducted (Total 12)

Part - I

All the following experiments have to be implemented using HDL

1. Realize all the logic gates
2. Design of 8-to-3 encoder (without and with priority) and 2-to-4 decoder
3. Design of 8-to-1 multiplexer and 1-to-8 demultiplexer
4. Design of 4 bit binary to gray code converter
5. Design of 4 bit comparator
6. Design of Full adder using 3 modeling styles
7. Design of flip flops: SR, D, JK, T

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8. Design of 4-bit binary, BCD counters (synchronous/ asynchronous reset) or any sequence counter
9. Finite State Machine Design

Part - II

Layout, physical verification, placement & route for complex design, static timing analysis, IR drop analysis and crosstalk analysis for the following:

1. Basic logic gates
2. CMOS inverter
3. CMOS NOR/ NAND gates
4. CMOS XOR and MUX gates
5. Static / Dynamic logic circuit (register cell)
6. Latch
7. Pass transistor
8. Layout of any combinational circuit (complex CMOS logic gate).

TEXT BOOKS

1. Essentials of VLSI circuits and systems–Kamran Eshraghian, Eshraghian Dougles and A.Pucknell, PHI, 2005 Edition
2. CMOS VLSI Design–A Circuits and Systems Perspective, Neil H.E Weste, David Harris, Ayan Banerjee, 3rd Ed, Pearson, 2009.

REFERENCE BOOKS

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective–Ming-BOLin, CRC Press, 2011
2. CMOS logic circuit Design-John.P.Uyemura, Springer, 2007.
3. Modern VLSI Design –Wayne Wolf, Pearson Education, 3rd Edition, 1997.
4. VLSI Design- K.Lal Kishore, V.S.V.Prabhakar, I.K International, 2009.

WEB REFERENCES

1. https://books.google.co.in/books/about/Basic_VLSI_Design.html?id=FCJTAAAAMAAJ
2. https://docs.google.com/file/d/0Bxo5NRLCo5Sqbmt5V1NDd3Q4MTg/view?resourcekey=0-BsHQYeJB6BOa-wMTll_v9A

E -TEXT BOOKS

1. VLSI DESIGN by Wayne wolf
2. Basic VLSI Design-Eshraghian Dougles and A.Pucknell

MOOCS COURSE

1. https://nptel.ac.in/courses/117/101/117101058/
2. https://nptel.ac.in/courses/117/106/117106093/

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ADVANCED ENGLISH COMMUNICATION SKILLS LABORATORY

III B. TECH -II SEMESTER

Course Code	Category	Hours /Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EN606HS	B. Tech	0	0	2	1	40	60	100

COURSE OBJECTIVES:

To train students

1. To use relevant words through the practice of vocabulary and responding appropriately.
2. To improve Reading Comprehension Skills and Techniques, to read and infer for meanings.
3. To enable to write and improve writing skills to present different types of writing.
4. To enable students to perform presentation skills with the right usage of Body language through seminars, posters, etc.
5. To prepare students for placements by practicing various activates like group discussions, mock interviews, etc.

COURSE OUTCOMES:

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

1. Gather ideas and information to organize ideas relevantly and coherently.
2. Participate in group discussions.
3. Face interviews.
4. Write project/research reports/technical reports.
5. Make oral presentations and written presentations.

LIST OF EXPERIMENTS:

EXERCISE: I

Activities on Listening and Reading Comprehension: Active Listening-Development of Listening Skills Through Audio clips - Benefits of Reading -Methods and Techniques of Reading- Basic Steps to Effective Reading - Common Obstacles - Discourse Markers or Linkers- Sub- skills of reading- Reading for facts, negative facts and Specific Details- Guessing Meanings from Context, Inferring Meaning - Critical Reading - Reading Comprehension - Exercises for Practice.

EXERCISE: II

Activities on Writing Skills: Vocabulary for Competitive Examinations- Planning for Writing - Improving Writing Skills - Structure and presentation of different types of writing - Free Writing and

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Structured Writing - Letter Writing -Writing a Letter of Application –Resume vs. Curriculum Vitae - Writing a Résumé - Styles of Résumé - e-Correspondence -Emails -Blog Writing - (N)etiquette - Report Writing - Importance of Reports – Types and Formats of Reports- Technical Report Writing- Exercises for Practice.

EXERCISE: III

Activities on Presentation Skills - Starting a conversation – responding appropriately and relevantly – using the right language and body language - Role Play in different situations including Seeking Clarification, Making a Request, Asking for and Refusing Permission, Participating in a Small Talk - Oral presentations (individual and group) through JAM sessions- PPTs - Importance of Presentation Skills - Planning, Preparing, Rehearsing and Making a Presentation - Dealing with Glossophobia or Stage Fear **–** Understanding Nuances of Delivery - Presentations through Posters/Projects/Reports – Checklist for Making a Presentation and Rubrics of Evaluation.

EXERCISE: IV

Activities on Group Discussion (GD): Types of GD and GD as a part of a Selection Procedure - Dynamics of Group Discussion- Myths of GD- Intervention, Summarizing - Modulation of Voice, Body Language, Relevance, Fluency and Organization of Ideas -Do's and Don'ts - GD Strategies- Exercises for Practice.

EXERCISE: V

Interview Skills: Concept and Process - Interview Preparation Techniques - Types of Interview Questions – Pre-interview Planning, Opening Strategies, Answering Strategies - Interview Through Tele-conference & Video-conference- Mock Interviews.

MINIMUM REQUIREMENTS:

The Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- One PC with latest configuration for the teacher
- T. V, a digital stereo
- Headphones of High quality

TEXT BOOKS:

1. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd. 2nd Edition
2. Academic Writing: A Handbook for International students by Stephen Bailey, Routledge, 5th Edition.

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REFERENCE BOOKS:

1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar and Hemalatha Nagarajan. Pearson 2007
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press2009.
4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
5. English Vocabulary in Use series, Cambridge University Press 2008.

WEB REFERENCES:

1. http://www.skillsyouneed.com/ips/interpersonal-communication.html#ixzz3Zo3C60Js
2. http://en.wikipedia.org/wiki/Conversation
3. http://www.wikihow.com/Start-a-Conversation-When-You-Have-Nothing-to-Talk-About 10 Sure-Fire Strategies to Improve Your Vocabulary
4. https://litemind.com/top-3-reasons-to-improve-your-vocabulary/

E –TEXTBOOKS:

1. Mc corry Laurie Kelly Mc Corry Jeff Mason, Communication Skills fortheHealthcare Profession-al, 1 edition,ISBN:1582558140, ISBN-13:9781582558141
2. Robert E Owens ,Jr ,Language Development, 9th edition, ISBN:0133810364,9780133810363

MOOCS Course:

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

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ENVIRONMENTAL SCIENCE

III B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
*ES607MC	B.Tech	3	0	0	0	100	-	100

COURSE OBJECTIVES

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures
- Understanding the environmental policies and regulations

COURSEOUTCOMES

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

1. Differentiate between various biotic and abiotic components of ecosystem
2. Describe the various types of natural resources
3. Examine the values, threats of biodiversity, the methods of conservation, endangered and endemic species of India
4. Illustrate causes, effects, and control measures of various types of environmental pollutions.
5. Understand technologies on the basis of ecological principles environmental regulations which in turn helps in sustainable development

UNIT-I	ECOSYSTEMS	Classes: 12

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, Biomagnifications, ecosystem value, services and carrying capacity, Field visits

UNIT-II	NATURAL RESOURCES	Classes: 12

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: 12

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.

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UNIT-IV	ENVIRONMENTAL POLLUTION AND CONTROL TECHNOLOGIES	Classes: 12

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 Problems 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.

UNIT-V	ENVIRONMENTAL POLICY, LEGISLATION & EIA	Classes: 12

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, 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.

TEXT BOOKS

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

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.

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WEB REFERENCES
1. https://www.britannica.com/science/ecosystem 2. https://ocw.mit.edu/resources/#EnvironmentandSustainability
E -TEXT BOOKS
1. P N Palani samy Environmental Science ISBN:9788131773253, eISBN:97899332509771 Edition: Second edition 2. Environmental Studies. Author, Dr. J. P. Sharma. Publisher, Laxmi Publications, 2009 ISBN, 8131806413, 9788131806418.
MOOCS COURSE
1. https://nptel.ac.in/courses/122103039/38 2. https://nptel.ac.in/courses/106105151/12

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MICROWAVE AND OPTICAL COMMUNICATIONS

IV B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC701PC	B.Tech	3	1	0	4	40	60	100

COURSE OBJECTIVES

1. To get familiarized with microwave frequency bands, their applications and to understand the limitations and losses of conventional tubes at these frequencies.
2. To distinguish between different types of microwave tubes, their structures and principles of microwave power generation.
3. To impart the knowledge of Scattering Matrix, its formulation and utility, and establish the S-Matrix for various types of microwave junctions.
4. Understand the utility of Optical Fibres in Communications.

COURSEOUTCOMES

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

1. Known power generation at microwave frequencies and derive the performance characteristics.
2. Realize the need for solid state microwave sources and understand the principles of solid-state devices.
3. Distinguish between the different types of waveguide and ferrite components, and select proper components for engineering applications
4. Measure the S-parameters in microwave component design.
5. Demonstrate the mechanism of light propagation through Optical Fibres.

UNIT-I	MICROWAVE TUBES	Classes: 12

Limitations and Losses of conventional Tubes at Microwave Frequencies, Microwave Tubes – O Type and M Type Classifications, O-type Tubes: 2 Cavity Klystrons – Structure, Reentrant Cavities, Velocity Modulation Process and Applegate Diagram, Bunching Process and Small Signal Theory – Expressions for O/P Power and Efficiency. Reflex Klystrons – Structure, Velocity Modulation and Applegate Diagram, Mathematical Theory of Bunching, Power Output, Efficiency, Oscillating Modes and O/P Characteristics.

Helix TWTs: Types and Characteristics of Slow Wave Structures; Structure of TWT and Amplification Process (qualitative treatment), Suppression of Oscillations, Gain Considerations.

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UNIT-II	M-TYPE TUBES	Classes: 12

Introduction, Cross-field Effects, Magnetrons – Different Types, Cylindrical Traveling Wave Magnetron – Hull Cut-off and Hartree Conditions, Modes of Resonance and PI-Mode Operation, Separation of PI- Mode, o/p characteristics,

Microwave Solid State Devices: Introduction, Classification, Applications. TEDs – Introduction, Gunn Diodes – Principle, RWH Theory, Characteristics, Modes of Operation - Gunn Oscillation Modes, Principle of operation of IMPATT and TRAPATT Devices.

UNIT-III	WAVEGUIDE COMPONENTS	Classes: 12

Coupling Mechanisms – Probe, Loop, Aperture types. Waveguide Discontinuities – Waveguide Windows, Tuning Screws and Posts, Matched Loads. Waveguide Attenuators – Different Types, Resistive Card and Rotary Vane Attenuators; Waveguide Phase Shifters– Types, Dielectric and Rotary Vane Phase Shifters, Waveguide Multiport Junctions - E plane and H plane Tees. Ferrites– Composition and Characteristics, Faraday Rotation, Ferrite Components – Gyrator, Isolator,

UNIT-IV	SCATTERING MATRIX	Classes: 12

Scattering Matrix Properties, Directional Couplers – 2 Hole, Bethe Hole, [s] matrix of Magic Tee and Circulator.

Microwave Measurements: Description of Microwave Bench – Different Blocks and their Features, Errors and Precautions, Measurement of Attenuation, Frequency. Standing Wave Measurements, measurement of Low and High VSWR, Cavity Q, Impedance Measurements.

UNIT-V	OPTICAL FIBER TRANSMISSION MEDIA	Classes: 12

Optical Fiber types, Light Propagation, Optical fiber Configurations, Optical fiber classifications, Losses in Optical Fiber cables, Light Sources, Optical Sources, Light Detectors, LASERS, WDM Concepts, Optical Fiber System link budget.

TEXT BOOKS

1. Samuel Y. Liao -Microwave Devices and Circuits, 3rd Edition, Pearson, 2003.
2. Wayne Tomasi- Electronic Communications Systems, 5th Edition, Pearson,

REFERENCE BOOKS

1. Gerd Keiser - Optical Fiber Communication, 4th Edition, TMH, 2008.
2. David M. Pozar - Microwave Engineering – 3rd edition, John Wiley & Sons (Asia) Pvt Ltd., 2011 Reprint.
3. G.S. Raghuvanshi - Microwave Engineering, Cengage Learning India Pvt. Ltd., 2012.
4. George Kennedy - Electronic Communication System, 6th Edition, McGraw Hill.

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1. https://www.khanacademy.org/science/physics/magnetic-forces-and-magnetic-fields/magnetic-field-current-carrying-wire/v/magnetism-6-magnetic-field-due-to-current
E -TEXT BOOKS
1. https://www.electrical4u.com
MOOCS COURSE
1. https://nptel.ac.in/courses/108106073/ 2. https://nptel.ac.in/courses/108106073/7 3. https://nptel.ac.in/courses/108106073/23 4. https://nptel.ac.in/courses/108106073/38

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

DIGITAL IMAGE PROCESSING

(PE – III)

IV B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC711PE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To provide a approach towards image processing and introduction about 2D transforms
2. To expertise about enhancement methods in time and frequency domain
3. To expertise about segmentation and compression techniques
4. To understand the Morphological operations on an image

COURSEOUTCOMES

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

1. Explore the fundamental relations between pixels and utility of 2-D .Transforms in image processer.
2. Understand the enhancement, segmentation and restoration processes on an image.
3. Implement the various Morphological operations on an image
4. Understand the need of compression and evaluation of basic compression Algorithms.
5. Understand the Image Compression techniques.

UNIT-I	DIGITAL IMAGE FUNDAMENTALS & IMAGE TRANSFORMS	Classes: 12

Digital Image Fundamentals, Sampling and Quantization, Relationship between Pixels. Image Transforms: 2-D FFT, Properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling Transform.

UNIT-II	IMAGE ENHANCEMENT (SPATIAL DOMAIN)	Classes: 12

Introduction, Image Enhancement in Spatial Domain, Enhancement through Point Processing, Types of Point Processing, Histogram Manipulation, Linear and Non – Linear Gray Level Transformation, Local or Neighborhood criterion, Median Filter, Spatial Domain High-Pass Filtering.

Image Enhancement(Frequency Domain): Filtering in Frequency Domain, Low Pass (Smoothing) and High Pass (Sharpening) Filters in Frequency Domain.

UNIT-III	IMAGE RESTORATION	Classes: 12

Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

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UNIT-IV	IMAGE SEGMENTATION	Classes: 12

Detection of Discontinuities, Edge Linking And Boundary Detection, thresholding, Region Oriented Segmentation.

Morphological Image Processing: Dilation and Erosion: Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, Hit or Miss Transformation.

UNIT-V	IMAGE COMPRESSION	Classes: 12

Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Huffman and Arithmetic Coding, Error Free Compression, Lossy Compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000 Standards.

TEXT BOOKS

1. Rafael C. Gonzalez, Richard E. Woods -Digital Image Processing, 3rd Edition, Pearson, 2008
2. S Jayaraman, S Esakkirajan, T Veerakumar - Digital Image Processing- - TMH, 2010.

REFERENCE BOOKS

1. Scotte Umbaugh- Digital Image Processing and Analysis-Human and Computer Vision
2. Application with using CVIP Tools, 2nd Ed, CRC Press, 2011
3. Rafael C. Gonzalez, Richard E Woods and Steven L. Eddings - Digital Image Processing using
4. MATLAB, 2nd Edition, TMH, 2010.
5. Somka, Hlavac, Boyle-Digital Image Processing and Computer Vision –Cengage Learning (Indian edition) 2008.
6. Adrian low- Introductory Computer Vision Imaging Techniques and Solutions-,2nd Edition, BS Publication, 2008.

WEB REFERENCES

1. https://www.nature.com/subjects/image-processing
2. http://image-sensors-world.blogspot.com/
3. https://www.pyimagesearch.com/Programme/image-processing/
4. https://www.mygreatlearning.com/blog/tag/image-processing/
5. https://blogs.mathworks.com/steve

E -TEXT BOOKS

1. www.libgen.is
2. http://sdeuoc.ac.in/sites/default/files/sde_videos/Digital%20Image%20Processing%203rd%20ed.%20-%20R.%20Gonzalez%2C%20R.%20Woods-ilovepdf-compressed.pdf

MOOCS COURSE

1. https://www.mooc-list.com/course/fundamentals-digital-image-and-video-processing-coursera
2. https://classroom.udacity.com/courses/ud810
3. https://www.my-mooc.com/en/mooc/digital/
4. https://www.coursera.org/courses?languages=en&query=digital+image+processing
5. https://onlinecourses.nptel.ac.in/noc16_ec14/preview

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CMOS ANALOG IC DESIGN

(PE - III)

IV B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC712PE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

Analog circuits play a very crucial role in all electronic systems and due to continued miniaturization, many of the analog blocks are not getting realized in CMOS technology.

1. To understand most important building blocks of all CMOS Analog ICs.
2. To study the basic principle of operation, the circuit choices and the trade-offs involved in the MOS transistor level design common to all Analog CMOS ICs.
3. To understand specific design issues related to single and multistage voltage, current and differential amplifiers, their output and impedance issues, bandwidth, feedback and stability.
4. To understand the design of differential amplifiers, current amplifiers and OPAMPs.

COURSEOUTCOMES

After studying the course, each student is expected to be able to

1. Design basic building blocks of CMOS Analog ICs.
2. Carryout the design of single and two stage operational amplifiers and voltage references.
3. Determine the device dimensions of each MOSFETs involved.
4. Design various amplifiers like differential, current and operational amplifiers.

UNIT-I	MOS DEVICES AND MODELING	Classes: 12

The MOS Transistor, Passive Components- Capacitor & Resistor, Integrated circuit Layout, CMOS Device Modeling - Simple MOS Large-Signal Model, Other Model Parameters, Small-Signal Model for the MOS Transistor, Computer Simulation Models, Sub-threshold MOS Model.

UNIT-II	ANALOG CMOS SUB-CIRCUITS	Classes: 12

MOS Switch, MOS Diode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors-Current mirror with Beta Helper, Degeneration, Cascode current Mirror and Wilson Current Mirror, Current and Voltage References, Bandgap Reference.

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UNIT-III	CMOS AMPLIFIERS	Classes: 12
Inverters, Differential Amplifiers, Cascode Amplifiers, Current Amplifiers, Output Amplifiers, High Gain Amplifiers Architectures.		
UNIT-IV	**CMOS OPERATIONAL AMPLIFIERS**	**Classes: 12**
Design of CMOS Op-Amps, Compensation of Op-Amps, Design of Two-Stage Op-Amps, Power- Supply, Rejection Ratio of Two-Stage Op-Amps, Cascode Op-Amps, Measurement Techniques of OP- Amp.		
UNIT-V	**COMPARATORS**	**Classes: 12**
Characterization of Comparator, Two-Stage, Open-Loop Comparators, Other Open-Loop Comparators, Improving the Performance of Open-Loop Comparators, Discrete-Time Comparators.		

TEXT BOOKS

1. Philip E. Allenand Douglas, R. Holberg – CMOS Analog Circuit Design, Oxford University Press, International Second Edition/Indian Edition, 2010.
2. Paul R. Gray, Paul J. Hurst, S. Lewis and R.G. Meyer -Analysis and Design of Analog Integrated Circuits, 5th edition, Wiley India, 2010.

REFERENCE BOOKS

1. David A. Johns, Ken Martin- Analog Integrated Circuit Design, Wiley Student Edn, 2013.
2. Behzad Razavi – Design of Analog CMOS Integrated Circuits, TMH.
3. Baker, Liand Boyce - CMOS: Circuit Design, Layout and Simulation, PHI.

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1. https://moodle.fel.cvut.cz/course/view.php?id=542&lang=en
2. https://www.coursera.org/specializations/fpga-design

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1. https://books.google.co.in/books/about/Low_Power_VLSI_Design_and_Technology.html?id=l2GtgPvLQJUC
2. https://books.google.co.in/books/about/Low_Power_Design_Methodologies.html?id 9IzuBwAAQBAJ&redir_esc=y

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1. https://nptel.ac.in/courses/106/105/106105034/
2. https://nptel.ac.in/courses/117/106/117106109/
3. https://nptel.ac.in/courses/106/103/106103016/

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ARTIFICIAL NEURAL NETWORKS

(PE – III)

IV B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC713PE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To understand the biological neural network and to model equivalent neuron models.
2. To understand the architecture, learning algorithms
3. To know the issues of various feed forward and feedback neural networks.
4. To explore the Neuro dynamic models for various problems.

COURSEOUTCOMES

Upon completing this course, the student will be able to

1. Understand the similarity of Biological networks and Neural networks
2. Perform the training of neural networks using various learning rules.
3. Understanding the concepts of forward and backward propagations.
4. Understand and Construct the Hopfield models.
5. Understand and implement the Neuro Dynamics.

UNIT-I	INTRODUCTION	Classes: 12

A Neural Network, Human Brain, Models of a Neuron, Neural Networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks

Learning Process: Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning, Credit Assignment Problem, Memory, Adaption, Statistical Nature of the Learning Process

UNIT-II	SINGLE LAYER PERCEPTRONS	Classes: 12

Adaptive Filtering Problem, Unconstrained Organization Techniques, Linear Least Square Filters, Least Mean Square Algorithm, Learning Curves, Learning Rate Annealing Techniques, Perceptron –Convergence Theorem, Relation Between Perceptron and Bayes Classifier for a Gaussian Environment

Multilayer Perceptron: Back Propagation Algorithm XOR Problem, Heuristics, Output Representation and Decision Rule, Computer Experiment, Feature Detection

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UNIT-III	BACK PROPAGATION	Classes: 12

Back Propagation and Differentiation, Hessian Matrix, Generalization, Cross Validation, Network Pruning Techniques, Virtues and Limitations of Back Propagation Learning, Accelerated Convergence, Supervised Learning

UNIT-IV	SELF-ORGANIZATION MAPS (SOM)	Classes: 12

Two Basic Feature Mapping Models, Self-Organization Map, SOM Algorithm, Properties of Feature Map, Computer Simulations, Learning Vector Quantization, Adaptive Patter Classification

UNIT-V	NEURO DYNAMICS	Classes: 12

Dynamical Systems, Stability of Equilibrium States, Attractors, Neuro Dynamical Models, Manipulation of Attractors as a Recurrent Network Paradigm
Hopfield Models – Hopfield Models, restricted boltzmen machine.

TEXT BOOKS

1. Simon S Haykin - Neural Networks a Comprehensive Foundations, PHI
2. Jacek M. Zurada - Introduction to Artificial Neural Systems, JAICO Publishing House, 2006.

REFERENCE BOOKS

1. Li Min Fu - Neural Networks in Computer Intelligence, TMH 2003
2. James A Freeman David M S Kapura - Neural Networks, Pearson, 2004.
3. B. Vegnanarayana -Artificial Neural Networks, Prentice Hall of India P Ltd, 2005

WEB REFERENCES

1. https://www.researchgate.net/publication/226213344_Semantic_Web_Technologies_and_Artificial_Neural_Networks_for_Intelligent_Web_Knowledge_Source_Discovery
2. https://ieeexplore.ieee.org/document/485891
3. https://www.sciencedirect.com/science/article/pii/S2405844018332067

E -TEXT BOOKS

1. https://www.intechopen.com/books/6187
2. https://books.google.co.in/books/about/Artificial_Neural_Networks.html?id=tJokAQAIAAJ&redir_esc=y

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1. https://www.coursera.org/courses?query=neural%20networks
2. https://www.mooc-list.com/tags/neural-networks
3. https://www.mooc-list.com/tags/artificial-neural-networks

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

NETWORK SECURITY AND CRYPTOGRAPHY

(PE – IV)

IV B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC721PE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. Understand the basic concept of Cryptography and Network Security, their mathematical models
2. To understand the necessity of network security, threats/vulnerabilities to networks and countermeasures
3. To understand Authentication functions with Message Authentication Codes and Hash Functions.
4. To provide familiarity in Intrusion detection and Firewall Design Principles

COURSEOUTCOMES

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

1. Describe network security fundamental concepts and principles
2. Encrypt and decrypt messages using block ciphers and network security technology and protocols
3. Analyze key agreement algorithms to identify their weaknesses
4. Identify and assess different types of threats, malware, spyware, viruses, vulnerabilities

UNIT-I	SECURITY SERVICES, MECHANISMS AND ATTACKS	Classes: 12

Security Services, Mechanisms and Attacks, A Model for Internetwork security, Classical Techniques: Conventional Encryption model, Steganography, Classical Encryption Techniques.
Modern Techniques: Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Block Cipher Design Principles.

UNIT-II	ENCRYPTION	Classes: 12

Triple DES, International Data Encryption algorithm, Blowfish, RC5, Characteristics of Advanced Symmetric block Ciphers. Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation.

UNIT-III	PUBLIC KEY CRYPTOGRAPHY	Classes: 12

Principles, RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptography.

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Number Theory: Prime and Relatively prime numbers, Modular arithmetic, Fermat's and Euler's theorems, Testing for primality, Euclid's Algorithm, the Chinese remainder theorem, Discrete logarithms.		
UNIT-IV	**MESSAGE AUTHENTICATION AND HASH FUNCTIONS**	**Classes: 12**
Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash functions and MACs. Hash and Mac Algorithms: MD-5, Message digest Algorithm, Secure Hash Algorithm. Digital signatures and Authentication protocols: Digital signatures, Authentication Protocols, Digital signature standards. Authentication Applications: Kerberos, Electronic Mail Security: Pretty Good Privacy, SIME/MIME.		
UNIT-V	**IP SECURITY**	**Classes: 12**
Overview, Architecture, Authentication, Encapsulating Security Payload, Key Management. Web Security: Web Security requirements, Secure sockets layer and Transport layer security, Secure Electronic Transaction. Intruders, Viruses and Worms: Intruders, Viruses and Related threats. Fire Walls: Fire wall Design Principles, Trusted systems.		

TEXT BOOKS

1. William Stallings-Cryptography and Network Security: Principles and Practice, Pearson Education.
2. Robert Bragg, Mark Rhodes -Network Security: The complete reference, TMH, 2004.

REFERENCE BOOKS

1. William Stallings - Network Security Essentials (Applications and Standards), Pearson Education.
2. Eric Maiwald - Fundamentals of Network Security, Dreamtech press Whitman - Principles of Information Security, Thomson.
3. Buchmann - Introduction to Cryptography, Springer.

WEB REFERENCES

1. https://www.sanfoundry.com/best-reference-books-cryptography-network-security/
2. https://www.google.com/search?q=network+security+and+crytography+e+referenc s&ei=_X-wYcuwAaSd4-EP7va-iAo&ved=0ahUKEwiLo8rn9tP0AhWkzjgGHW67D6EQ4dUDCA4&uact=

E -TEXT BOOKS

1. https://www.sanfoundry.com/best-reference-books-cryptography-network-security/
2. https://books.google.co.in/books/about/Cryptography_and_Network_Security.html?d=jdo6eUKdrVkC&redir_esc=y

MOOCS COURSE

1. https://www.coursera.org/lecture/managing-network-cybersecurity/cryptography-and-network-security-w9SuJ
2. https://www.classcentral.com/course/swayam-cryptography-and-network-security-9896

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SATELLITE COMMUNICATIONS

(PE – IV)

IV B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC722PE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To acquired foundation in orbital mechanics and launch vehicles for the satellites.
2. To provide basic knowledge of link design of satellite.
3. To understand multiple access systems and earth station technology
4. To understand the concepts of satellite navigation and GPS.

COURSEOUTCOMES

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

1. Understand basic concepts and frequency allocations for satellite communication, orbital mechanics and launch vehicles.
2. Envision the satellite sub systems and design satellite links for specified C/N.
3. Understand the various multiple access techniques for satellite communication systems and earth station technologies.
4. Known the concepts of LEO, GEO Stationary Satellite Systems and satellite navigation.
5. To Understand the Geo-Stationary Satellite Systems.

UNIT-I	INTRODUCTION	Classes: 12

Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency Allocations for Satellite Services, Applications, Future Trends of Satellite Communications.

Orbital Mechanics and Launchers: Orbital Mechanics, Look Angle determination, Orbital Perturbations, Orbit determination, Launches and Launch vehicles, Orbital Effects in Communication Systems Performance.

UNIT-II	SATELLITE SUBSYSTEMS	Classes: 12

Altitude and Orbit Control System, Telemetry, Tracking, Command And Monitoring, Power Systems, Communication Subsystems, Satellite Antennas, Equipment Reliability and Space Qualification.

UNIT-III	SATELLITE LINK DESIGN	Classes: 12

Basic Transmission Theory, System Noise Temperature and G/T Ratio, Design of Down Links, Up Link Design, Design Of Satellite Links For Specified C/N, System Design Examples.

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Multiple Access: Frequency Division Multiple Access (FDMA), Inter modulation, Calculation of C/N, Time Division Multiple Access (TDMA), Frame Structure, Examples, Satellite Switched TDMA Onboard Processing, DAMA, Code Division Multiple Access (CDMA), Spread Spectrum Transmission and Reception.		
UNIT-IV	**EARTH STATION TECHNOLOGY**	**Classes: 12**
Introduction, Transmitters, Receivers, Antennas, Tracking Systems, Terrestrial Interface, Primary Power Test Methods.		
UNIT-V	**LOW EARTH ORBIT AND GEO-STATIONARY SATELLITE SYSTEMS**	**Classes: 12**
Orbit Considerations, Coverage and Frequency Consideration, Delay & Throughput Considerations, System Considerations, Operational NGSO Constellation Designs. Satellite Navigation & Global Positioning System: Radio and Satellite Navigation, GPS Position Location Principles, GPS Receivers and Codes, Satellite Signal Acquisition, GPS Navigation Message, GPS Signal Levels, GPS Receiver Operation, GPS C/A Code Accuracy, Differential GPS.		

TEXT BOOKS

1. Timothy Pratt, Charles Bostian and Jeremy Allnutt - Satellite Communications, WSE, Wiley Publications, 2nd Edition, 2003.
2. Wilbur L. Pritchard, Robert A Nelson and Henri G. Suyderhoud - Satellite Communications Engineering, 2nd Edition, Pearson Publications, 2003.

REFERENCE BOOKS

1. M. Richharia - Satellite Communications : Design Principles, 2nd Edition, BS Publications, 2003.
2. D.C Agarwal - Satellite Communication, 5th Edition, Khanna Publications,
3. K.N. Raja Rao - Fundamentals of Satellite Communications, PHI, 2004
4. Dennis Roddy - Satellite Communications, 4th Edition, McGraw Hill, 2009.

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2. http://image-sensors-world.blogspot.com/
3. https://www.pyimagesearch.com/Programme/image-processing/
4. https://www.mygreatlearning.com/blog/tag/image-processing/
5. https://blogs.mathworks.com/steve

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2. http://sdeuoc.ac.in/sites/default/files/sde_videos/Digital%20Image%20Processing%2 03rd%20ed.%20-%20R.%20Gonzalez%2C%20R.%20Woods-ilovepdf-compressed.pdf

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1. https://www.mooc-list.com/course/fundamentals-digital-image-and-video-processing-coursera
2. https://classroom.udacity.com/courses/ud810
3. https://www.my-mooc.com/en/mooc/digital/
4. https://www.coursera.org/courses?languages=en&query=digital+image+processing
5. https://onlinecourses.nptel.ac.in/noc16_ec14/preview

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

BIOMEDICAL INSTRUMENTATION

(PE – IV)

IV B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC723PE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. Identify significant biological variables at cellular level and ways to acquire different bio-signals.
2. Elucidate the methods to monitor the activity of the heart,brain, eyes and muscles.
3. Introduce therapeutic equipment for intensive and critical care.
4. Outline medical imaging techniques and equipment for certain diagnosis and therapies.

COURSEOUTCOMES

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

1. Understand bio systems and medical systems from an engineering perspective.
2. Identify the techniques to acquire record and primarily understand physiological activity of the human body through cellpotential, ECG, EEG, BP and blood flow measurement and EMG.
3. Understand the working of various medical instruments and critical care equipment.
4. Know the imaging techniques including CT, PET, SPECT and MRI used in diagnosis of various medical conditions.
5. Understand the Principles in Medical Imaging.

UNIT-I	BIO-POTENTIAL SIGNALS AND ELECTRODES	Classes: 12

Bio-signals and their characteristics, Organization of cell, Nernst equation of membrane, Resting and Action potentials. Bio-amplifiers, characteristics of medical instruments, problems encountered with measurements from living systems. Bio-potential electrodes – Body surface recording electrodes, Internal electrodes, micro electrodes. Bio-chemical transducers – reference electrode, the pH electrodes, Blood gas electrodes.

UNIT-II	CARDIOVASCULAR INSTRUMENTATION	Classes: 12

Heart and cardiovascular system Heart electrical activity, blood pressure and heart sounds. Cardiovascular measurements electro cardiography – electrocardiogram, ECG Amplifier, Electrodes and leads, ECG recorder principles. Types of ECG recorders. Principles of blood pressure and blood flow measurement.

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UNIT-III	NEUROLOGICAL INSTRUMENTATION	Classes: 12

Neuronal communication, electro encephalogram (EEG), EEG Measurements EEG electrode-placement system, interpretation of EEG, EEG system Block diagram, preamplifiers and amplifiers. EMG block diagram and Stimulators

UNIT-IV	EQUIPMENT FOR CRITICAL CARE	Classes: 12

Therapeutic equipment - Pacemaker, Defibrillator, Shortwave diathermy, Hemodialysis machine. Respiratory Instrumentation - Mechanism of respiration, Spirometry, Pneumotachograph, Ventilators.

UNIT-V	PRINCIPLES OF MEDICAL IMAGING	Classes: 12

Radiography, computed Radiography, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Nuclear Medicine, Single Photon Emission Computed Tomography (SPECT), Positron Emission Tomography (PET), Ultrasonography, Introduction to Telemedicine.

TEXT BOOKS

1. R.S. Khandpur - Hand-book of Biomedical Instrumentation, McGraw-Hill, 2003.
2. John G. Webster = Medical Instrumentation, Application and Design, John Wiley.

REFERENCE BOOKS

1. Leslie Cromwell, F.J. Weibell, E.A. Pfeiffer - Biomedical Instrumentation and Measurements, PHI.
2. L.A. Geoddes and L.E. Baker - Principles of Applied Biomedical Instrumentation, John Wiley and Sons.Joseph Carr and Brown - Introduction to Biomedical equipment technology.

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2. https://www.sanfoundry.com/best-reference-books-biomedical-instrumentation/
3. https://www.springer.com/journal/42600

E -TEXT BOOKS

1. https://books.google.co.in/books/about/Handbook_of_Biomedical_Instrumentation.html?id=bYsiBAAAQBAJ&redir_esc=y

MOOCS COURSE

1. https://www.mooc-list.com/tags/biomedical-engineering
2. https://www.coursera.org/courses?query=biomedical/

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

PROFESSIONAL PRACTICE, LAW AND ETHICS

IV B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
SM702MS	B.Tech	2	0	0	2	40	60	100

COURSE OBJECTIVES

1. To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession
2. To develop some ideas of the legal and practical aspects of their profession.

COURSEOUTCOMES

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

1. Understand the importance of professional practice, Law and Ethics in their personal lives and professional careers.
2. learn the rights and responsibilities as an employee, team member and a global citizen

UNIT-I	PROFESSIONAL PRACTICE AND ETHICS	Classes: 12

Definition of Ethics, Professional Ethics - Engineering Ethics, Personal Ethics; Code of Ethics - Profession, Professionalism, Professional Responsibility, Conflict of Interest, Gift Vs Bribery, Environmental breaches, Negligence, Deficiencies in state-of-the-art; Vigil Mechanism, Whistle blowing, protected disclosures. Introduction to GST- Various Roles of Various Stake holders

UNIT-II	LAW OF CONTRACT	Classes: 12

Nature of Contract and Essential elements of valid contract, Offer and Acceptance, Consideration, Capacity to contract and Free Consent, Legality of Object. Unlawful and illegal agreements, Contingent Contracts, Performance and discharge of Contracts, Remedies for breach of contract. Contracts-II: Indemnity and guarantee, Contract of Agency, Sale of goods Act -1930: General Principles, Conditions & Warranties, Performance of Contract of Sale.

UNIT-III	ARBITRATION, CONCILIATION AND ADR (ALTERNATIVE DISPUTE RESOLUTION) SYSTEM	Classes: 12

Arbitration – meaning, scope and types – distinction between laws of 1940 and 1996; UNCITRAL model law – Arbitration and expert determination; Extent of judicial intervention; International commercial arbitration; Arbitration agreements – essential and kinds, validity, reference and interim measures by court; Arbitration tribunal

– appointment, challenge, jurisdiction of arbitral tribunal, powers, grounds of challenge, procedure and court assistance; Distinction between conciliation, negotiation, mediation and

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arbitration, confidentiality, resort to judicial proceedings, costs; Dispute Resolution Boards; Lok Adalats.

UNIT-IV	ENGAGEMENT OF LABOUR AND LABOUR & OTHER CONSTRUCTION-RELATED LAWS	Classes: 12

Role of Labour in Civil Engineering; Methods of engaging labour- on rolls, labour sub-contract, piece rate work; Industrial Disputes Act, 1947; Collective bargaining; Industrial Employment (Standing Orders) Act, 1946; Workmen's Compensation Act, 1923; Building & Other - Construction Workers (regulation of employment and conditions of service) Act (1996) and Rules (1998); RERA Act 2017, NBC 2017.

UNIT-V	LAW RELATING TO INTELLECTUAL PROPERTY	Classes: 12

Introduction – meaning of intellectual property, main forms of IP, Copyright, Trademarks, Patents and Designs, Secrets; Law relating to Copyright in India including Historical evolution of Copy Rights Act, 1957, Meaning of copyright – computer programs, Ownership of copyrights and assignment, Criteria of infringement, Piracy in Internet – Remedies and procedures in India; Law relating to Patents under Patents Act, 1970.

TEXT BOOKS

1. R. Subramanian - Professional Ethics, Oxford University Press, 2015.
2. Ravinder Kaur - Legal Aspects of Business, 4th edition, Cengage Learning, 2016.

REFERENCE BOOKS

1. RERA Act, 2017.
2. Wadhera - Intellectual Property Rights, Universal Law Publishing Co., 2004.
3. T. Ramappa - Intellectual Property Rights Law in India, Asia Law House, 2010.
4. O.P. Malhotra - Law of Industrial Disputes, N.M. Tripathi Publishers.

WEB REFERENCES

1. Concepts of Intellectual Property Rights: https://nptel.ac.in/courses/110/105/110105139/
2. Copy rights: https://nptel.ac.in/courses/110/105/110105139/

E -TEXT BOOKS

1. http://libgen.rs/book/index.php?md5=CD6FF866EA24FA5A1AC3F10805EE5B11
2. http://libgen.rs/book/index.php?md5=13C4B3A45B1C95B4A388F94729CCCFBC

MOOCS COURSE

1. https://nptel.ac.in/courses/109/105/109105112/
2. https://nptel.ac.in/courses/109/106/109106148/
3. https://nptel.ac.in/courses/110/105/110105139/

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MICROWAVE AND OPTICAL COMMUNICATIONS LABORATORY

IV B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC703PC	B.Tech	0	0	4	2	40	60	100

COURSE OBJECTIVES

1. To understand Characteristics of reflex klystron.
2. To understand characteristic of gunn diodes
3. To understand the concepts of attenuation measurements.
4. To impart the knowledgeof VSWR measurement its formulation and utility
5. Understand the utility of Optical Fibers in Communications

COURSE OUTCOMES

Upon successful completion of the course, the student is able

1. Know the characteristic of reflex klystron and derive the its performance
2. To understand characteristic of gunn diodes
3. To understand the concepts of attenuation measurements.
4. To impart the knowledgeof VSWR measurement its formulation and utility
5. Understand the utility of optical fibers in communication

LIST OF EXPERIMENTS

Note: Any twelve of the following experiments

List of Experiments:

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation measurement
4. Directional coupler Characteristics.
5. Scattering parameters of wave guide components
6. Frequency measurement.
7. Impedance measurement
8. VSWR measurement
9. Characterization of LED.
10. Characterization of Laser Diode.
11. Intensity modulation of Laser output through an optical fiber.
12. Measurement of Data rate for Digital Optical link.
13. Measurement of Numerical Aperture of fiber cable.
14. Measurement of losses for Optical link

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TEXT BOOKS

1. Microwave Devices and Circuits– Samuel Y. Liao, Pearson, 3rd Edition, 2003.
2. Electronic Communications Systems- Wayne Tomasi, Pearson, 5th Edition

REFERENCE BOOKS

1. Optical Fiber Communication– Gerd Keiser, TMH, 4th Ed., 2008.
2. Microwave Engineering-David M. Pozar, John Wiley & Sons (Asia) Pvt Ltd., 1989, 3rd ., 2011Reprint.
3. Microwave Engineering- G.S.Raghuvanshi, Cengage Learning India Pvt. Ltd., 2012.
4. Electronic Communication System– George Kennedy, 6thEd., McGrawHill

WEB REFERENCES

1. https://www.khanacademy.org/science/physics/magnetic-forces-and-magnetic-fields/magnetic-field-current-carrying-wire/v/magnetism-6-magnetic-field-due-to-current

E -TEXT BOOKS

1. https://www.electrical4u.com

MOOCS COURSE

1. https://nptel.ac.in/courses/108106073/
2. https://nptel.ac.in/courses/108106073/7

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

RADAR SYSTEMS

(PE – V)

IV B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC811PE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To explore the concepts of radar and its frequency bands.
2. To understand Doppler effect and get acquainted with the working principles of CW radar, FM- CW radar.
3. To impart the knowledge of functioning of MTI and Tracking Radars.
4. To explain the designing of a Matched Filter in radar receivers.

COURSEOUTCOMES

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

1. Derive the complete radar range equation.
2. Understand the need and functioning of CW, FM-CW and MTI radars
3. Known various Tracking methods.
4. Derive the matched filter response characteristics for radar receivers.
5. Understand and Analyze the noise in Radar System

UNIT-I	BASICS OF RADAR	Classes: 12

Maximum Unambiguous Range, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications. Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Modified Radar Range Equation.

Radar Equation: SNR, Envelope Detector – False Alarm Time and Probability, Integration of Radar Pulses, Radar Cross Section of Targets, Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment).

UNIT-II	CW AND FREQUENCY MODULATED RADAR	Classes: 12

Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar.

FM-CW Radar: Range and Doppler Measurement, Block Diagram and Characteristics, FM-CW altimeter.

UNIT-III	MTI AND PULSE DOPPLER RADAR	Classes: 12

Principle, MTI Radar - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, Staggered PRFs. Range Gated Doppler Filters. MTI Radar Parameters, Limitations to MTI Performance, MTI versus Pulse Doppler Radar.

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UNIT-IV	TRACKING RADAR	Classes: 12
Tracking with Radar, Sequential Lobing, Conical Scan, Mono pulse Tracking Radar – Amplitude Comparison Mono pulse (one- and two- coordinates), Phase Comparison Mono pulse, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.		
UNIT-V	**DETECTION OF RADAR SIGNALS IN NOISE MATCHED FILTER RECEIVER**	**Classes: 12**
Detection of Radar Signals in Noise Matched Filter Receiver – Response Characteristics and Derivation, Correlation Function and Cross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise. Radar Receivers – Noise Figure and Noise Temperature, Displays – types. Duplexers – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Applications, Advantages and Limitations.		

TEXT BOOKS

1. Merrill I. Skolnik- Introduction to Radar Systems, 2nd Edition, TMH Special Indian Edition, 2007.

REFERENCE BOOKS

1. Byron Edde - Radar: Principles, Technology, Applications, Pearson Education, 2004.
2. Peebles, Jr., P.Z., Wiley - Radar Principles, New York, 1998.
3. Mark A. Richards, James A. Scheer, William A. Holm, Yesdee - Principles of Modern Radar: Basic Principles, 2013
4. Merrill I. Skolnik -Radar Handbook, 3rd Edition., McGraw-Hill Education, 2008.

WEB REFERENCES

1. https://www.nature.com/subjects/image-processing
2. http://image-sensors-world.blogspot.com/
3. https://www.pyimagesearch.com/Programme/image-processing/
4. https://www.mygreatlearning.com/blog/tag/image-processing/
5. https://blogs.mathworks.com/steve
6. https://www.ipol.im/

E -TEXT BOOKS

1. www.libgen.is
2. http://sdeuoc.ac.in/sites/default/files/sde_videos/Digital%20Image%20Processing%03rd%20ed.%20-%20R.%20Gonzalez%2C%20R.%20Woods-ilovepdf-compressed.pdf

MOOCS COURSE

1. https://www.mooc-list.com/course/fundamentals-digital-image-and-video-processing-coursera
2. https://classroom.udacity.com/courses/ud810
3. https://www.my-mooc.com/en/mooc/digital/
4. https://www.coursera.org/courses?languages=en&query=digital+image+processing
5. https://onlinecourses.nptel.ac.in/noc16_ec14/preview

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

5G AND BEYOND COMMUNICATIONS
(PE-V)

IV B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC812PE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To differentiate various mobile wireless technologies
2. To understand the design considerations for mm Wave

COURSEOUTCOMES

1. Understand the MIMO Communications
2. Able to differentiate various mobile wireless technologies
3. understand the design considerations for mm Wave
4. Able to identify the security issues occurring in cyber security

UNIT-I	MULTIPLE INPUT MULTIPLE OUTPUT (MIMO) COMMUNICATIONS	Classes: 12

Spatial Multiplexing, Spatial Diversity, Beamforming in MIMO systems, Hybrid Precoding, 5G Commun`ication Landscape, Related work on 5G.

UNIT-II	INTRODUCTION TO MOBILE WIRELESS TECHNOLOGY GENERATIONS	Classes: 12

5G, WISDOM, GIMVC, Requirements of 5G, standardization of WISDOM, Vision of 5G, WISDOM Concept and Challenges, Cellular D2D Communication, D2D Using Physical Layer Network Coding, Using FFR and Using Cognitive Radio.

SMNAT: Introduction, Network Architecture and the Process, Implementation of SMNAT for In-Band- D2D and Interoperability with WISDOM, Description of Network elements of SMNAT and Call Flow for Session Establishment.

UNIT-III	RADIO WAVE PROPAGATION FOR MM WAVE	Classes: 12

Introduction, Large-scale Propagation Channel Effects, Small-Scale Channel Effects, Spatial Characterization of Multipath and Beam Combing, Outdoor Channel Models, Indoor Channel Models.

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UNIT-IV	HIGHER LAYER DESIGN CONSIDERATIONS FOR mm WAVE	Classes: 12

Challenges when Networking Mm Wave Devices, Beam Adaptation Protocols, Relaying for Coverage Extension, Support for Multimedia Transmission, Multiband considerations, Performance of Cellular networks, Mm Wave Standardization: ECMA-387, IEEE 802.11ad.

UNIT-V	BEYOND 2020	Classes: 12

Major Challenges Surrounding Future Cyber Security, Users Awareness, Spectrum Related Security Issues in CRNs. Challenges for 2020 and beyond, Future Mobile Technologies, High Altitude Stratospheric Platform Station Systems, Human Bond Communications, CONASENSE.

TEXT BOOKS

1. Ramjee Prasad, 5G: 2020 and Beyond, River Publishers
2. T. S. Rappaport, R. W. Heath Jr., R. C. Daniels, and J. M. Murdock, Millimetre Wave Wireless Communication, Pearson Education, 2015.

REFERENCE BOOKS

1. M. Manish, G. Devendra, P. Pattanayak, and N. Ha, 5G and Beyond Wireless Systems PHY Layer Perspective, Springer Series in Wireless Technology
2. M. Vaezi, Z. Ding, and H. V. Poor, Multiple Access techniques for 5G Wireless Networks and Beyond, Springer Nature,Switzerland, 2019.

WEB REFERENCES

1. https://onlinelibrary.wiley.com/doi/book/10.1002/9781119089469
2. http://ieeexplore.ieee.org/document/7948772/
3. http://www.eitc.org/research-opportunities/5g-and-beyond-mobile-wireless-technology
4. https://www.mpirical.com/blog/5g-and-satellite-communications

E -TEXT BOOKS

1. https://library.oapen.org/bitstream/handle/20.500.12657/76277/978-981-99-3668-7.pdf?sequence=1
2. https://www.riverpublishers.com/pdf/ebook/RP_E9788793379787.pdf
3. https://pce-fet.com/common/library/books/50/6998_[Jonathan_Rodriguez]_Fundamentals_of_5G_Mobile_N et(b-ok.org).pdf

MOOCS COURSE

1. https://archive.nptel.ac.in/noc/courses/noc21/SEM2/noc21-ee102/
2. https://onlinecourses.nptel.ac.in/noc23_ee61/preview
3. https://www.digimat.in/nptel/courses/video/108105179/L28.html
4. https://www.youtube.com/watch?v=xa_kghtt10g

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MACHINE LEARNING

(PE-V)

IV B. TECH- II ISEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC813PE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To introduce the foundations of Artificial Neural Networks
2. To acquire the knowledge on Deep Learning Concepts
3. To learn various types of Artificial Neural Networks
4. To gain knowledge to apply optimization strategies

COURSEOUTCOMES

1. Ability to understand the concepts of Neural Networks
2. Ability to select the Learning Networks in modeling real world systems
3. Ability to use an efficient algorithm for Deep Models
4. Ability to apply optimization strategies for large scale applications

UNIT-I	ARTIFICIAL NEURAL NETWORKS	Classes: 12

Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks-Introduction to various networks.

UNIT-II	UNSUPERVISED LEARNING NETWORK	Classes: 12

Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks-Introduction to various networks.

UNIT-III	LINEAR MODELS	Classes: 12

Linear Basis Function Models -Maximum likelihood and least squares, Geometry of least squares , Sequential learning, Regularized least squares, Multiple outputs , The Bias-Variance Decomposition, Bayesian Linear Regression -Parameter distribution, Predictive, Equivalent, Bayesian Model Comparison, Probabilistic Generative Models-Continuous inputs, Maximum likelihood solution, Discrete features, Exponential family, Probabilistic Discriminative Models -Fixed basis functions, Logistic regression, Iterative reweighted least squares, Multiclass logistic regression, Probit regression, Canonical link functions

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UNIT-IV	KERNEL METHODS	Classes: 12

Constructing Kernels, Radial Basis Function Networks - Nadaraya-Watson model, Gaussian Processes -Linear regression revisited, Gaussian processes for regression, Learning the hyper parameters, Automatic relevance determination, Gaussian processes for classification, Laplace approximation, Connection to neural networks, Sparse Kernel Machines- Maximum Margin Classifiers, Overlapping class distributions, Relation to logistic regression, Multiclass SVMs, SVMs for regression, Computational learning theory, Relevance Vector Machines- RVM for regression, Analysis of sparsity, RVM for classification

UNIT-V	GRAPHICAL MODELS	Classes: 12

Bayesian Networks, Example: Polynomial regression, Generative models, Discrete variables, Linear-Gaussian models, Conditional Independence- Three example graphs, D-separation, Markov Random Fields -Conditional independence properties, Factorization properties, Illustration: Image de-noising, Relation to directed graphs, Inference in Graphical Models- Inference on a chain, Trees, Factor graphs, The sum-product algorithm, The max-sum algorithm, Exact inference in general graphs, Loopy belief propagation, Learning the graph structure.

TEXT BOOKS

1. C. Bishop -Pattern Recognition and Machine Learning- -Springer, 2006.
2. Neural Networks and Learning Machines, Simon Haykin, 3rd Edition, Pearson Prentice Hall.

REFERENCE BOOKS

1. Nils J. Nilsson -Introduction to machine learning, Stanford University Stanford.
2. William J. Deuschle – Undergraduate Fundamentals of Machine Learning, thesis Harvard College, Cambridge.
3. Shai Shalev-Shwartz, Shai Ben-David- Understanding Machine Learning, From theory to Algorithms, Cambridge University press, 2014

WEB REFERENCES

1. https://link.springer.com/article/10.1007/s42979-021-00592-x
2. https://www.techtarget.com/searchenterpriseai/definition/machine-learning-ML
3. https://www.geeksforgeeks.org/machine-learning/
4. https://www.w3schools.com/python/python_ml_getting_started.asp

E -TEXT BOOKS

1. https://alex.smola.org/drafts/thebook.pdf
2. https://bmansoori.ir/book/Machine%20Learning%20For%20Absolute%20Beginners.pdf
3. https://www.cs.huji.ac.il/~shais/UnderstandingMachineLearning/understanding-machine-learnin theory-algorithms.pdf

MOOCS COURSE

1. https://nptel.ac.in/courses/106105077
2. http://www.digimat.in/nptel/courses/video/106106126/L01.html
3. https://www.youtube.com/watch?v=oV74Najm6Nc
4. https://www.pexels.com/search/videos/artificial%20intelligence/

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MULTIMEDIA DATABASE MANAGEMENT SYSTEMS

(PE – VI)

IV B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC821PE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To understand the basic concepts and the applications of database systems.
2. To master the basics of SQL and construct queries using SQL.
3. Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

COURSEOUTCOMES

1. Gain knowledge of fundamentals of DBMS, database design and normal forms
2. Master the basics of SQL for retrieval and management of data.
3. Be acquainted with the basics of transaction processing and concurrency control.
4. Familiarity with database storage structures and access techniques

UNIT-I	DATABASE SYSTEM APPLICATIONS	Classes: 12

A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the ER Model

UNIT-II	INTRODUCTION TO THE RELATIONAL MODEL	Classes: 12

Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views.

Relational Algebra, Tuple relational Calculus, Domain relational calculus.

UNIT-III	SQL	Classes: 12

Queries, Constraints, Triggers: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases.

Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal form

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UNIT-IV	TRANSACTION CONCEPT	Classes: 12

Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

UNIT-V	DATA ON EXTERNAL STORAGE	Classes: 12

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning, Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

TEXT BOOKS

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill 3rd Edition
2. Database System Concepts, Silberschatz, Korth, Mc Graw hill, V edition.

REFERENCE BOOKS

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
3. Introduction to Database Systems, C. J. Date, Pearson Education
4. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

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1. https://www.google.com/amp/s/www.geeksforgeeks.org/multimedia-database/amp/
2. https://en.m.wikipedia.org/wiki/Multimedia_database
3. https://www.tutorialspoint.com/multimedia-database-concepts
4. https://www.codingninjas.com/studio/library/multimedia-databae

E -TEXT BOOKS

1. https://ebooks.inflibnet.ac.in/csp4/chapter/multimedia-database/
2. https://www.libgen.is/search.php?req=Multimedia+database+management+&open=0&res=25&view=simple&phrase=1&column=title
3. https://books.google.co.in/books/about/Multimedia_Database_Management_Systems.html?id=zeNKPYnOuzEC
4. https://vdoc.pub/documents/multimedia-database-management-systems-p85b3dcjq0g0

MOOCS COURSE

1. https://www.coursera.org/courses?query=database%20management
2. https://www.udemy.com/topic/database-management/
3. https://onlinecourses.nptel.ac.in/noc19_cs46/preview
4. https://www.edx.org/learn/databases

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SYSTEM ON CHIP ARCHITECTURE
(PE – VI)

IV B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC822PE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To introduce the architectural features of system on chip.
2. To imbibe the knowledge of customization using case studies.

COURSEOUTCOMES

1. Expected to understand SOC Architectural features.
2. To acquire the knowledge on processor selection criteria and limitations
3. To acquires the knowledge of memory architectures on SOC.
4. To understands the interconnection strategies and their customization on SOC.
5. To understand about Processor Configuration.

UNIT-I	INTRODUCTION TO THE SYSTEM APPROACH	Classes: 12

System Architecture, Components of the system, Hardware & Software, Processor Architectures, Memory and Addressing. System level interconnection, An approach for SOC Design, System Architecture and Complexity.

UNIT-II	PROCESSORS	Classes: 12

Introduction, Processor Selection for SOC, Basic concepts in Processor Architecture, Basic concepts in Processor Micro Architecture, Basic elements in Instruction handling. Buffers: minimizing Pipeline Delays, Branches, More Robust Processors, Vector Processors and Vector Instructions extensions, VLIW Processors, Superscalar Processors

UNIT-III	MEMORY DESIGN FOR SOC	Classes: 12

Overview of SOC external memory, Internal Memory, Size, Scratchpads and Cache memory, Cache Organization, Cache data, Write Policies, Strategies for line replacement at miss time, Types of Cache, Split – I, and D – Caches, Multilevel Caches, Virtual to real translation, SOC Memory System, Models of Simple Processor – memory interaction.

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UNIT-IV	INTERCONNECT CUSTOMIZATION	Classes: 12

Inter Connect Architectures, Bus: Basic Architectures, SOC Standard Buses, Analytic Bus Models, Using the Bus model, Effects of Bus transactions and contention time. SOC Customization

UNIT-V	CONFIGURATION	Classes: 12

An overview, Customizing Instruction Processor, Reconfiguration Technologies, Mapping design onto Reconfigurable devices, Instance- Specific design, Customizable Soft Processor, Reconfiguration - overhead analysis and trade-off analysis on reconfigurable Parallelism.

TEXT BOOKS

1. Computer System Design System-on-Chip by Michael J. Flynn and Wayne Luk, Wiely India Pvt.Ltd
2. ARM System on Chip Architecture – Steve Furber –2nd Ed., 2000, Addison Wesley Professional

REFERENCE BOOKS

1. Design of System on a Chip: Devices and Components – Ricardo Reis, 1st Ed., 2004, Springer
2. Co-Verification of Hardware and Software for ARM System on Chip Design (EmbeddedTechnology) – Jason Andrews – Newnes, BK and CDROM
3. System on Chip Verification – Methodologies and Techniques –Prakash Rashinkar, Peter Paterson and Leena Singh L, 2001, Kluwer Academic Publishers

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2. http://image-sensors-world.blogspot.com/
3. https://www.pyimagesearch.com/Programme/image-processing/
4. https://www.mygreatlearning.com/blog/tag/image-processing/
5. https://blogs.mathworks.com/steve
   https://www.ipol.im/

E -TEXT BOOKS

1. www.libgen.is
2. http://sdeuoc.ac.in/sites/default/files/sde_videos/Digital%20Image%20Processing%203rd%20ed.%20-%20R.%20Gonzalez%2C%20R.%20Woods-ilovepdf-compressed.pdf

MOOCS COURSE

1. https://www.mooc-list.com/course/fundamentals-digital-image-and-video-processing-coursera
2. https://classroom.udacity.com/courses/ud810
3. https://www.my-mooc.com/en/mooc/digital/
4. https://www.coursera.org/courses?languages=en&query=digital+image+processing

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

WIRELESS SENSOR NETWORKS

(PE – VI)

IV B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC823PE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To acquire the knowledge about various architectures and applications of Sensor Networks
2. To understand issues, challenges and emerging technologies for wireless sensor networks
3. To learn about various routing protocols and MAC Protocols
4. To understand various data gathering and data dissemination methods
5. To Study about design principals, node architectures, hardware and software required for implementation of wireless sensor networks.

COURSEOUTCOMES

1. Analyze and compare various architectures of Wireless Sensor Networks
2. Understand Design issues and challenges in wireless sensor networks
3. Analyze and compare various data gathering and data dissemination methods.
4. Design, Simulate and Compare the performance of various routing and MAC protocol

UNIT-I	INTRODUCTION TO SENSOR NETWORKS	Classes: 12

Introduction to Sensor Networks, unique constraints and challenges, Advantage of Sensor Networks, Applications of Sensor Networks, Types of wireless sensor networks

UNIT-II	MOBILE AD-HOC NETWORKS (MANETS) AND WIRELESS SENSOR NETWORKS	Classes: 12

Mobile Ad-hoc Networks (MANETs) and Wireless Sensor Networks, Enabling technologies for Wireless Sensor Networks. Issues and challenges in wireless sensor networks

UNIT-III	ROUTING PROTOCOLS	Classes: 12

Routing protocols, MAC protocols: Classification of MAC Protocols, S-MAC Protocol, B-MAC protocol, IEEE 802.15.4 standard and ZigBee

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UNIT-IV	DISSEMINATION PROTOCOL FOR LARGE SENSOR NETWORK	Classes: 12

Dissemination protocol for large sensor network. Data dissemination, data gathering, and data fusion; Quality of a sensor network; Real-time traffic support and security protocols.

UNIT-V	DESIGN PRINCIPLES FOR WSNS	Classes: 12

Design Principles for WSNs, Gateway Concepts Need for gateway, WSN to Internet Communication, and Internet to WSN Communication. Single-node architecture, Hardware components & design constraints, Operating systems and execution environments, introduction to Tiny OS and nes C.

TEXT BOOKS

1. Ad-Hoc Wireless Sensor Networks- C. Siva Ram Murthy, B. S. Manoj, Pearson
2. Principles of Wireless Networks – Kaveh Pah Laven and P. Krishna Murthy, 2002, PE

REFERENCE BOOKS

1. Wireless Digital Communications – Kamilo Feher, 1999, PHI.
2. Wireless Communications-Andrea Goldsmith, 2005 Cambridge University Press.
3. Mobile Cellular Communication – Gottapu Sasibhushana Rao, Pearson Education, 2012.
4. Wireless Communication and Networking – William Stallings, 2003, PHI.

WEB REFERENCES

1. https://www.nature.com/subjects/image-processing
2. http://image-sensors-world.blogspot.com/
3. https://www.pyimagesearch.com/Programme/image-processing/
4. https://www.mygreatlearning.com/blog/tag/image-processing/
5. https://blogs.mathworks.com/steve

E -TEXT BOOKS

1. www.libgen.is
2. http://sdeuoc.ac.in/sites/default/files/sde_videos/Digital%20Image%20Processing%203rd%20ed.%20-%20R.%20Gonzalez%2C%20R.%20Woods-ilovepdf-compressed.pdf

MOOCS COURSE

1. https://www.mooc-list.com/course/fundamentals-digital-image-and-video-processing-coursera
2. https://classroom.udacity.com/courses/ud810
3. https://www.my-mooc.com/en/mooc/digital/
4. https://www.coursera.org/courses?languages=en&query=digital+image+processing
5. https://onlinecourses.nptel.ac.in/noc16_ec14/preview

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

FUNDAMENTALS OF INTERNET OF THINGS

(OE – I)

III B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC600OE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

The objectives of the course are to:

1. Make concepts of Internet of Things understandable to build IoT applications.
2. Teach the programming and use of Arduino and Raspberry Pi boards.
3. provide Knowledge about data handling and analytics in SDN.

COURSEOUTCOMES

Upon completing this course, the students will be able to

1. Know basic protocols in sensor networks.
2. Program and configure Arduino boards for various designs.
3. Python programming and interfacing for Raspberry Pi.
4. Design IoT applications in different domains.

UNIT-I	INTRODUCTION TO INTERNET OF THINGS	Classes: 12

Characteristics of IoT, Physical design of IoT, Functional blocks of IoT, Sensing, Actuation, Basics of Networking, Communication Protocols, Sensor Networks.

UNIT-II	MACHINE-TO-MACHINE COMMUNICATIONS	Classes: 12

Difference between IoT and M2M, Interoperability in IoT, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino.

UNIT-III	INTRODUCTION TO PYTHON PROGRAMMING	Classes: 12

Introduction to Python programming, Introduction to Raspberry Pi, Interfacing Raspberry Pi with basic peripherals, Implementation of IoT with Raspberry Pi.

UNIT-IV	IMPLEMENTATION OF IOT WITH RASPBERRY PI	Classes: 12

Implementation of IoT with Raspberry Pi: Introduction to Software defined Network (SDN), SDN for IoT, Data Handling and Analytics.

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UNIT-V	CLOUD COMPUTING	Classes: 12

Cloud Computing: Sensor-Cloud, Smart Cities and Smart Homes, Connected Vehicles, Smart Grid, Industrial IoT.

Case Study: Agriculture, Healthcare, Activity Monitoring

TEXT BOOKS

1. "The Internet 'of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)
2. "Make sensors": Terokarvinen, kemo, karvinen and villeyvaltokari, 1st edition, maker media, 2014.
3. "Internet of Things: A Hands-on Approach", by Arshdeep Bahga and Vijay Madisetti

REFERENCE BOOKS

1. Vijay Madisetti, Arshdeep Bahga, "Internet of Things: A Hands-On Approach"
2. Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice".
3. Beginning Sensor networks with Arduino and Raspberry Pi – Charles Bell, Apress, 2013

WEB REFERENCES

1. https://link.springer.com/chapter/10.1007/978-3-030-41110-7_1
2. https://en.wikipedia.org/wiki/Internet_of_things
3. https://www.oracle.com/in/internet-of-things/what-is-iot/
4. https://www.internetsociety.org/resources/doc/2015/iot-overview/\

E -TEXT BOOKS

1. https://www.routledge.com/Fundamentals-of-Internet-of-Things/Kumar/p/book/9781032126449
2. https://www.tableau.com/learn/articles/internet-of-things-books
   https://insights.btoes.com/top-10-internet-of-things-iot-books

MOOCS COURSE

1. https://www.mooc-list.com/tags/iot
2. https://www.my-mooc.com/en/categorie/internet-of-things
3. https://www.coursera.org/specializations/iot
4. https://onlinecourses.nptel.ac.in/noc19_cs65/preview

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

PRINCIPLES OF SIGNAL PROCESSING
(OE- I)

III B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC601OE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To give the basics of Signals and Systems required for all Engineering related courses.
2. To provide the basic characteristics of LTI systems.
3. To provide knowledge on signal transmission requirements.
4. To give basic understanding of signal statistical properties and noise source concepts.

COURSEOUTCOMES

Upon completing this course, the student will be able to:

1. Differentiate various signal functions.
2. Understand the characteristics of linear time invariant systems.
3. Understand the concepts of sampling theorem and signal to noise ratios.
4. Determine the Spectral and temporal characteristics of Signals.

UNIT-I	SIGNAL ANALYSIS	Classes: 12

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	SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS	Classes: 12

Signal Transmission through Linear Systems 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, Convolution and Correlation of Signals, Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution.

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UNIT-III	SAMPLING THEOREM	Classes: 12

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.

UNIT-IV	TEMPORAL CHARACTERISTICS OF SIGNALS	Classes: 12

Temporal characteristics of signals: Concept of Stationarity and Statistical Independence, First-Order Stationary Processes, Time Averages and Ergodicity, Cross Correlation and Auto Correlation of Functions, Properties of Correlation Functions, Cross-Correlation Function and Its Properties, Power Spectrum and its Properties, Relationship between Power Spectrum and Autocorrelation Function.

UNIT-V	NOISE SOURCES	Classes: 12

Noise sources: 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.

TEXT BOOKS

1. Signals, Systems & Communications - B.P. Lathi, B.S. Publications, 2013.
2. Probability, Random Variables & Random Signal Principles - Peyton Z. Peebles, TMH, 4 th Ed.,2001.

REFERENCE BOOKS

1. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawabi, 2 Ed.
2. Fundamentals of Signals and Systems - Michel J. Robert, MGH, 2008.
3. Random Processes for Engineers-Bruce Hajck, Cambridge unipress, 2015
4. Statistical Theory of Communication – S.P Eugene Xavier, New Age Publications, 2003

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

DIGITAL ELECTRONICS FOR ENGINEERING
(OE-I)

III B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC602OE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To provide basic understanding of properties and theorems of Boolean Algebra.
2. To provide knowledge on logic gates and universal gates.
3. To teach techniques to reduce the Boolean expressions using K map.
4. To give introduction to Logic families and different types Integrated circuits.

COURSEOUTCOMES

1. Get basic knowledge on logic gates, Universal gates and their switching logics.
2. Realize Boolean expressions using NAND/NOR gates and reduce them using K map.
3. Know all types of combinational and sequential circuits.
4. Acquire knowledge on realization of logic families using diodes and transistor.
5. A thorough understanding of operational amplifiers with linear integrated circuits.

UNIT-I	NUMBER SYSTEMS	Classes: 12

Number systems, Complements of Numbers, Codes- Weighted and Non- weighted codes and its Properties. 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

UNIT-II	MINIMIZATION OF BOOLEAN FUNCTIONS	Classes: 12

Minimization of Boolean functions: Karnaugh Map Method - Up to four Variables, Don't Care Map Entries, Tabular Method, Combinational Logic Circuits: Adders, Subtractors, Comparators, Multiplexers, Demultiplexers, Encoders, Decoders and Code converters, Hazards and Hazard Free Relations.

UNIT-III	SEQUENTIAL CIRCUITS FUNDAMENTALS	Classes: 12

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, Fundamentals of shift registers, ripple and decade counters.

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UNIT-IV	REALIZATION OF LOGIC GATES USING DIODES & TRANSISTORS	Classes: 12

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 tristate outputs, CMOS transmission gate,

UNIT-V	INTEGRATED CIRCUITS	Classes: 12

Integrated Circuits: Classification, chip size and circuit complexity, basic information of Op- amp, ideal and practical Op-amp, internal circuits, Op-amp characteristics, DC and AC Characteristics, 741 opamp and its features, modes of operation-inverting, non-inverting, differential.

TEXT BOOKS

1. Switching and Finite Automata Theory - ZviKohavi& Niraj K. Jha, 3rd Edition, Cambridge, 2010.
2. Modern Digital Electronics – R. P. Jain, 3rd Edition, 2007- Tata McGraw-Hill
3. Linear Integrated Circuits, D. Roy Chowdhury, New Age International(p) Ltd.
4. Op-Amps & Linear ICs, Ramakanth A. Gayakwad, PHI

REFERENCE BOOKS

1. Digital Design- Morris Mano, PHI, 4th Edition,2006
2. Operational Amplifiers & Linear Integrated Circuits, R.F. Coughlin & Fredrick F. Driscoll, PHI
3. Operational Amplifiers & Linear Integrated Circuits: Theory & Applications, Denton J. Daibey, TMH.

WEB REFERENCES

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

ELECTRONIC SENSORS
(OE - II)

IV B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC700OE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To teach the characterization of sensors.
2. to provide knowledge on working of Electromechanical, Thermal, Magnetic and radiation sensors
3. To provide basic Understanding of Electro analytic and smart sensors
4. provide different applications of sensors.

COURSEOUTCOMES

1. Upon completing this course, the student will be able to Learn about sensor Principle, Classification and Characterization.
2. Explore the working of Electromechanical, Thermal, Magnetic radiation and Electro analytic sensors.
3. Understand the basic concepts of Smart Sensors.
4. Design a system with sensors.
5. Learn about the smart sensors

UNIT-I	SENSORS/TRANSDUCERS	Classes: 12

Sensors / Transducers: Principles, Classification, Parameters, Characteristics, Environmental Parameters (EP), Characterization Electromechanical Sensors: Introduction, Resistive Potentiometer, Strain Gauge, Resistance Strain Gauge, Semiconductor Strain Gauges -Inductive Sensors: Sensitivity and Linearity of the Sensor – Types-Capacitive Sensors: Electrostatic Transducer, Force/Stress Sensors Using Quartz Resonators, Ultrasonic Sensors

UNIT-II	THERMAL SENSORS	Classes: 12

Thermal Sensors: Introduction ,Gas thermometric Sensors ,Thermal Expansion Type Thermometric Sensors ,Acoustic Temperature Sensor ,Dielectric Constant and Refractive Index thermo sensors ,Helium Low Temperature Thermometer ,Nuclear Thermometer ,Magnetic Thermometer, Resistance Change Type Thermometric Sensors, Thermo emf Sensors, Junction Semiconductor Types, Thermal Radiation Sensors, Quartz Crystal Thermoelectric Sensors, NQR Thermometry, Spectroscopic Thermometry, Noise Thermometry, Heat Flux Sensors

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UNIT-III	MAGNETIC SENSORS	Classes: 12
Magnetic sensors: Introduction, Sensors and the Principles Behind, Magneto-resistive Sensors, Anisotropic Magneto resistive Sensing, Semiconductor Magneto resistors, Hall Effect and Sensors, Inductance and Eddy Current Sensors, Angular/Rotary Movement Transducers, Synchros.		
UNIT-IV	**RADIATION SENSORS**	**Classes: 12**
Radiation Sensors: Introduction, Basic Characteristics, Types of Photo resistors/ Photo detectors, Xray and Nuclear Radiation Sensors, Fibre Optic Sensors Electro analytical Sensors: The Electrochemical Cell, The Cell Potential - Standard Hydrogen Electrode (SHE), Liquid Junction and Other Potentials, Polarization, Concentration Polarization, Reference Electrodes, Sensor Electrodes, Electro ceramics in Gas Media.		
UNIT-V	**SMART SENSORS**	**Classes: 12**
Smart Sensors: Introduction, Primary Sensors, Excitation, Amplification, Filters, Converters, Compensation, Information Coding/Processing - Data Communication, Standards for Smart Sensor Interface, the Automation Sensors –Applications: Introduction, On-board Automobile Sensors (Automotive Sensors), Home Appliance Sensors, Aerospace Sensors, Sensors for Manufacturing – Sensors for environmental Monitoring		

TEXT BOOKS

1. "Sensors and Transducers - D. Patranabis" –PHI Learning Private Limited., 2003.
2. Introduction to sensors- John veteline, aravindraghu, CRC press, 2011

REFERENCE BOOKS

1. Sensors and Actuators, D. Patranabis, 2nd Ed., PHI, 2013.
2. Make sensors: Terokarvinen, kemo, karvinen and villeyvaltokari, 1st edition, maker media,2014.
3. Sensors handbook- Sabriesoloman, 2nd Ed. TMH, 2009

WEB REFERENCES

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2. https://appmeas.co.uk/resources/sensor-reference-articles/
3. https://www.hindawi.com/journals/js/2019/6514520/
4. https://www.elsevier.com/journals/sensors-and-actuators-a-physical/0924-4247/guide-for-authors

E -TEXT BOOKS

1. https://link.springer.com/book/10.1007/b97321
2. https://www.quora.com/Which-is-the-best-book-for-learning-about-sensors-and-their-signal-conditioning
3. https://www.azosensors.com/book-index.aspx

MOOCS COURSE

1. https://www.mooc-list.com/tags/sensors
2. https://onlinecourses.nptel.ac.in/noc19_ee41/preview
3. https://www.coursera.org/learn/sensors-circuit-interface
4. https://www.my-mooc.com/en/mooc/iot-sensors-and-devices/

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ELECTRONICS FOR HEALTH CARE
(OE-II)

IV B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC701OE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To provide knowledge on Health care data
2. To demonstrate need of Electronics in Health Care.
3. To give basic knowledge on electronic equipments used in medical field.

COURSEOUTCOMES

1. Know about health care data and its conversion to information and to knowledge.
2. Acquire knowledge on (Electronic Health Records) EHRs and their Implementation.
3. Understand the working of electronic devices used for the patient monitoring.
4. Know the concepts of Telemedicine and therapeutic devices used inside the human body

UNIT-I	HEALTH CARE DATA, INFORMATION AND KNOWLEDGE	Classes: 12

Health care data, Information and Knowledge: Definitions and Concepts, Converting Data to Information to Knowledge, Clinical Data Warehouses, What makes Health Informatics Difficult, Why Health IT fails Sometimes, Terminology of Analytics, Challenges to Data Analytics, Research and application of analytics, Role of Informatics in analytics.

UNIT-II	ELECTRONIC HEALTH RECORDS	Classes: 12

Electronic Health Records: Introduction, Need for Electronic Health Records, Institute of Medicine's Vision for EHRs, Electronic Health Record Key Component, Electronic Prescribing, Electronic Health Record Adoption, Electronic Health Record Adoption and Meaningful use Challenges, Electronic Health Record Examples, Logical Steps to Selecting and Implementing an EHR

UNIT-III	PATIENT MONITORING SYSTEMS	Classes: 12

Patient Monitoring Systems: System Concepts, Cardiac Monitor, Bedside Patient Monitoring Systems, Central Monitors, Measurement of Heart Rate, Measurement of Pulse Rate, Blood Pressure Measurement, Measurement of Temperature, Measurement of Respiration Rate, Catheterization Laboratory Instrumentation.

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UNIT-IV	BIOMEDICAL TELEMETRY AND TELEMEDICINE	Classes: 12

Biomedical Telemetry and Telemedicine: Wireless Telemetry, Single Channel Telemetry Systems, Multi-channel Wireless Telemetry Systems, Multi-patient Telemetry, Implantable Telemetry Systems, Transmission of Analog Physiological Signals, Over Telephone, Telemedicine.

UNIT-V	THERAPEUTIC DEVICES	Classes: 12

Therapeutic devices: Need for Cardiac Pacemaker, Implantable Pacemakers, DC Defibrillator, Electronics in the Anaesthetic Machine.

TEXT BOOKS

1. Robret E. Hoyt MD FACP "Health Informatics" sixth edition 2007.
2. R. S. Kandpur "Biomedical Instrumentation Technology and Applications" second edition Tata McGraw-Hill.

REFERENCE BOOKS

1. Edward H. Shortlliffe, James J.Cimino "Biomedical Informatics, Computer applications in Health care and Biomedicine" third edition Springer.
2. G.V.R.K. Acharyulu, Bhimaraya Metri, L. Kalyan Viswanath REDDY "Health care and Hospital Management Contemporary Issues and Strategies".

WEB REFERENCES

1. https://www.mdpi.com/journal/sensors
2. https://appmeas.co.uk/resources/sensor-reference-articles/
3. https://www.hindawi.com/journals/js/2019/6514520/

E -TEXT BOOKS

1. L.A. Geoddes and L.E. Baker, Principles of Applied Biomedical Instrumentation, 3rd Edition, John Wiley and Sons, 1991.
2. R.S. Khandpur, Hand-book of Biomedical Instrumentation, 2nd Edition, McGraw-Hill, 2003.
3. Arun Ghosh, Introduction to measurements and instrumentation, 3rd Edition, PHI learning, 2010.
4. Joseph J.Carr and John M.Brown, "Introduction to Biomedical Equipment Technology", John Wiley and Sons, New York, 2004

MOOCS COURSE

1. https://nptel.ac.in/courses/108105101/
2. https://www.youtube.com/watch?v=jPimD3EzuiM&list=PLrX_pL1fvnTVLKlDGFAIyuwDhq-NEpK3f&index=4
3. https://www.youtube.com/watch?v=rloMKSphCM8&list=PLgMDNELGJ1CbufZjqWa8uoSlQWKqVwPN7&index=7
4. https://www.youtube.com/watch?v=LN0EHIPJvr8&list=PLgMDNELGJ1CbufZjqWa8uoSlQWKqVwPN7&index=5

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

TELECOMMUNICATIONS FOR SOCIETY

(OE - II)

IV B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC702OE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To introduce Telecommunications and its vast development.
2. To give knowledge on voice, Data and image transmission.
3. To treat with different types of noise/distortions that occur during transmissions.
4. To make topics like TV transmission by satellite and broadcasting understandable.

COURSEOUTCOMES

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

1. Understand the concepts of simplex, half duplex, and full duplex of one-way and two-way circuits.
2. Get knowledge on subscriber loop design and VF repeaters of voice telephony.
3. Get brief overview of video transmission and its broadcasting standardsin television transmission.
4. Know different of modes of television transmission.

UNIT-I	INTRODUCTORY TOPICS IN TELECOMMUNICATIONS	Classes: 12

Introductory Topics in Telecommunications: End-Users, Nodes, and Connectivities, Telephone Numbering and Routing, Use Of Tandem Switches in aLocal Area Connectivity, Introduction to the Busy Hour and Grade Of Service, Simplex, Half-Duplex, and Full Duplex, One-Way and Two-Way Circuits, Network Topologies, Variations in Traffic Flow, Quality Of Service, Standardization in Telecommunications, The Organization of the PSTN in the United States, Points Of Presence.

UNIT-II	QUALITY OF SERVICE AND TELECOMMUNICATION IMPAIRMENTS	Classes: 12

Quality of Service and Telecommunication Impairments: Objective, Quality of Service: Voice, Data, and Image, Signal-to-Noise Ratio, Voice Transmission, Data Circuits, Video (Television), The Three Basic Impairments and How They Affect the End-User, Amplitude Distortion, Phase Distortion, Noise Level, Typical Levels, Echo and Singing.

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UNIT-III	TRANSMISSION ASPECTS OF VOICE TELEPHONY	Classes: 12
Transmission Aspects of Voice Telephony: Definition of the Voice Channel, Operation of the Telephone Subset, Subscriber Loop Design, Design of Local Area Wire-Pair Trunks (Junctions), VF Repeaters (Amplifiers).		
UNIT-IV	**TELEVISION TRANSMISSION**	**Classes: 12**
Television Transmission: Background and Objectives, An Appreciation of Video Transmission, Critical Video Parameters, Video Transmission Standards (Criteria for Broadcasters), Methods of Program Channel Transmission, The Transmission of Video Over LOS Microwave, TV Transmission by Satellite Relay, Digital Television, Conference Television, Brief Overview of Frame Transport for Video Conferencing.		
UNIT-V	**COMMUNITY ANTENNA TELEVISION (CABLE TELEVISION)**	**Classes: 12**
Community Antenna Television (Cable Television): Objective and Scope, The Evolution of CATV, System Impairments and Performance Measures, Hybrid Fiber-Coax (HFC) Systems, Digital Transmission of CATV Signals, Two-Way CATV Systems, Two-Way Voice and Data over CATV Systems Based on the DOCSIS 2.0 Specification, Subsplit/Extended Subsplit Frequency Plan, Other General Information.		

TEXT BOOKS

1. 1. Roger L. Freeman "Fundamentals of Telecommunications" 2nd Edition, John Wiley & Sons Publications 2005.
2. Annabel Z. Dodd "The Essential Guide to Telecommunications" 5thEdition , Prentice Hall 2012.

REFERENCE BOOKS

1. JYRKI T. J. PENTTINEN "THE TELECOMMUNICATIONS HANDBOOK" John Wiley & Sons Publications 2015.
2. Prof. Dr. Muhammad EL-SABA "Telecommunications systems and data networks" 3rd Edition 2015.

WEB REFERENCES

1. https://www.umsl.edu/~joshik/msis480/chapt07.htm
2. https://www.tandfonline.com/toc/rics20/current
3. https://www.geeksforgeeks.org/telecom-networks/

E -TEXT BOOKS

1. Roger L. Freeman, 'Fundamentals of Telecommunications. 1999, DOI:10.1002/0471224162.
2. Paolo Bellavista and Robert Saracco, Telecommunication systems and technologies.
3. H. Nwana, Telecommunications, Media & Technology (TMT) for Developing Economies, London: Gigalen Press; 1st edition, 2014.

MOOCS COURSE

1. https://archive.nptel.ac.in/noc/courses/noc19/SEM1/noc19-ee06/
2. https://onlinecourses.nptel.ac.in/noc22_ee61/preview

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COMMUNICATION TECHNOLOGIES
(OE-III)

IV B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC800OE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To give an overview of Source-Destination communication.
2. To provide the different modes of communication technologies like wireless and cellular mobile networks.
3. To make familiar with the generations of communications like 1G, 2G, 3G, 4G and 5G.
4. To give brief explanation on security of network and its management.

COURSEOUTCOMES

Upon completing this course, the student will be able to

1. Understand the information theory and its coding styles.
2. Acquire knowledge on satellite communication and broadcasting services.
3. Know GSM, LTE and 5G mobile networks.
4. Know about network security through encryption and decryption.

UNIT-I	INFORMATION THEORY	Classes: 12

Information Theory: Shanon Capacity, Multimedia Data, Data Processing, Boolean Logics, Information Content, Entropy, Source Coding, Channel Coding, Modulation Schemes, Internet.

UNIT-II	WIRELESS COMMUNICATION TECHNOLOGIES	Classes: 12

Wireless Communication Technologies: WLAN, Wifi, Bluetooth, Other Wireless PAN And WAN Technologies, Satellite Communications, Broadcast Services.

UNIT-III	CELLULAR MOBILE NETWORKS	Classes: 12

Cellular Mobile Networks: GSM(2G), UMTS (3G), LTE(4G), 5G Mobile Networks, Mobile Network Planning Aspects.

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UNIT-IV	FREE SPACE OPTICAL COMMUNICATIONS	Classes: 12
Free Space Optical Communications: Optical Fiber, FTTC, FTTH, FTTBS, Free Space Optical Link, Channel Model with Different Factors, Deep Space Optical Communications.		
UNIT-V	**NETWORK SECURITY AND MANAGEMENT**	**Classes: 12**
Network Security and Management: Symmetrical Encryption, Asymmetrical Encryption, Authentication, Hash-Value, Integrity Check, Telecommunications Management Network, SNMP, Functionalities of Network Management, Trends and Future Development.		

TEXT BOOKS

1. Shun-Ping Chen, "Fundamentals of Information and Communication Technologies" 2020
2. B.P. Lathi, "Communication systems"- BS Publications, 2006.

REFERENCE BOOKS

1. Simon Haykin, John Wiley "Digital Communications" 2005.
2. Herbert Taub, Donald L Schilling Gautham Saha "Principles of Communication systems" 3rd edition McGraw-Hill 2008.

WEB REFERENCES

1. https://learn.g2.com/communication-technology.
2. https://journals.sagepub.com/doi/abs/10.1177/0002764208321338.
3. https://ieeexplore.ieee.org/abstract/document/8262021.
4. https://www.tutorialspoint.com/communication_technologies/communication_technologies_quick_guide.htm.

E -TEXT BOOKS

1. Everett M. Roger's, Communication Technology: The New Media in Society, Free Press, 1986.
2. August E. Grant, Communication Technology Update and Fundamentals, 18th Edition, Features & details, Technology Futures, Inc. 2022.

MOOCS COURSE

1. https://onlinecourses.swayam2.ac.in/cec21_ed10/preview
2. https://nptel.ac.in/courses/108104091
3. https://www.classcentral.com/course/swayam-communication-technologies-in-education-17545

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MEASURING INSTRUMENTS
(OE - III)

IV B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC801OE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To provide basic knowledge in transduction principles, sensors and transducer technology and measurement systems.
2. To provide better familiarity with the concepts of Sensors and Measurements.
3. To provide the knowledge of various measurement methods of physical parameters like velocity, acceleration, force, pressure and viscosity.

COURSEOUTCOMES

Upon Completion of this course the student is

1. Able to identify suitable sensors and transducers for real time applications.
2. Able to translate theoretical concepts into working models.
3. Able to understand the basics of measuring devices and use them in relevant situation.

UNIT-I	INTRODUCTION TO MEASUREMENTS	Classes: 12

Introduction to measurements: Physical measurement, Forms and methods of measurements, Measurement errors, Statistical analysis of measurement data, Probability of errors, Limiting errors, Standards, Definition of standard units, International standards, Primary standards, Secondary standards, Working standards, Voltage standard, Resistance standard, Current standard, Capacitance standard, Time and frequency standards.

UNIT-II	PASSIVE SENSORS RESISTIVE SENSORS	Classes: 12

Passive Sensors Resistive Sensors: Potentiometers, Strain Gages, Resistive Temperature Detectors (RTDs), Thermistors, Light-dependent Resistors (LDRs), Resistive Hygrometers, Capacitive Sensors: Variable capacitor, Differential capacitor, Inductive Sensors: Reluctance variation sensors, Eddy current sensors.

UNIT-III	METROLOGY	Classes: 12

Metrology: Measurement of length – Plainness – Area – Diameter – Roughness – Angle – Comparators – Gauge Blocks, Optical Methods for length and distance measurements. Velocity and Acceleration Measurement: Relative velocity – Translational and Rotational velocity measurements – Revolution counters and Timers - Magnetic and Photoelectric

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pulse counting stroboscopic methods, Accelerometers- different types, Gyroscopes- applications.

UNIT-IV	FORCE AND PRESSURE MEASUREMENT	Classes: 12

Force and Pressure Measurement: Gyroscopic Force Measurement – Vibrating wire Force transducer. Basics of Pressure measurement –Manometer types – Force-Balance and Vibrating Cylinder Transducers – High- and Low-Pressure measurement

UNIT-V	FLOW: DENSITY AND VISCOSITY MEASUREMENTS	Classes: 12

Flow: Density and Viscosity Measurements: Flow Meters- Head type, Area type (Rota meter), electromagnetic type, Positive displacement type, Density measurements – Strain Gauge load cell method – Buoyancy method. Units of Viscosity, Two float viscorator – Industrial consistency meter

TEXT BOOKS

1. Measurement Systems – Applications and Design – by Doeblin E.O., 4/e, McGraw Hill International, 1990.
2. Principles of Industrial Instrumentation – Patranabis D. TMH. End edition 1997.

REFERENCE BOOKS

1. Sensor Technology Hand Book – Jon Wilson, Newne 2004.
2. Instrument Transducers – An Introduction to their Performance and design – by Herman K.P. Neubrat, Oxford University Press.
3. Measurement system: Applications and Design – by E.O. Doeblin, McGraw Hill Publications.
4. Electronic Instrumentation by H.S. Kalsi.

WEB REFERENCES

1. https://www.osapublishing.org/josa/abstract.cfm?uri=josa-9-3-309
2. https://www.nist.gov/sri
3. https://iopscience.iop.org/journal/0957-0233
4. https://www.researchgate.net/publication/271498593_A_reference_model_of_an_instrument_for_quality_measurement_of_semantic_IS_standards

E -TEXT BOOKS

1. https://www.schandpublishing.com/books/tech-professional/electrical-engineering-electronics/electrical-measurements-measuring-instruments/9788121929639
2. https://www.britannica.com/technology/measurement
3. https://ec.europa.eu/growth/single-market/european-standards/harmonised-standards/measuring-instruments-mid_en

MOOCS COURSE

1. https://www.mooc-list.com/tags/electrical-instruments
2. https://www.classcentral.com/course/swayam-mechanical-measurement-systems-10084
3. https://nptel.ac.in/courses/112/107/112107242/
4. https://www.bcit.ca/free-online-learning/mooc-0371-metrology-the-science-of-measurement/

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

FUNDAMENTALS OF SOCIAL NETWORKS
(OE-III)

IV B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC802OE	B.Tech	3	0	0	3	40	60	100

COURSE OBJECTIVES

1. To give overview on social networks.
2. To make social media, information networks and world wide web concepts more familiar.
3. To provide knowledge on social network ties.
4. To provide knowledge on power laws related to information networks.

COURSEOUTCOMES

1. Understand concepts like small-world experiment and snowball sampling related to social networks.
2. Get knowledge on ties, weak ties and their strength.
3. Know about structure of the web, modern web search, link analysis using hubs.
4. Acquire knowledge on power laws and analysis of Rich-get-Richer phenomena.

UNIT-I	INTRODUCTION TO SOCIAL NETWORKS	Classes: 12

Introduction to social networks: The Empirical Study of Social Networks, Interviews and Questionnaires, Direct Observation, Data from Archival or Third-Party Records, Affiliation Networks, The Small-World Experiment, Snowball Sampling, Contact Tracing, and Random Walks.

UNIT-II	GRAPH THEORY AND SOCIAL NETWORKS	Classes: 12

Graph theory and Social Networks: Basic definitions, Paths and Connectivity, The strength of weak ties, Tie Strength and Network Structure in Large-Scale Data, Tie strength, social media, passive engagement.

UNIT-III	INFORMATION NETWORKS AND WORLD WIDE WEB	Classes: 12

Information networks and World Wide Web: The World Wide Web, Information Networks, Hypertext, and Associative Memory, The Web as a Directed Graph, The Bow-Tie Structure of the Web, the emergence of web 2.0, Searching the Web: The Problem of Ranking Link Analysis using Hubs and Authorities, PageRank, Applying Link Analysis in Modern Web Search.

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UNIT-IV	POWER LAWS AND RICH-GET-RICHER PHENOMENA	Classes: 12
Power Laws and Rich-Get-Richer Phenomena: Popularity as a Network Phenomenon, Power Laws, Rich-Get-Richer Models, The Unpredictability of Rich-Get-Richer Effects, The Long Tail, The Effect of Search Tools and Recommendation Systems, Advanced Material: Analysis of Rich-Get- Richer Processes.		
UNIT-V	**THE SMALL-WORLD PHENOMENON**	**Classes: 12**
The Small-World Phenomenon: Six Degrees of Separation, Structure and Randomness, Decentralized Search, Modeling the Process of Decentralized Search, Empirical Analysis and Generalized Models, Core-Periphery Structures and Difficulties in Decentralized Search, Advanced Material: Analysis of Decentralized Search.		

TEXT BOOKS

1. M. E. J. Newman "Networks an introduction" Oxford University Press 2010.
2. Networks, Crowds and Markets by David Easley and Jon Kleinberg, Cambridge University Press, 2010.

REFERENCE BOOKS

1. Social and Economic Networks by Matthew O. Jackson, Princeton University Press, 2010.
2. Maksim Tsvetovat and Alexander Kouznetsov. "Social Network Analysis for Startups". O'Reilly Media, 2011.

WEB REFERENCES

1. https://www.techtarget.com/whatis/definition/social-networking
2. https://www.investopedia.com/terms/s/social-networking.asp
3. https://faculty.ucr.edu/~hanneman/nettext/C7_Connection.html
4. https://www.lifewire.com/what-is-social-networking-3486513

E -TEXT BOOKS

1. https://freecomputerbooks.com/Introduction-to-Social-Network-Methods.html
2. https://2012books.lardbucket.org/books/management-principles-v1.1/s13-social-networks.html
3. https://www.libgen.is/book/index.php?md5=118FE000A6FEEF7041BD5AADE7FEB1C0
4. https://www.libgen.is/book/index.php?md5=FB0A0AAD1E10F66C931FF7594053F394

MOOCS COURSE

1. https://onlinecourses.nptel.ac.in/noc19_cs66/preview
2. https://www.coursera.org/learn/social-network-analysis
3. https://www.classcentral.com/course/swayam-social-networks-9920
4. https://www.udemy.com/course/socialnetwork/

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