COURSE STRUCTURE
AND
DETAILED SYLLABUS

ELECTRONICS & COMMUNICATION ENGINEERING

FOR

5 YEAR INTEGRATED DUAL DEGREE PROGRAM(I.D.P)

Leading to

(B.Tech& M.Tech)

(Applicable For The Batches Admitted From 2021-2022)

JNTUH COLLEGE OF ENGINEERING HYDERABAD
(AUTONOMUS)
KUKATPALLY, HYDERABAD-500085
TELANGANA, INDIA

J.N.T.U.H COLLEGE OF ENGINEERING HYDERABAD
(AUTONOMOUS)
B.TECH. FIVE YEAR DEGREE COURSE
(ELECTRONICS AND COMMUNICATION ENGINEERING)
COURSE STRUCTURE

I YEAR ISEMESTER

S.No.	Course Code	CourseTitle	L	T	P	Credits
1	BSC	Matrix Algebra and Calculus	3	1	0	4
2	ESC	Programming for Problem Solving	3	0	0	3
3	BSC	EngineeringChemistry	3	1	0	4
4	HSMC	English	2	0	0	2
5	ESC-LC	Programming for Problem Solving Lab	0	0	3	1.5
6	BSC-LC	EngineeringChemistryLab	0	0	2	1
7	HSMC-LC	EnglishLanguageandCommunicationSkillsLab	0	0	2	1
8	ESC-LC	EngineeringWorkshop practice	0	0	3	1.5
TotalCredits						18

IYEAR IISEMESTER

S.No.	Course Code	CourseTitle	L	T	P	Credits
1.	BSC	Applied and Multi Variable Calculus	3	1	0	4
2.	BSC	AppliedPhysics	3	1	0	4
3.	ESC	BasicElectricalEngineering	3	0	0	3
4.	ESC	EngineeringGraphics	1	0	3	2.5
5.	BSC-LC	AppliedPhysicsLab	0	0	3	1.5
6.	ESC-LC	BasicElectricalEngineering Lab	0	0	2	1
7.	ESC	Applied Python Programming Lab	0	1	2	2
TotalCredits						18

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II YEAR **I SEMESTER**

S.No.	Course Type	Subject	L	T	P	Credits
1	BSC	Electronic Devices and Circuits	3	1	0	4
2	PCC-1	Network Analysis & Transmission Lines	3	0	0	3
3	PCC-2	Signals and Systems	3	0	0	3
4	PCC-3	Switching Theory and Logic Design	3	1	0	4
5	PCC-4	Probability Theory and Stochastic Processes	3	1	0	4
6	ESC-LC	Electronic Devices and Circuits Lab	0	0	2	1
7	LC-1	Digital Logic Design Lab	0	0	2	1
8	LC-2	Modelling and Simulation Lab	0	0	2	1
9	*MC	Constitution of India	2	0	0	0
		Total	**17**	**03**	**06**	**21**

II YEAR **II SEMESTER**

S.No.	Course Type	Subject	L	T	P	Credits
1	BSC	Numerical Methods, Complex variables and Graphs	3	1	0	4
2	PCC-5	Electromagnetic Fields and Waves	3	0	0	3
3	PCC-6	Analog and Digital Communications	3	1	0	4
4	PCC-7	Linear and Digital Integrated Circuits	3	0	0	3
5	PCC-8	Analog and Pulse Circuits	3	1	0	4
6	LC-3	Analog and Digital Communications Lab	0	0	2	1
7	LC-4	Linear and Digital Integrated Circuits Lab	0	0	2	1
8	ESC-LC	Analog and Pulse Circuits Lab	0	0	2	1
9	*MC	Environmental Science	2	0	0	0
		Total	17	**03**	**06**	**21**

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III YEAR **I SEMESTER**

S.No.	Course Type	Subject	L	T	P	Credits
1	PCC-9	Digital Signal Processing	3	1	0	4
2	PCC-10	Microprocessors and Controllers	3	1	0	4
3	PCC-11	Control Systems	3	1	0	4
4	PEC-1	Professional Elective - 1	3	0	0	3
5	PEC-2	Professional Elective - 2	3	0	0	3
6	LC-5	Microprocessors and Controllers Lab	0	0	3	1.5
7	LC-6	Digital Signal Processing Lab	0	0	3	1.5
8	HSMC-LC	Advanced English Language and Communication Skills Lab	0	0	2	1
9	*MC	Introduction to Cyber security	0	0	2	0
		Total	**15**	**03**	**10**	**22**

III YEAR **II SEMESTER**

S.No.	Course Type	Subject	L	T	P	Credits
1	HSMC	Business Economics & Financial Analysis	3	0	0	3
2	PCC-12	Antennas and Propagation	3	1	0	4
3	PCC-13	Computer Networks	3	1	0	4
4	PCC-14	VLSI Design	3	1	0	4
5	OEC-1	Open Elective-1	3	0	0	3
6	LC-7	Computer Networks Lab	0	0	2	1
7	LC-8	VLSI Design Lab	0	0	3	1.5
8	LC-9	Communication Systems Lab for IOT	0	0	3	1.5
	*MC	Introduction to Artificial Intelligence	2	0	0	0
		Total	**17**	**03**	**06**	**22**

Summer between III & IV Year: Industry Oriented Mini Project

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COURSE STRUCTURE

IV YEAR **I SEMESTER**

S.No.	Course Type	Subject	L	T	P	Credits
1	PCC-15	Microwave Engineering	2	0	0	3
2	PEC-03	Professional Elective-3	3	0	0	3
3	PEC-04	Professional Elective-4	3	0	0	3
4	PEC-05	Professional Elective-5	3	0	0	3
5	OE-2	Open Elective -2	3	00	0	3
6	LC-10	Antennas and Microwave Devices lab	0	0	2	1
7	MINIPROJ	Mini Project(UG)/Summer Internship	0	0	4	2
8	PROJ	Project Stage-I	0	0	6	3
9	PGC-1	Wireless Communication & Networks	0	0	3	3
10	PGLAB-1	Scripting Language Lab	0	0	4	2
11	Seminar	Seminar	0	0	2	1
		Total	**14**	**0**	**21**	**21+5**

IV YEAR **II SEMESTER**

S.No.	Course Type	Subject	L	T	P	Credits
1	PGC-2	Advance DSP	3	0	0	3
2	PGC-3	Adaptive signal processing	3	0	0	3
3	PGE-1	PG Professional elective -1	3	0	0	3
4	PGE-2	PG Professional elective -2	3	0	0	3
5	PGE-3	PG Professional elective -3	3	0	0	3
6	PGLAB-2	Advance DSP Lab	0	0	4	2
7	MC	Research Methodology & IPR	2	0	0	2
8	PROJ	(UG) Project Stage-II	0	0	16	8
		Total	**17**	**0**	**20**	**27 (8UG+19PG)**

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COURSE STRUCTURE

V YEAR **I SEMESTER**

S.No.	Course Type	Subject	L	T	P	Credits
1	PGC-4	Transform Techniques	3	0	0	3
2	PGE-4	PG Professional elective -3	3	0	0	3
3	PGLAB-3	Advance communication Lab	0	0	4	2
4	PGOE	Open Elective	3	0	0	3
5	PROJ	(PG) Project Phase-I	0	0	20	10
		Total	**9**	**0**	**24**	**21**

V YEAR **II SEMESTER**

S.No.	Course Type	Subject	L	T	P	Credits
1	PROJ	(PG) Project Phase-II	0	0	32	16
		Total	**0**	**0**	**32**	**16**

Professional Elective – 1

1. Operating Systems
2. OOPS through Java
3. Data Analytics

Professional Elective - 2

1. Network Security and Cryptography
2. Artificial Neural Networks and Deep Learning
3. Electronic Measurements and Instrumentation

Professional Elective - 3

1. Digital Image Processing
2. Speech Signal Processing
3. Bio-Medical Signal Processing

Professional Elective –4

1. Micro-Chip fabrication Techniques
2. Low Power VLSI
3. Testing and Testability

Professional Elective - 5

1. Radar Systems
2. Satellite Communications
3. Optical Communications

PGProfessional Elective-1

1. RandomProcessandQueuingTheory
2. Bio-MedicalSignalProcessing
3. AdvancedDataCommunications
4. DetectionandEstimationTheory

PGProfessional Elective-2

1. DigitalSignalProcessorsandArchitectures
2. RadarSignalProcessing
3. VLSISignalProcessing
4. TCP/IPandATMNetworks

PGProfessional Elective-3

1. VideoProcessing
2. PatternRecognitionand MachineLearning
3. CodingTheoryandTechniques
4. SoftwareDefinedRadio

PGProfessional Elective-4

1. CommunicationTechnologies
2. SpreadSpectrumCommunications
3. Ad-hocandWirelessSensorNetworks
4. MultimediaandSignalCoding

OpenElective-1

SystemDesignthroughIoT

OpenElective-2

ElectronicSensors

PGOpenElective

PrinciplesofSignalProcessing

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COURSE STRUCTURE

B.TECH HONOURS COURSE

Stream 1: IC Design

1. Mixed Signal Design
2. System on Chip
3. Embedded RTOS
4. RF IC Design

Stream 2: Signal Processing

1. Advanced Digital Signal Processing
2. Digital Signal Processors
3. Transfer Techniques
4. RF Signal Processing

Stream 3: Communication

1. Detection and Estimation Theory
2. Coding Theory & Techniques
3. Next Generation Communications
4. Advanced Radar Techniques

*** Project-2 credits**

MATRIX ALGEBRA AND CALCULUS

B.Tech I Year.I Sem

L	T	P	C
3	1	0	4

Pre-requisites: Mathematical Knowledge of 12^{th} / Intermediate level

Objectives: To learn

- Types of matrices and their properties.
- Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- Concept of Eigenvalues and Eigenvectors and to reduce the quadratic form to canonical form
- Methods of solving the differential equations of first and higher order.
- Geometrical approach to the mean value theorems and their application to the mathematical problems
- Evaluation of surface areas and volumes of revolutions of curves.
- Evaluation of improper integrals using Beta and Gamma functions.

Course Outcomes:

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

- Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations
- Find the Eigenvalues and Eigenvectors
- Reduce the quadratic form to canonical form using orthogonal transformations.
- Identify whether the given differential equation of first order is exact or not
- Solve higher differential equation and apply the concept of differential equation to real world problems
- Solve the applications on the mean value theorems.
- Evaluate the improper integrals using Beta and Gamma functions

UNIT-I: Matrices **10 L**

Matrices: Rank of a matrix: Echelon form, Normal form, System of linear equations: solving system of Homogeneous and Non-Homogeneous equations, Gauss-elimination method,

LU Decomposition method.

Linear Transformation and Orthogonal Transformation: Eigenvalues and Eigenvectors and their properties, Eigenvalues and Eigenvectors of Symmetric, Hermitian, Skew-Symmetric, Skew-Hermitian, Orthogonal and Unitary matrices.

UNIT-II: Diagonalization of a Matrix **8 L**

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: Mean value theorems and Beta, Gamma functions **10 L**

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. (All theorems without proof).

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: First Order ODE **10 L**

Exact differential equations, converting non-exact equations to exact equations, Linear and Bernoulli's differential equations. Applications: Newton's law of cooling, Law of natural growth and decay, orthogonal trajectories and electrical circuits. First order equations with higher degree: solvable for the differential coefficient, dependent variable and Independent variable.

UNIT-V: Ordinary Linear Differential Equations of Higher Order **10 L**

Second order linear differential equations with constant coefficients - Non-Homogeneous terms of the type $e^{ax}, \sin ax, \cos ax,$ polynomials in$x$, $e^{ax}V(x)$ and $xV(x)$ - method of variation of parameters, Equations reducible to linear ODE with constant coefficients, Legendre's equation, Cauchy-Euler equation. Applications: Bending of beams, Electrical circuits and simple harmonic motion.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley &Sons,2006.
3.

REFERENCES

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition,Pearson, Reprint, 2002.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, LaxmiPublications, Reprint, 2008.
3. RamanaB.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi,11thReprint, 2010.

PROGRAMMINGFORPROBLEMSOLVING

B.Tech I Year.I Sem	L	T	P	C
	3	0	0	3

Prerequisites:Nil

Course Objectives:

1. Tolearnthefundamentalsofcomputers.
2. TounderstandthevariousstepsinProgramdevelopment.
3. TolearnthesyntaxandsemanticsofCProgrammingLanguage.
4. Tolearntheusageofstructuredprogrammingapproachinsolvingproblems.

Course Outcomes:

Thestudentwilllearn

1. Towritealgorithmsandtodrawflowchartsforsolvingproblems.
2. Totranslatethealgorithms/flowchartstoprograms(inClanguage).
3. Tocodeandtest,a given logicinCprogramminglanguage.
4. Toformulatesimplealgorithmsforarithmeticandlogicalproblems.
5. Todecomposeaproblemintofunctions andtodevelopmodularreusablecode.
6. Tousearrays,pointers,stringsandstructurestoformulatealgorithmsandprograms.Searchingand sortingproblems.

UNIT–I:

IntroductiontoComputers: ComputerSystems,ComputingEnvironments,ComputerLanguages, Creating and running programs, Software Development Method, Algorithms, Pseudocode,flowcharts, applyingthesoftwaredevelopment method.

Introduction to C Language: Background, Simple C programs, Identifiers, Basic data types,Variables, Constants, Input / Output, Operators.Expressions, Precedence and Associatively,ExpressionEvaluation,Typeconversions,Bitwiseoperators,Statements,SimpleCProgrammingexamples.

UNIT–II:

Statements: if and switch statements, Repetition statements – while, for, do-while statements,Loopexamples,otherstatementsrelatedtolooping– break,continue,goto,SimpleCProgrammingexamples.

DesigningStructuredPrograms: Functions,basics,userdefinedfunctions,interfunctioncommunication, Scope, Storage classes-auto, register, static, extern, scope rules, type qualifiers,recursion- recursivefunctions, Preprocessorcommands, exampleCprograms

UNIT–III:

ArraysandStrings: Concepts,usingarraysinC,interfunctioncommunication,arrayapplications, two – dimensional arrays, multidimensional arrays, C program examples. Concepts,CStrings,StringInput/Outputfunctions,arraysofstrings,stringmanipulationfunctions,string /dataconversion,Cprogramexamples.

UNIT–IV:

Pointers: Introduction (Basic Concepts), Pointers for inter function communication, pointers topointers,compatibility,memoryallocationfunctions,arrayofpointers,programmingapplications,pointers tovoid,pointersto functions,command –linearguments.

InputandOutput: Conceptofafile,streams,standardinput/outputfunctions,formattedinput / output functions, text files and binary files, file input / output operations, file status functions(errorhandling), C program examples.

UNIT–V:

Derived types: Structures – Declaration, definition and initialization of structures, accessingstructures, nested structures, arrays of structures, structures and functions, pointers to structures,self-referentialstructures,unions,typedef,bitfields,enumeratedtypes,Cprogrammingexamples.

SortingandSearching: Selection sort, Bubble sort, Insertion sort, Linear search andBinarysearchmethods.

TEXT BOOKS:

1. CProgramming&DataStructuresbyB.A.ForouzanandR.F.Gilberg,ThirdEdition,CengageLearning.
2. ProblemSolvingandProgramDesigninCbyJ.R.HanlyandE.B.Koffman,FifthEdition,PearsonEducation.
3. TheCProgrammingLanguagebyB.W.KernighanandDennisM.Ritchie,PHI/PearsonEducation

ReferenceBooks:

1. CforEngineersandScientistsbyH.Cheng,Mc.Graw-Hill InternationalEdition
2. DataStructuresusingCbyA.M.Tanenbaum,Y.Langsam,andM.J.Augenstein,PearsonEducation,PHI
3. CProgramming&Data StructuresbyP.Dey,MGhoshRThereja,OxfordUniversityPress

ENGINEERING CHEMISTRY

B.Tech I Year.I Sem

L	T	P	C
3	1	0	4

OBJECTIVES:

1. To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.
2. To acquire the knowledge of water treatment, electrochemistry and corrosion which are essential for the Engineers and in industry.
3. To acquire the skills pertaining to Polymers and Energy sources to apply them for various engineering fields etc.
4. To impart then knowledge of Engineering materials and their aspects useful for understanding material chemistry.

OUTCOMES: The basic concepts included in this course will help the student to gain:

1. Differentiate hard and soft water; solve the related problems on water purification and its significance in industry and daily life.
2. Understand the principles, concepts of electrochemistry and causes of corrosion, its consequences and methods to minimize corrosion to improve industrial designs.
3. The required skills to get clear concepts on polymers and energy sources and their applications to various engineering fields etc.
4. The knowledge of engineering materials such as Portland cement, white cement, concrete and lubricants etc.

Unit-I: Water and its treatment: (11 hours)

Introduction – hardness of water – Causes of hardness. Types of hardness: temporary and permanent. Expression and units of hardness. Estimation of hardness of water by complexometric method. Potable water and its specifications. Steps involved in treatment of water – Disinfection of water by chlorination, breakpoint chlorination, Ozonisation. Boiler troubles - Scale, Sludge, Priming, Foaming and Caustic embrittlement. Treatment of boiler feed water by Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water- Ion exchange process. Desalination of water – Reverse osmosis. Numerical problems based on Determination of hardness of water.

Unit-II: Electrochemistry and corrosion: (12 Hours)

Electrochemistry: Electrochemical cells – Cell, Electrode, electrode potential, standard electrode potential, Nernst equation-derivation and significance- Electrochemical series and its applications. Construction and functioning of Calomel, Quinhydrone and glass electrode. Determination of pH of a solution by using quinhydrone and glass electrode. Numerical problems. Potentiometric titrations. Batteries – Primary (Lithium cell) and secondary batteries (Lead – acid storage battery and Lithium ion battery).

Corrosion: Causes and effects of corrosion – Theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion. Galvanic corrosion, Concentration cell corrosion- water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anodic protection and impressed current cathodic methods. Surface coatings – metallic coatings – Methods of coatings - Hot dipping - galvanization, tinning. cementation, electroplating and electroless plating of copper.

Unit – III: Polymeric materials: (11 Hours)

Polymers: Definition, Monomer, functionality and degree of polymerisation. Classification – Types of Polymerisation - Addition & Condensation – Mechanisms of Polymerisation. Plastics: Definition, characteristics - Compounding and fabrication- Methods of Moulding - Thermoplastics and Thermosets – Preparation, properties and applications– PVC, Teflon and Bakelite. Fibres: Definition, Characteristics. Preparation, Properties and applications of Terylene, Nylon 6:6. Elastomers: Definition and characteristics. Natural rubber- structure, processing of latex, Vulcanisation. Preparation, properties and applications of BuNa-S and Butyl rubber. Conducting Polymers- Definition, Classification. Mechanism of conduction in Polyacetylene, Polyaniline & Applications. Biodegradable polymers - Concept, Synthetic and Natural polymers, Polylactic acid, Poly Vinyl alcohol, Nylon-2 and Nylon – 6. Applications and advantages of biodegradable polymers.

Unit – IV: Energy sources: (12 Hours)

Fuels: Definition, classification with examples. Calorific value. Determination of calorific value by Junker's gas Calorimeter. Characteristics of good fuel. Coal: Types- Analysis of coal- proximate analysis. Petroleum-Refining- Fractional distillation- composition, properties and uses of petrol, diesel and kerosene. Cracking-types, Moving bed catalytic cracking. Knocking - Octane and Cetane rating, Composition, characteristics and

uses of LPG, CNG. Biodiesel-Transesterification. Advantages. Hydrogen fuel- Production, storage, advantages and limitations. Combustion - Definition, Calculation of air required for the combustion of fuel, numerical problems related to calorific value and combustion.

Unit-V: Engineering Materials: (10 Hours)

Portland cement: Composition and constituents. Setting and hardening of cement, special cements- properties and uses of High alumina cement, White cement and water proof cement. RCC, Decay of Concrete. Refractories: Classification, Properties - Refractoriness, RUL, Chemical inertness and porosity. Characteristics of a good refractory. Engineering Applications. Failure of a refractory. Lubricants: functions of lubricants, Classification, Mechanism of Lubrication, Properties - Viscosity, Acid value, Flash & Fire point, Cloud & Pour point, Aniline point.

Text Book:

1. Engineering Chemistry – PC Jain and M Jain – Dhanpath Rai and Sons, New Delhi.

Reference Books:

1. Text book of Engineering Chemistry by Ramadevi, Venkata Ramana Reddy & Prashanth Rath, Cengage learning publications.
2. A text book of Engineering Chemistry by Thirumala Chary, Laxminarayana, Shashikala. Pearson Publications.

ENGLISH

B.Tech I Year.I Sem

L	T	P	C
2	0	0	2

INTRODUCTION

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic, and communicative competencies of Engineering students. In English classes, the focus would be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers use the prescribed text for detailed study. The students are encouraged to read the texts leading to reading comprehension and different known/unknown passages may be given for practice in the class. The time is utilized for working out the exercises given after each excerpt. Authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material are used to supplement exercises. *The focus in this syllabus is on skill development in the areas of Vocabulary, Grammar, Reading and Writing Skills and practice of language skills in various contexts.*

LEARNING OBJECTIVES

The course will help students to:

a. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
b. Develop study skills and communication skills in formal and informal situations.
c. Equip students to study engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.

Reading Skills

Objectives

1. To develop an awareness in students about the significance of silent reading and comprehension.
2. To develop students' ability to guess meanings of words from the context and grasp the overall message of the text, draw inferences, etc.,
3. To facilitate the students practice the sub-skills of reading viz., Skimming and Scanning the text, Intensive and Extensive Reading, Reading for Pleasure, Identifying the topic sentence, Inferring lexical and contextual meaning, Recognizing Coherence/Sequencing of Sentences.

☛ **NOTE:** *The students will be trained in reading skills using the prescribed texts for detailed study. They will be tested in reading comprehension of different 'unseen' passages which may be taken from authentic texts, such as magazines/newspaper articles.*

Writing Skills

Objectives

1. To bring an awareness in the students about the difference between formal and informal writing
2. To make students understand sentence structures and variations in process writing
3. To develop students' creativity in different disciplines of academic writing

SYLLABUS

The course content / study material is divided into **Five Units.**

Unit –I

Chapter entitled '***Presidential Address' by Dr. A.P.J. Kalam*** from ***"Fluency in English– A Coursebook for Engineering Students"*** published by Orient BlackSwan, Hyderabad

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes- Collocations
Grammar: Punctuation - Identifying Common Errors in Writing with reference to Articles.
Reading: Reading and its Importance- Techniques for Effective Reading.
Writing: Sentence Structures -Use of Phrases and Clauses in Sentences- Paragraph Writing - Creating Coherence and Cohesiveness.

Unit –II

Chapter entitled ***Satya Nadella: Email to Employees on his First Day as CEO*** from ***"Fluency in English– A Coursebook for Engineering Students"*** Published by Orient BlackSwan, Hyderabad.

Vocabulary: Synonyms and Antonyms – Homonyms, Homophones and Homographs
Grammar: Identifying Common Errors in Writing with Reference to Noun-Pronoun Agreement – Words with appropriate Prepositions - Phrasal Verbs
Reading: Improving Comprehension Skills – Techniques for Good Comprehension
Writing: Writing Formal Letters **–** Format - Letter of Complaint and Reply - Letter of Requisition and Reply.

Unit –III

Vocabulary: Acquaintance with Phrases from Foreign Languages (Latin/French) with a focus on usage in English
Grammar: Tenses - Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses
Reading: Sub-skills of Reading- Skimming and Scanning.
Writing: Job Application with Resume- Writing Introduction and Conclusion - Essay Writing.

Unit –IV

Chapter entitled ***'Good Manners' by J.C. Hill***from***Fluency in English – A Coursebook for Engineering Students"*** published by Orient BlackSwan, Hyderabad
Vocabulary: Standard Abbreviations in English – Idioms – One Word Substitutes
Grammar: Subject-Verb Agreement - Redundancies and Clichés in Oral and Written Communication – Sequence of Tenses.
Reading: Comprehension- Intensive Reading and Extensive Reading- Reading Practice – *'If'* by Rudyard Kipling.

Writing: Writing Practices - Information Transfer -Précis Writing.

Unit –V

Chapter entitled ***'Father Dear Father'* by Raj Kinger**from ***Fluency in English – A Coursebook for Engineering Students"*** Published by Orient BlackSwan, Hyderabad
Vocabulary: Technical Vocabulary and their Usage – Indian Colloquial Terms
Grammar: Common Errors in English
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 covered in the syllabus of ELCS Lab Course.***

- (**Note**: 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 the needs of the students in their respective colleges for effective teaching/learningin the class.)

COURSE OUTCOMES

Students will be able to:

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

PRESCRIBED TEXTBOOK:

1. ***"Fluency in English – A Coursebook for Engineering Students"*** byBoard of Editors**:**Hyderabad:Orient BlackSwan Pvt. Ltd. 2016. Print.

Suggested Reading:

(i) *Practical English Usage.* Michael Swan. OUP. 1995.
(ii) *Remedial English Grammar*. F.T. Wood. Macmillan.2007
(iii) *Contemporary English Grammar Structures and Composition*. David Green. Macmillan. 2010.
(iv) *Communication Skills*. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.

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PROGRAMMING FOR PROBLEM SOLVING LAB

B.Tech I Year.I Sem

L	T	P	C
0	0	3	1.5

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.

Outcomes

1. Write algorithms and to draw flowcharts for solving problems.
2. Translate the algorithms/flowcharts to programs (in C language).
3. Code and test a given logic in C programming language.
4. Formulate simple algorithms for arithmetic and logical problems.
5. Decompose a problem into functions and to develop modular reusable code.
6. Use arrays, pointers, strings and structures to formulate algorithms and programs.
7. Searching and sorting problems.

Week 1:

1. Write a C program to find the sum of individual digits of a positive integer.
2. Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.
3. Write a C program to generate the first n terms of the sequence.
4. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
5. Write a C program to find the roots of a quadratic equation.

Week 2:

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)

Week 3:

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

Week 4:

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.

Week 5:

16. Write a C program to generate Pascal's triangle.
17. Write a C program to construct a pyramid of numbers
18. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:

$1+x+x^2+x^3+\ldots\ldots\ldots\ldots+x^n$

For example: if n is 3 and x is 5, then the program computes 1+5+25+125.
Print x, n, the sum
Perform error checking.
For example, the formula does not make sense for negative exponents – if n is less than 0.

Have your program print an error message if n<0, then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal ? If so, test for them too.

Week 6:

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.

Week 7:

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.)

Week 8:

22. . i) Write a C program which copies one file to another.
    ii) Write a C program to reverse the first n characters in a file.

(Note: The file name and n are specified on the command line.)

23. . i)Write a C program to display the contents of a file.
    ii)Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

Week 9:

24. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
    i) Bubble sort ii) Selection sort iii) Insertion sort

Week 10:

25. Write C programs that use both recursive and non recursive functions to perform the following searching Operations for a Key value in a given list of integers:
    i) Linear search ii) Binary search

Textbooks:

1. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Fifth Edition, Pearson Education.
3. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

REFERENCES:

1. C for Engineers and Scientists, H.Cheng, Mc.Graw-Hill International Edition
2. Data Structures using C – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education / PHI
3. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press

ENGINEERING CHEMISTRY LABORATORY

B.Tech I Year.I Sem

L	T	P	C
0	0	2	1

I. Volumetric Analysis:

1. Estimation of Ferrous iron by Dichrometry method.
2. Estimation of Ferrous iron by Permanganometry method.
3. Estimation of Hardness of water by EDTA Complexometry method.

II. Conductometry:

1. Estimation of the concentration of an acid by Conductometry.

III. Potentiometry:

1. Estimation of the amount of Fe^{+2} by Potentiomentry.

IV. *p*H Metry:

1. Determination of an acid concentration using *p*H meter.

V. Preparations:

1. Preparation of Bakelite.
2. Preparation Nylon-6.

VI. Lubricants:

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

VII. Corrosion:

1. Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.

Recommended Books:

1. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
2. Laboratory Manual of Engineering Chemistry by Y. Bharathi Kumari & Jyotsna C, VGS Booklinks, Vijayawada, 2009.
3. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

Engineering Chemistry Lab Manual by Cengage Publications

ENGLISH LANGUAGE AND COMMUNICATION SKILLS (ELCS) LAB

B.Tech I Year.I Sem

L	T	P	C
0	0	2	1

The **EnglishLanguage 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.

Objectives

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

Learning Outcomes

Students will be able to:

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

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

a. Computer Assisted Language Learning (CALL) Lab

b. Interactive Communication Skills (ICS) Lab

Listening Skills:

Objectives

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

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

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

Speaking Skills:

Objectives

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts

- Oral practice
- Describing objects/situations/people
- Role play – Individual/Group activities
- Just A Minute (JAM) Sessions

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

Exercise – I

CALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening.

Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs- Consonant Clusters- Past Tense Marker and Plural Marker- *Testing Exercises*

ICS Lab:

Understand: Spoken vs. Written language- Formal and Informal English.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

Exercise – II

CALL Lab:

Understand: Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Sentence Stress – Intonation.
Practice: BasicRules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Sentence Stress – 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-the Interference of Mother Tongue (MTI).
Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation -*Testing Exercises*

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

Exercise – IV

CALL Lab:
Understand: Listening for General Details.
Practice: Listening Comprehension Tests - *Testing Exercises*

ICS Lab:
Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication- Presentation Skills.
Practice: Making a Short Speech – Extempore- Making a Presentation.

Exercise – V

CALL Lab:
Understand: Listening for Specific Details.
Practice: Listening Comprehension Tests -*Testing Exercises*

ICS Lab:
Understand: Group Discussion
Practice: Group Discussion

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:

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

System Requirement (Hardware component):
Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

i) Computers with Suitable Configuration
ii) High Fidelity Headphones

2. Interactive Communication Skills (ICS) Lab :

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

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, 8th 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).

REFERENCES:

1. Suzanna, R. *A Practical Course in English Pronunciation (with CD).* McGraw Hill Education. 2017. Print.

2. *Exercises in Spoken English*. Part 1, 2 and 3. CIEFL. Oxford University Press, 1997. Print.
3. Hancock, M. *English Pronunciation in Use*. *Intermediate Cambridge*: Cambridge University Press. 2009. Print.

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ENGINEERING WORKSHOP PRACTICE

B.Tech I Year.I Sem

L	T	P	C
0	0	3	1.5

Pre-requisites: Practical skill

Course Objectives: The objectives of this course is to acquire knowledge on the engineering trades.

i. To impart hands-on practice on Carpentry trade and skills.
ii. To impart hands-on practice on Fitting trade and skills
iii. To impart hands-on practice on Black Smithy trade and skills
iv. To impart hands-on practice on House Wiring trade and skills
v. To impart hands-on practice on Tin Smithy trade and skills
vi. To impart hands-on practice on Plumbing trade and skills

Note: At least two exercises to be done from each trade.

A. Carpentry
1. T-Lap Joint
2. Cross Lap Joint
3. Dovetail Joint

B. Fitting
1. Vee Fit
2. Square Fit
3. Half Round Fit

C. Black Smithy
1. Round rod to Square
2. S-Hook
3. Round Rod to Flat Ring

D. House Wiring
1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting

E. Tin Smithy
1. Taper Tray
2. Open Scoop
3. Funnel

F. Plumbing
1. Coupling Joint
2. Elbow Joint
3. T Joint

TEXT BOOKS:

1. Workshop Practice by B.L.Juneja CengageLearning
2. Elements of Workshop Technology–S. K.Hajra Choudhury and A. K. Hajra Choudhury.

APPLIED AND MULTIVARIABLE CALCULUS

B.Tech I Year.II Sem

L	T	P	C
3	1	0	4

Pre-requisites: Mathematical Knowledge of 12^{th} / Intermediate level

Objectives: To learn

- Concept, properties of Laplace transforms
- Solving ordinary differential equations using Laplace transforms techniques.
- Partial differentiation, concept of total derivative
- Finding maxima and minima of function of two and three variables.
- Evaluation of multiple integrals and their applications
- The physical quantities involved in engineering field related to vector valued functions
- The basic properties of vector valued functions and their applications to line, surface and volume integrals.

Course Outcomes:

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

- Use the Laplace transforms techniques for solving ODE's.
- Find the extreme values of functions of two variables with/ without constraints.
- Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and gravity for cubes, sphere and rectangular parallel piped

Evaluate the line, surface and volume integrals and converting them from one to another

UNIT-I: Laplace transforms: 8 L

Laplace Transforms; Laplace Transform of standard functions, first shifting theorem,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), solving Initial value problems by Laplace Transform method.

UNIT-II: Partial Derivatives and applications 10 L

Definitions of Limit and continuity.

Partial Differentiation, Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence, Maxima and minima of functions of two variables and three variables, method of Lagrange multipliers.

UNIT-III: Multiple Integration 10 L

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), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallel piped).

UNIT-IV: Vector Differentiation 10 L

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 10 L

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. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley &Sons,2006
3. M Apostol , Calculus vol-2, John Wiley & Sons

REFERENCES

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition,Pearson, Reprint, 2002
2. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
3. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

APPLIED PHYSICS

B.Tech I Year.II Sem **L T P C**
3 1 0 4

Course Objectives:

The course enables the student to understand:

1. Basic concepts of quantum physics required to deal with behavior of particles and waves.
2. Carrierconcentrationandrecombinationprocessof semiconductor materials.
3. Basic lasing action, various types of lasers and to learn fundamental concepts of Optical fibres.
4. Various polarization mechanisms in dielectric materials and explore the different types of magnetic materials.
5. The unique properties of Superconductors.

Course Outcomes:

The student should be able to gain the knowledge on:

1. Waveparticleduality and quantization of energylevels.
2. Fundamentals concepts of semiconductor technology.
3. Principles of Lasers and their categorization and properties and categorization of Optical fibres.
4. Characteristics ofdielectric andmagneticmaterials.
5. Various types of superconductors and their transport properties.

UNIT-I:QUANTUM MECHANICS: Introduction to quantum physics, Black body radiation,Planck's law, photoelectric effect, Compton effect, wave-particle duality, de Broglie hypothesis,Davisson andGermerexperiment, Heisenberg'suncertainty principle,Born's interpretation ofthe wave function, Schrodinger's time independent wave equation, particle in one dimensional potential box, potential barrier-tunneling effect.

UNIT-II:SEMICONDUCTOR PHYSICS: Intrinsic and extrinsic semiconductors:Estimationof carrier-concentration, Dependence of Fermi level on carrier-concentration and variation withtemperature, Carrier generation and recombination, Carrier transport: diffusion and drift, HallEffect, p-n junction diode: I-V Characteristics, Zener diode: I-V Characteristics, Bipolar JunctionTransistor(BJT):Construction,Principleofoperationandcharacteristics.

UNIT- III:LASERS AND FIBRE OPTICS

Lasers: Introduction, Laser Beam Characteristics, Interaction of light with matter and the three Quantum Processes, Einstein Coefficients and their relations, Light Amplification, Components of Laser, Three requirements for Lasing Action, Pumping Methods, Types of Lasers: Ruby Laser, He-Ne Laser, Semiconductor Laser, Applications of laser.

Fibre Optics: Introduction to Optical Fibre, Total Internal Reflection, Construction of optical fibre, Acceptance angle - Numerical Aperture, classification based on materials, Refractive index profile and mode propagation, Losses in Optical Fibre, Fibre Optic Communication System, Merits of Optical Fibres, Applications.

UNIT-IV:DIELECTRICANDMAGNETICMATERIALS

Dielectrics: Introduction, Basic definitions: Electric field, Electric flux density, Dielectric Constant, Polarization vector, Electric susceptibility, Polarizability, Relation between polaraization, susceptibility and dielectric constant, Effect of dielectric on the behavior of a capacitor, Calculation of polarizabilities:Electronic,IonicandOrientationPolarizations,Internalfieldsinasolid -Clausius-Mossottirelation, Piezoelectrics, Ferroelectrics and Pyroelectric materials.

Magnetism:Introduction,Bohrmagneton,classificationofDia,ParaandFerromagnetic materialsonthebasisofmagneticmoment,Hysteresiscurvebasedondomaintheory,Softand hardmagneticmaterials,Propertiesofanti-Ferroandferrimagnetic materials, magneto electrics, multi ferroics.

UNIT-V: SUPERCONDUCTIVITY

Introduction to Superconductivity, Low T_C superconductors, Properties of Superconductors: Zero electrical resistance, Persistent current, Critical temperature, Critical magnetic field, Critical current density, Perfect diamagnetism-Meissner effect, London penetration depth, Flux quantization, Entropy, Heat capacity, Isotope effect, Type-I and Type-II Superconductors, BCS Theory, Josephson Effect, High T_CSuperconductors, Applications.

TEXT BOOKS:

1. Principles of Physics, Jearl Walker, David Halliday and Robert Resnick-Wiley publications.
2. EngineeringPhysics, B.K.Pandey,S.Chaturvedi–Cengage Learing.
3. A text book of Engineering Physics, Dr. M. N Avadhanulu, Dr. P.G. Kshirsagar- S. Chand.

REFERENCES:

1. Engineering Physics, R. K. Gaur - S.L. Gupta, Dhanpat Rai & Sons
2. J.Singh,SemiconductorOptoelectronics:PhysicsandTechnology,McGraw-Hillinc.(1995).
3. IntroductiontoSolidStatePhysicsbyCharleskittel,wileystudentedition.
4. S.M.Sze,SemiconductorDevices:Physicsand Technology,wiley(2008).

BASIC ELECTRICAL ENGINEERING

B.Tech I Year.II Sem **L T P C**
3 0 0 3

Pre-requisites: --

Course Objectives:

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To import the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.

Course Outcomes:

- To analyze and solve electrical circuits using network laws and theorems.
- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines
- To introduce components of Low Voltage Electrical Installations

UNIT-I:
D.C. CIRCUITS
Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems.
Time-domain analysis of first-order RL and RC circuits.

UNIT-II:
A.C. CIRCUITS
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
Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT-IV:
ELECTRICAL MACHINES
Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor.
Construction and working of synchronous generators.

UNIT-V:
ELECTRICAL INSTALLATIONS
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. . P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.

REFERENCES:

1. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
2. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
3. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.
4.

ENGINEERING GRAPHICS

B.Tech I Year.II Sem

L	T	P	C
1	0	3	2.5

Pre-requisites: Nil

Course Objectives:

- To provide basic concepts in engineeringdrawing
- To impart knowledge about standard principles of orthographic projection ofobjects
- To draw sectional views and pictorial views ofsolids

Course Outcomes:

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

- Prepare working drawings to communicate the ideas andinformation.
- Read, understand and interpret engineeringdrawings.

UNIT–I:

INTRODUCTION TO ENGINEERING DRAWING:

Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Involute. Scales – Plain, Diagonal and Vernier Scales.

UNIT-II:

ORTHOGRAPHIC PROJECTIONS:

Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. —Auxiliary Planes.

UNIT–III:

Projections of Regular Solids – Auxiliary Views.

UNIT–IV:

Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere. Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone

UNIT–V:

ISOMETRIC PROJECTIONS:

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 Auto CAD: Basic principlesonly

TEXT BOOKS:

1. Engineering Drawing by N.D. Bhatt,Charotar
2. Engineering Drawing and Graphics by Rane and Shah, PearsonEdu.

REFERENCE BOOKS:

1. A Text Book of Engineering Drawing by Dhawan R K, S.Chand
2. Engineering Graphics with Auto CAD by James D Bethune, PearsonEdu.
3. Engineering Graphics by K R Mohan, Dhanpat Rai.
4. Text book on Engineering Drawingby KL Narayana, P Kannaih,Scitech

APPLIED PHYSICS LAB

B.Tech I Year.II Sem

L	T	P	C
0	0	3	1.5

Course Objectives: The course enables the students to understand:

1. The band concept of semiconductors, characterization of solar cell and LED.
2. The magnetic field strength along the axis of a electromagnet and to study the Hall effect.
3. The Photoelectric effect and characterization of Lasers and Optical fibres.
4. Resonance due to electrical waves and time constant of RC circuit.

Course Outcomes: Attheendofthecoursestudentswillbeable:

1. To gain the knowledge on photoelectronic devices such as semiconductors, solar cells and LED.
2. To understand the magnetic properties of electromagnets and combined effect of electric field and magnetic field on a semiconductor.
3. To understand the phenomena of photoelectric effect and principles of Lasers and Optical fibres.
4. To observe Resonance phenomena due to electrical waves using LCR circuits and to study the time constant of RC circuits using different resistor and capacitor combinations.

LISTOFEXPERIMENTS:

2. EnergygapofP-Njunctiondiode:Determination of energygapofasemiconductordiode.
3. SolarCell:V-ICharacteristicsofsolarcell.
4. Lightemittingdiode:V-IandP-Icharacteristicsoflightemittingdiode.
5. Stewart–Gee'sexperiment: Determinationof magnetic fieldalongtheaxisofacurrentcarryingcoil.
6. HallEffect:Determinationof Hallco-efficientofa givensemiconductor.
7. Photoelectriceffect:Determinationof workfunctionofa givenmaterial.
8. LASER: CharacteristicsofLASERsources.
9. Opticalfiber:Determinationof thebendinglosses ofOptical fibers.
10. LCRCircuit:QualityfactorofLCRCircuit.
11. R-CCircuit: TimeconstantofR-Ccircuit.
12. BJT:Characteristicsof NPN transistor.
13. Zenerdiode:TostudytheV-ICharacteristics, zener effect - doping concentration

Note: Any 8 experiments are to be performed by each student

BASIC ELECTRICAL ENGINEERING LAB

B.Tech I Year.II Sem

L	T	P	C
0	0	2	1

Pre-requisites: Basic Electrical Engineering

Course Objectives:

- To analyze a given network by applying various electrical laws and network theorems
- To know the response of electrical circuits for different excitations
- To calculate, measure and know the relation between basic electrical parameters.
- To analyze the performance characteristics of DC and AC electrical machines

Course Outcomes:

- Get an exposure to basic electrical laws.
- Understand the response of different types of electrical circuits to different excitations.
- Understand the measurement, calculation and relation between the basic electrical parameters
- Understand the basic characteristics of transformers and electrical machines.

List of experiments/demonstrations:

1. Verification of Ohms Law
2. Verification of KVL and KCL
3. Transient Response of Series RL and RC circuits for DC excitation
4. Transient Response of RLC Series circuit for DC excitation
5. Resonance in series RLC circuit
6. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
7. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single Phase Transformer
8. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
9. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)
10. Measurement of Active and Reactive Power in a balanced Three-phase circuit
11. Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
12. Torque-Speed Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
13. Performance Characteristics of a Three-phase Induction Motor
14. Torque-Speed Characteristics of a Three-phase Induction Motor
15. No-Load Characteristics of a Three-phase Alternator

TEXT BOOKS:

1. D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.

REFERENCES:

1. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
2. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
3. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.

APPLIED PYTHON PROGRAMMING LAB

B.Tech I Year.II Sem

L	T	P	C
0	1	2	2

LIST OF EXPERIMENTS

Cycle - 1

1. **Downloading and Installing Python and Modules**
   a) **Python 3 on Linux**
   Follow the instructions given in the URL https://docs.python-guide.org/starting/install3/linux/
   b) **Python 3 on Windows**
   Follow the instructions given in the URL https://docs.python.org/3/using/windows.html
   (Please remember that Windows installation of Python is harder!)
   c) **pip3 on Windows and Linux**
   Install the Python package installer by following the instructions given in the URL
   https://www.activestate.com/resources/quick-reads/how-to-install-and-use-pip3/
   d) **Installing numpy and scipy**
   You can install any python3 package using the command pip3 install <packagename>
   e) **Installing jupyterlab**
   Install from pip using the command pip install jupyterlab
2. **Introduction to Python3**
   a) Printing your biodata on the screen
   b) Printing all the primes less than a given number
   c) Finding all the factors of a number and show whether it is a *perfect* number, i.e., the sum of all its factors (excluding the number itself) is equal to the number itself
3. **Defining and Using Functions**
   a) Write a function to read data from a file and display it on the screen
   b) Define a boolean function *is palindrome*(<input>)
   c) Write a function *collatz(x)* which does the following: if x is odd, $x = 3x + 1$; if x is even, then $x = x/2$. Return the number of steps it takes for $x = 1$
   d) Write a function $N(m, s) = exp(-(x-m)^2/(2s^2))/sqrt(2\pi)s$ that computes the Normal distribution
4. **The package** numpy
   a) Creating a matrix of given order $m \times n$ containing *random numbers* in the range 1 to 99999
   b) Write a program that adds, subtracts and multiplies two matrices. Provide an interface such that, based on the prompt, the function (addition, subtraction, multiplication) should be performed
   c) Write a program to solve a system of n linear equations in n variables using matrix inverse
5. **The package** scipy **and** pyplot
   a) Finding if two sets of data have the same *mean* value
   b) Plotting data read from a file
   c) Fitting a function through a set a data points using *polyfit* function
   d) Plotting a histogram of a given data set
6. **The** strings **package**
   a) Read text from a file and print the number of lines, words and characters
   b) Read text from a file and return a list of all n letter words beginning with a vowel
   c) Finding a secret message hidden in a paragraph of text
   d) Plot a histogram of words according to their length from text read from a file

Cycle -2

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

Follow the instructions given in the URL https://www.raspberrypi.com/documentation/computers/getting-started.html

8. Accessing GPIO pins using Python
   a) Installing GPIO Zero library.
      First, update your repositories list:
      sudo apt update
      Then install the package for Python 3:
      sudo apt install python3-gpiozero
   b) Blinking an LED connected to one of the GPIO pin
   c) Adjusting the brightness of an LED

Adjust the brightness of an LED (0 to 100, where 100 means maximum brightness) using the in-built PWM wavelength.

9. Collecting Sensor Data
   a) DHT Sensor interface
   - Connect the terminals of DHT GPIO pins of Raspberry Pi.
   - Import the DHT library using ***import Adafruit_DHT***
   - Read sensor data and display it on screen.

ELECTRONIC DEVICESAND CIRCUITS

B.Tech II Year I Sem **L T P C**
3 1 0 4

Pre-

Requisites:PhysicsCourse

Objectives

1. Tointroducecomponentssuchasdiodes,BJTsandFETs.
2. Toknowtheapplicationsofcomponents.
3. Toknowtheswitchingcharacteristicsofcomponents.
4. Togiveunderstandingofvarioustypesofamplifiercircuits.

Course Outcomes

UponcompletionoftheCourse,thestudentswillbeableto:

1. Acquire the knowledge ofvarioussemiconductor devices and their use on real life.
2. Understandthe 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.

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

UNIT I

Diode and Applications: Diode - Static and Dynamic resistances, Equivalent circuit, DiffusionandTransitionCapacitances,DiodeApplications:Switch-Switchingtimes.

Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers WithCapacitive Filter,Clippers-Clippingattwoindependentlevels,Clampers-ClampingOperation,types,ClampingCircuitTheorem,Comparators.

UNIT II

BipolarJunctionTransistor(BJT): PrincipleofOperationandcharacteristics-CommonEmitter,Common Base, Common Collector Configurations, Operating point, DC & AC load lines, Transistor Hybridparametermodel,Determinationofh-parametersfromtransistorcharacteristics,Conversionofh-parameters.

UNIT III

Transistor Biasing and Stabilization : Bias Stability, Fixed Bias, Collector to Base bias, Self Bias, BiasCompensationusing Diodesand Transistors.

AnalysisandDesignofSmallSignalLowFrequencyBJTAmplifiers: AnalysisofCE,CC,CBAmplifiers and CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect ofcouplingandbypasscapacitorson CEAmplifier.

UNIT IV

Junction Field Effect Transistor: Construction, Principle of Operation, Pinch-Off Voltage, Volt-AmpereCharacteristic, Comparison of BJT and FET, Biasing of FET, FET as Voltage Variable Resistor, MOSFETConstruction anditsCharacteristicsinEnhancementandDepletionmodes.

UNIT V

FETAmplifiers: SmallSignalModel**,**AnalysisofCS,CD,CGJFETAmplifiers.

Special Purpose Devices: Zener Diode - Characteristics, Voltage Regulator;Principle of Operation - SCR,Tunneldiode,UJT, VaractorDiode.

TEXTBOOKS

1. ElectronicDevicesandCircuits-JacobMillman,McGrawHillEducation.
2. ElectronicDevicesandCircuitstheory–RobertL.Boylestead,LouisNashelsky,11th Edition,Pearson,2009**.**

REFERENCES

1. TheArtofElectrionics,Horowitz,3rd EditionCambridgeUniversityPress,2018
2. ElectronicDevicesandCircuits,DavidA.Bell–5th Edition,Oxford.
3. Pulse,DigitalandSwitchingWaveforms– J.Millman,H.TaubandMothikiS.PrakashRao,2Ed.,McGrawHill,2008.
4. ElectronicDevicesandCircuits,S.Salivahanan,N.SureshKumar,AVallvaraj,2nd Edition,TMH.

NETWORK ANALYSIS AND TRANSMISSION LINES

B.Tech II Year I Sem

L	T	P	C
3	0	0	3

Pre-Requisites:Ni

lCourse Objectives

1. TounderstandthebasicconceptsonRLCcircuits.
2. ToknowthebehaviorofthesteadystatesandtransientsstatesinRLCcircuits.
3. Tounderstandthetwoportnetworkparameters.
4. To study thepropagation,reflection and transmission of planewaves inbounded andunboundedmedia.

Course Outcomes

Uponsuccessfulcompletionofthecourse,studentswillbeableto:

1. GaintheknowledgeonbasicRLCcircuitsbehavior.
2. AnalyzetheSteadystateandtransientanalysisofRLCCircuits.
3. Characterizationoftwoportnetworkparameters.
4. AnalyzetheDesign aspect of transmissionlineparametersandconfigurations.

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

UNIT I

Network Topology, Basic cutset and tie setmatrices forplanar networks, Magnetic Circuits, Self andMutualinductances,dotconvention,impedance,reactanceconcept,Impedancetransformationandcoupledcircuits,co-efficientofcoupling,equivalentTforMagneticallycoupledcircuits,IdealTransformer.

UNIT II

Transient and Steady state analysisof RC, RL and RLC Circuits,Sinusoidal,Step and Square responses.2nd order series and parallel RLC Circuits, Root locus,damping factor,over damped,under damped,criticallydampedcases,qualityfactorandbandwidthforseriesandparallelresonance,resonancecurves.

UNIT III

Two port network parameters, Z, Y, ABCD, h and g parameters, Characteristic impedance, Image transferconstant, image and iterative impedance, network function, driving point and transfer functions – usingtransformed (S) variables, Poles and Zeros. Standard T, π, L Sections, Characteristic impedance, imagetransferconstants,Design ofAttenuators,impedancematchingnetwork.

UNIT IV

TransmissionLines-

I:Types,Parameters,TransmissionLineEquations,Primary&SecondaryConstants,EquivalentCircuit,CharacteristicImpedance,PropagationConstant,PhaseandGroupVelocities,Infinite Line Concepts, Lossless /Low Loss Characterization, Types of Distortion, ConditionforDistortionlessline,MinimumAttenuation,Loading - TypesofLoading.

UNIT V

Transmission Lines – II: Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR.λ/4, λ/2, λ/8 Lines – Impedance Transformations, Smith Chart – Configuration and Applications, SingleStubMatching.

TEXT BOOKS

1. NetworkAnalysis–VanVelKenBurg,3rdEd.,Pearson,2016
2. Networks,LinesandFields-JDRyder,PHI,2ndEdition,1999.

REFERENCES

1. ElectricCircuits–J.EdministerandM.Nahvi–
   Schaum'sOutlines,MCGRAWHILLEDUCATION,1999.
2. EngineeringCircuitAnalysis–WilliamHaytandJackEKemmerly,MGH,8th Edition,1993.
3. ElectromagneticswithApplications–JD.Kraus,5th Ed.,TMH
4. TransmissionLines–RichardCollier,CambridgeUniversityPress,2013.

SIGNALS AND SYSTEMS

B.Tech II Year I Sem

L	T	P	C
3	0	0	3

Pre-Requisites: Mathematics

Course Objectives

ThissubjectgivesthebasicsofSignalsandSystemsrequiredforallElectricalEngineeringrelatedcourses.
Theobjectivesofthissubjectareto:

1. Classifysignalsandsystemsandtheiranalysisintimeandfrequencydomains.
2. StudytheconceptsofdistortionlesstransmissionthroughLTIsystems,convolutionandcorrelationproperties.
3. UnderstandLaplaceandZ-transformstheirpropertiesforanalysisofsignalsandsystems.
4. IdentifytheneedforsamplingofCTsignals,typesandmeritsanddemeritsofeachtype.

Course Outcomes

Uponcompletingthiscourse,thestudentwillbeableto:

1. Characterize various signals,systemsandtheirtimeandfrequencydomainanalysis, using transform techniques.
2. Identifytheconditionsfortransmissionofsignalsthroughsystemsand conditions for physicalrealizationofsystems.
3. Understandthesignificanceofsampling theorem for baseband and band pass signals for various types of sampling and for different duty cycles.
4. Understandthe concept of correlation and PSD functions and their applications.

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

UNIT I

SignalAnalysis

Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonalfunctions, Mean Square Error, Closed or complete set of Orthogonal functions, Orthogonality in Complexfunctions, Classification of Signals and systems, Exponential and Sinusoidal signals, Concepts of Impulsefunction,UnitStepfunction,Signumfunction.

UNIT II

Fourierseries

RepresentationofFourierseries,Continuoustimeperiodicsignals,PropertiesofFourierSeries,Dirichlet'sconditions,TrigonometricFourierSeries andExponentialFourier Series,Complex Fourierspectrum.

FourierTransforms

Deriving Fourier Transform from Fourier series,Fourier Transform of arbitrary signal, Fourier Transformofstandardsignals,FourierTransformofPeriodicSignals,PropertiesofFourierTransform,FourierTransformsinvolvingImpulsefunctionandSignumfunction,IntroductiontoHilbertTransform.

UNIT III

SignalTransmissionthroughLinearSystems

Linear System,Impulse response,Response of aLinearSystem,ConceptofconvolutioninTimedomainandFrequencydomain,GraphicalrepresentationofConvolution. ExtractionofSignalfromNoisebyFiltering. Linear TimeInvariant(LTI) System,Linear Time Variant (LTV) System, Transfer function of a LTI System, Filter characteristic of LinearSystem, Distortion less

transmission through a system, Signal bandwidth, System Bandwidth, Ideal LPF,HPF, and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, RelationshipbetweenBandwidthandrisetime.ExtractionofSignalfromNoisebyFiltering

UNIT IV

LaplaceTransforms

Laplace Transforms (L.T), Inverse Laplace Transform, Concept of Region of Convergence (ROC) forLaplace Transforms, Properties of L.T, Relation between L.T and F.T of a signal, Laplace Transform ofcertainsignalsusingwaveformsynthesis.

Correlation

Auto Correlation and Cross Correlation Functions, Relation between Convolution and Correlation, Properties of Correlation Functions, Energy DensitySpectrum, Power Density Spectrum, Relation between Autocorrelation Function andEnergy/Power Spectral Density Function, Parseval's Theorem, Detection ofPeriodicSignalsinthepresenceofNoisebyCorrelation.

UNIT V

Samplingtheorem

Graphicalandanalyticalproof of Sampling Theorem for Base band/BandLimited and Band Pass Signals, Types of Sampling: ImpulseSampling,NaturalandFlattopSampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing,

Z–Transforms

ConceptofZ-TransformofaDiscreteSequence,DistinctionbetweenLaplace,FourierandZTransforms, Region of Convergence in Z-Transform, Constraints on ROC for various classes of signals,InverseZ-transform,PropertiesofZ-transforms.

TEXT BOOKS

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

REFERENCES

1. SignalsandSystems–SimonHaykinandVanVeen,Wiley2Ed.,
2. SignalsandSystems–A.RamaKrishnaRao,2008,TMH
3. FundamentalsofSignalsandSystems-MichelJ.Robert,2008,MGHInternationalEdition.
4. Signals,SystemsandTransforms-C.L.Philips,J.M.ParrandEveA.Riskin,3Ed.,2004,PE.

SWITCHING THEORY AND LOGIC DESIGN

B.Tech II Year I Sem **L T P C**
3 1 0 4

Pre-Requisites: EngineeringMathematics

Course Objectives

1. Tounderstandcommonformsofnumberrepresentationinlogiccircuits.
2. Tolearnbasictechniquesforthedesignofdigitalcircuitsandfundamentalconceptsusedinthedesignofdigitalsystems.
3. Tounderstandtheconceptsofcombinationallogiccircuitsandsequentialcircuits.
4. TounderstandtheRealizationofLogicGatesUsingDiodes&Transistors.

Course Outcomes

Uponcompletingthiscourse,thestudentwillbeableto
1. Acquire the knowledge onnumericalinformationindifferentformsandBooleanAlgebratheorems.
2. Define PostulatesofBooleanalgebraandtominimizecombinationalfunctions,and design the combinational circuits.
3. Designandanalyzesequentialcircuits for various cyclic functions.
4. Characterize logicfamiliesandanalyze them for the purpose of AC and DC parameters.

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

UNIT I
NumberSystems
Numbersystems,Conversion and ComplementsCodes-WeightedandNon-weightedcodesandtheir Properties,ParitycheckcodeandHamming code.
BooleanAlgebra
BasicTheoremsandProperties,SwitchingFunctions-CanonicalandStandardForms, Function Simplification using Theorems,DigitalLogicGates,EX-ORgates,UniversalGates,Two level NAND/NORrealization of Boolean Function, Multilevelrealization of Boolean Function.

UNIT II
Minimizationwith Theorems
KarnaaughMapMethod-UptofiveVariables,Don'tCareMapEntries,TabularMethod,
CombinationalLogicCircuit Design and Applications
Adders,Subtractors,comparators,Multiplexers,Demultiplexers,Encoders,Decoders and Codeconverters,Hazards and Hazards Free Relations.Practical aspects related to Combinational Logic Design- Fan-in and Fan-out,Propogation Delay.

UNIT III
SequentialCircuitsFundamentals
Architecturaldifference of Combinationaland Sequentialcircuits, SR Latch,Types of Traditional Clocked FlipFlops:SR, JK, JK Master Slave, D and T Type Flip Flops, Excitation Tables of allFlip Flops, Timing andTriggeringConsideration,ConversionfromonetypeofFlip-Flop toanother.

Design and Application of RegistersandCounters

Shift Registers–Left,Rightand BidirectionalShift Registers,Counters-RingandTwistedRingCounter,Frequency Devider,Pseudo Random Sequence generator,OperationofAsynchronousandSynchronousCounters.

UNIT IV

SequentialMachines

FiniteStateMachines,State Diagram,Analysis of Synchronous Sequential Circuits,Design Steps of Synchronous SequentialCircuits.SynthesisofSynchronousSequentialCircuits-SerialBinary Adder,SequenceDetector, Parity-bit Generator, Synchronous Modulo -N Counters.State minimization capabilities andlimitations,MealyandMooremodels.

UNIT V

RealizationofLogicGatesUsingDiodes&Transistors

AND,ORandNOTGatesusingDiodesandTransistors, DCTL,RTL,DTL, TTLandCMLLogicFamiliesand itsComparison,Classification ofIntegratedCircuits.Transfer characteristics of TTL,Various forms of TTL family LS,H,S,Open Collector logic,Tristate logic.

TEXT BOOKS

1. SwitchingandFiniteAutomataTheory-ZviKohavi&NirajK.Jha,3rdEdition,Cambridge,2010.
2. ModernDigitalElectronics–R.P.Jain,3rdedition,TataMcGraw-Hill,2007.

REFERENCE

1. DigitalDesign-MorrisMano,PHI,4thEdition,2006
2. IntroductiontoSwitchingTheoryandLogicDesign–FredriacJ.Hill,GeraldR.Peterson,3rdEd,JohnWiley& SonsInc.
3. FundamentalsofLogicDesign-CharlesH.Roth,CengageLearning,5th,Edition,2004.
4. SwitchingTheoryandLogicDesign–AAnandKumar,PHI,2013
5. An Engineering approach to Digital Design-William I.Fletcher,PHI,2013.

PROBABILITY THEORY AND STOCHASTIC PROCESSES

B.Tech II Year I Sem

L	T	P	C
3	1	0	4

Pre-

requisite:MathematicsCour

se Objectives

1. Thisgivesbasicunderstandingofrandomvariables and operations that can be performed on them.
2. ToknowntheSpectralandtemporalcharacteristicsofRandomProcess.
3. ToLearntheBasicconceptsof Information theory Noisesources and its representation for understanding its characteristics.

Course Outcomes

Uponcompletingthiscourse,thestudentwillbeableto

1. Perform operations on single and multiple Random variables.
2. DeterminetheSpectralandtemporalcharacteristicsofRandomSignals.
3. Characterize LTI systems driven by stationary random process by using ACFs and PSDs.
4. UnderstandtheconceptsofNoise and Information theory inCommunicationsystems.

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

UNIT I

Probability&Randomvariables: ProbabilityintroducedthroughSetsandRelativeFrequency:ExperimentsandSampleSpaces,DiscreteandContinuousSampleSpaces,Events,ProbabilityDefinitions and Axioms, Joint Probability,Conditional Probability,TotalProbability, Bay's Theorem,IndependentEvents.

RandomVariables-

Definition,ConditionsforaFunctiontobeaRandomVariable,Discrete,ContinuousandMixedRandomVariable,DistributionandDensityfunctions,Properties,Binomial,Poisson,Uniform,Gaussian,Exponential,Rayleigh,MethodsofdefiningConditioningEvent,Conditional Distribution,ConditionalDensityandtheirProperties.

Operations on single Random Variable: Expected Value of a RandomVariable, Function of a Random Variable,Moments about the Origin, Central Moments, Variance andSkew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, TransformationsofaRandomVariable-Monotonicand Non-monotonic Transformationsof ContinuousandDiscreteRandom Variable, Computer generation of a Random Variable of a given PDF/CDF.

UNIT II

Multiple random variables and Operations on Multiple random variables: Vector Random Variables,JointDistributionFunction and itsProperties,MarginalDistributionFunctions,ConditionalDistributionandDensity–Pointand Intervalconditioning,StatisticalIndependence,SumofTwoandmoreRandomVariables, CentralLimitTheorem,EqualandUnequalDistribution (Proof not expected).

ExpectedValueofaFunctionofRandom Variables-JointMomentsabouttheOrigin,JointCentralMoments,JointCharacteristicFunctions,Jointly Gaussian Random Variables: TwoRandom Variablescase,NRandomVariablecase,Properties,TransformationsofMultipleRandomVariables,LinearTransformationsofGaussian Random Variables.

UNIT III

Randomprocesses–Temporalcharacteristics: TheRandomProcessConcept,ClassificationofProcesses, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept ofStationarity andStatisticalIndependence.First-OrderStationary Processes,Second-OrderandWide-SenseStationarity,(N-Order)andStrict-SenseStationarity,TimeAveragesandErgodicity,Mean-ErgodicProcesses,Correlation-ErgodicProcesses,AutocorrelationFunctionandItsProperties,Cross-CorrelationFunction andItsProperties,Covariance Functions,GaussianRandom Processes,PoissonRandomProcess.RandomSignalResponseofLinearSystems:SystemResponse– Convolution,Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-CorrelationFunctionsof InputandOutput.

UNIT IV

Random processes – Spectral characteristics: The Power Spectrum: Properties, Relationship betweenPowerSpectrumandAutocorrelationFunction,TheCross-PowerDensitySpectrum,Properties,Relationship between Cross-Power Spectrum and Cross-Correlation Function. Spectral Characteristics ofSystem Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input andOutput.

UNIT V

Noisesources:

Resistive/ThermalNoiseSource,ArbitraryNoiseSources,EffectiveNoiseTemperature,Noiseequivalentband width,AverageNoiseFigures,AverageNoiseFigure of cascadednetworks,Narrow Bandnoise,Quadrature representation ofnarrow bandnoise &itsproperties.

Informationtheory: Entropy,Informationrate,Sourcecoding:Huffmancoding,ShannonFanocoding,Mutual information, Channel capacity of discrete channel, Shannon-Hartley law; Trade -off betweenbandwidthandSNR.

TEXT BOOKS

1. Probability,RandomVariables&RandomSignalPrinciples-PeytonZ.Peebles,TMH,4th Edition,2001.
2. PrinciplesofCommunicationsystemsbyTaubandSchilling(TMH),2008

REFERENCES

1. Probability,RandomVariablesandStochasticProcesses– AthanasiosPapoulisandS.UnnikrishnaPillai,PHI,4thEdition,2002.
2. RandomProcessesforEngineers-BruceHajck,Cambridgeunipress,2015
3. Probability Theory and Stochastic Processes for Engineers -K.N. Hari Bhat, K. Anitha Sheela and Jayanti Ganguly, Pearson Publishers, 1st Edition, 2011

ELECTRONIC DEVICES AND CIRCUITS LAB

B.Tech II Year I Sem

L	T	P	C
0	0	2	1

CO1:Acquire the knowledge ofvarioussemiconductor devices and their use in real life.

CO2:Understandthe design aspects of biasing and keep them in active region of the device for functional circuits

CO3: Acquire the knowledge about the role of special purpose devices and their applications.

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

ListofExperiments(Twelveexperimentstobedone):

DesignandSimulation followingusingMultisimorPspiceorEquivalentSimulationSoftware and verify Through experiment,

1. Draw the VI Characteristics of given PNJunctiondiode. Determine the Static and Dynamic resistance the Diode.
2. Determine the VI Characteristics of Zenerdiodeandalso Design voltageRegulator Circuit for the given voltage.
3. Determine the Ripplefactor,%Regulation PIV and TUF of the given Rectifierwith&withoutfilter.
4. Obtain the I/O Characteristics of CE,CB, CCconfigurations of BJT.Calculate h-parameters from the Characteristics.
5. Obtain theDrain and Transfer characteristicsofCD,CSconfiguration of JFET. Calculate gm, rd fromthe Characteristics.
6. Determine the VI Characteristics of SCR. Calculate Breakover voltage from theCharacteristics.
7. Obtain theVI Characteristics of UJT and identify the negative resistance region.
8. Perform an experiment to choose Q-point for a Transistor thatoperate in active region and Observe the affect of external Load resistance on Q-point.
9. Design a Self biasCircuit and determine the Q-point of the Transistor and its Stability factor by both simulation and realization with hardware components.
10. Design and Simulate a Common Drain Amplifier with voltage divider bias and determine the Stability factor.
11. By experiment prove that the voltage gain of Emitter Follower Circuit is one.
12. Design a Common Emitter Amplifier with a gain of 30db and Bandwidth of 10KHZ and plot the frequency response practically.

DIGITAL LOGIC DESIGN LAB

B.Tech II Year I Sem

L	T	P	C
0	0	2	1

Course Outcomes

Uponcompletingthiscourse,thestudentwillbeableto

1. Acquire the knowledge onnumericalinformationindifferentformsandBooleanAlgebratheorems.
2. Define PostulatesofBooleanalgebraandtominimizecombinationalfunctions,and design the combinational circuits.
3. Designandanalyzesequentialcircuits for various cyclic functions.
4. Characterize logicfamiliesandanalyze them for the purpose of AC and DC parameters.

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

ListofExperiments

The experiments with designing procedure should be simulated using HDL before hardware verification.
Fromexperiments 1 to 7 should be completed in 5 classes

1. RealizationofLogic circuit to generate r's Compliment usingLogicGates.
2. Realizationofgiven Boolean function using universalgates and minimizing the same.Compare the gate count before and after minimization.
3. Design and realize Full Adder circuit using gates/universalgates. Implement Full Subtractor using full adder.
4. Designinga2–bitComparator using AND,OR and NOT gates. Realize 4 – bit Comparator using 2–bitComparators.
5. Realize2:1MUXusing the given gates and Design 8:1using2:1MUX.
6. Implement the given Boolean function usingthe givenMUX(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. Verificationoftruthtables of flipflops using different clocks (level triggering,positive and negative edge triggering) also convert the given flipflop from one type to other.
11. Designing of Universal n-bit shift register using flipflops and Multiplexers.Draw the timing diagram of the Shift Register.
12. Design of Sychronous binary counter using D-flipflop/given flipflop.
13. Designing of counter for the given sequence using given flipflops.
14. Designing of MOD 8 Counter using JKflipflops.
15. Designing of sequence detecting StateMachine 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.

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MODELLING &SIMULATION LAB

II Year B.Tech.I Sem

L	T	P	C
0	0	2	1

Note:

- AlltheexperimentsaretobesimulatedusingMATLABorequivalentsoftware
- Minimumof12experimentaretobecompleted/Simulated.

CO1: Will be able to design an App for generating, analyzing and performing various operations on Signals/Sequences both in time and Frequency domain

CO2: Will be able to design an App for Analyzing and Characterizing Continuous and Discrete Time Systems both in Time and Frequency domain along with the concept of Sampling

CO3: Will be able to design an App for generating different Random Signals and analyze their Characteristics by finding different higher order Moments

CO4: Will be able to design an App for applying the Concepts of Deterministic and Random Signals for Noise removal Applications and on other Real Time Signals

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

ListofExperiments:

1. Design and App for generating various standard viz: PeriodicandAperiodic,**UNIT I**mpulse,UnitStep,Square,Sawtooth,Triangular,Sinusoidal,Ramp,Sinc and Non standard Signals and Sequences generated from these standard signals /sequences using Waveform synthesis. Also for perform different operations viz: Addition,Multiplication,Scaling,Shifting,Folding,Computationof EnergyandAveragePoweron them.
2. Design an App for findingtheEvenandOddpartsofSignal/SequenceandRealandImaginarypartsofSignal.
3. Design an App for finding the output of a System for a given input and Impulse Response
4. Design an App for finding Auto Correlation and Cross Correlation of Signals/sequences
5. Design an App for Verifying whether a given Continuous/ Discrete System is Linear, Time Invariant, Stable and Physically Realizable
6. Design an App for obtainingSinusoidal response from the Impulse response of a given Continuous/ Discrete LTI System. Plot the Real and Imaginary part and Magnitude and Phase Plot of the response
7. Design an App for finding and plotting the Magnitude and Phase Spectrum of any given Signal by finding its Fourier Transform by using the properties where ever required.
8. Design an App for finding and plotting the Magnitude and Phase Spectrum of any given Signal by finding its Laplace Transform by using the properties where ever required. Also plotpole-zerodiagraminS-plane
9. Design an App for finding and plotting the Magnitude and Phase Spectrum of any given Sequence by finding its Z- Transform by using the properties where ever required. Also plotpole-zerodiagraminZ-plane
10. Design a Simulink or equivalent model for solving Differential Equations
11. Design a Simulink or equivalent model for finding the response of any RLC Circuit with different initial Conditions for AC and DC inputs and plot the corresponding responses

12. Design an App for generating various Random Variables with different CDFs/PDFs
13. Design an App for generating Gaussiannoiseand for findingitsmean,Skewness,Kurtosis,PDFandPSD.
14. Design an App for Verifying Sampling theorem for different sampling rates, Sampling types and Duty Cycles and for plotting the sampled and reconstructed Signals.
15. Design an App for Removalofnoise from the signal using Crosscorrelation.
16. Design an App for ExtractionofPeriodicSignalmaskedbynoiseusing AutoCorrelation

Application on Real Time signals

1. Application of Autocorrelation: GPS Synchronization

Satellite communication toolbox is required for this experiment.

Generate the GPS signal. Visualize the GPS signal. Plot of autocorrelation of C/A code and visualize the spectrum of GPS signals. For exact steps, go through the following page:

https://www.mathworks.com/help/satcom/ug/gps-waveform-generation.html

2. Sampling of Speech Signals

Record and play speech in Matlab. For steps, go through the following page:
https://in.mathworks.com/help/matlab/import_export/record-and-play-audio.html

Change the sampling rate of the recorded speech signal and play back to see the effect of aliasing. For steps, go through the following page:
https://in.mathworks.com/help/signal/ug/changing-signal-sample-rate.html

CONSTITUTION OF INDIA

B.Tech II Year I Sem

L	T	P	C
2	0	0	0

Course Objectives:

Students will be able to:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes:

Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution
4. Discuss the passage of the Hindu Code Bill of 1956.

UNIT I

History of Making of the Indian Constitution- History of Drafting Committee - Philosophy of the Indian Constitution- Preamble Salient Features

UNIT II

Contours of Constitutional Rights &Duties - Fundamental Rights

- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

UNIT III

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 IV

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: 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.

Suggested Reading

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

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NUMERICAL METHODS ,COMPLEX VARIABLES AND GRAPHS

B.Tech. II Year II Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

Pre-requisites: Mathematics courses of first year of study.

Objectives: To learn

- The student is made to learn the basic concepts of graph theory.
- Various methods to the find roots of an equation
- Concept of finite differences and to estimate the value for the given data using interpolation.
- Evaluation of integrals using numerical techniques
- Solving ordinary differential equations of first order using numerical techniques.
- Differentiation and integration of complex valued functions.
- Evaluation of integrals using Cauchy's integral formula and Cauchy's residue theorem.
- Expansion of complex functions using Taylor's and Laurent's series.

UNIT-I: Numerical Methods-I **10 L**

Solution of polynomial and transcendental equations: Bisection method, Iteration Method, Newton-Raphson method and Regula-Falsi method. Jacobi and Gauss-Seidal iteration methods for solving linear systems of equations.

Finite differences: forward differences, backward differences, central differences, symbolic relations and separation of symbols; Interpolation using Newton's forward and backward difference formulae. Central difference interpolation: Gauss's forward and backward formulae; Lagrange's method of interpolation.

UNIT-II: Numerical Methods-II **8 L**

Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 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-III: Complex Differentiation **10 L**

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)

UNIT-IV: Complex Integration **10 L**

Line integrals, Cauchy's theorem, Cauchy's Integral formula, zeros of analytic functions, singularities, Taylor's series, Laurent's series; Residues, Cauchy Residue theorem.

Conformal mappings, Mobius transformations and their properties. (All theorems without Proofs)

UNIT-V: Graphs: **10 L**

Basic concepts, Isomorphism and sub graphs, Trees and their properties, Spanning trees, Directed trees, Binary trees, Planner graphs, Euler's formula.

TEXT BOOKS

1. Joe L. Mott, A. Kendal and T.P. Baker, Discrete Mathematics for Computer Scientists and Mathematicians, 2nd Edition, Kiston.
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
3. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.
4. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.

REFERENCES

1. M. K. Jain, SRKIyengar, R.K. Jain, Numerical methods for Scientific and Engineering Computations , New Age International publishers.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley &Sons,2006.

ELECTRO MAGNETICFIELDS AND WAVES

B.Tech. II Year II Sem

L	T	P	C
3	0	0	3

Pre-requisite:Mathematics

Course Objectives

1. TolearntheBasicLaws,ConceptsandproofsrelatedtoElectrostaticFieldsandMagnetostaticFields,andapplythemtosolvephysicsandengineeringproblems.
2. Todistinguishbetweenstaticandtime-varyingfields,andunderstandthesignificanceandutilityofMaxwell'sEquationsandBoundaryConditions,andgainabilitytoprovidesolutionstocommunicationengineering problems.
3. ToanalyzethecharacteristicsofUniform Plane Waves(UPW), determine theirpropagationparametersandestimatethesamefordielectricanddissipativemedia.
4. Toconceptuallyunderstandthewaveguidesandtodeterminethecharacteristics ofrectangularwaveguides,microstriplines.

Course Outcomes

Uponcompletingthiscourse,thestudentwillbeableto

1. AcquiretheknowledgeofBasicLaws,ConceptsandproofsrelatedtoElectrostaticFieldsandMagnetostatic Fields.
2. Characterize thestaticandtime-varyingfields,establishthecorrespondingsetsofMaxwell'sEquationsandBoundary Conditions.
3. AnalyzetheWaveEquationsand classify conductors,dielectricsandevaluatetheUPWCharacteristicsforseveralpracticalmediaofinterest.
4. Determine the analysis of rectangularwaveguides,theirmodecharacteristics,anddesignwaveguidesforsolvingpracticalproblems.

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

UNIT I

Electrostatics

Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric FluxDensity,Gauss Law and Applications, Electric Potential, Relation between E and V, Maxwell's TwoEquationsforElectrostaticFields,EnergyDensity,ConvectionandConductionCurrents,DielectricConstant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's andLaplace'sEquations,Capacitors– ParallelPlate,Coaxial,Spherical.

UNIT II

Magnetostatics

Biot-Savart'sLaw,Ampere'sCircuitLaw andApplications,MagneticFluxDensity,Maxwell'sTwoEquationsforMagnetostaticFields,MagneticScalarand VectorPotentials,ForcesduetoMagneticFields,Ampere'sForceLaw.

UNIT III

Maxwell'sEquations(TimeVaryingFields)

Faraday'sLaw, Transformer and MotionalEMF,InconsistencyofAmpere'sLawandDisplacementCurrentDensity,Maxwell'sEquationsinDifferentForms,ConditionsataBoundarySurface-Dielectric-DielectricandDielectric-ConductorInterfaces.

UNIT IV

EMWaveCharacteristics

WaveEquationsforConductingandPerfectDielectricMedia,UniformPlaneWaves–Definitions,RelationbetweenE&H,SinusoidalVariations,WavePropagationinLosslessandConductingMedia,Conductors&Dielectrics–Characterization,WavePropagationinGoodConductorsandGoodDielectrics,Polarization.

ReflectionandRefraction of Plane Waves – Normal andOblique Incidencesfor bothPerfect Conductorand Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance,PoyntingVectorandPoyntingTheorem.

UNIT V

Waveguides

ElectromagneticSpectrumandBands.RectangularWaveguides–SolutionofWaveEquationsinRectangular Coordinates, TE/TM mode analysis, Expressions for Fields, Characteristic Equation and Cut-off Frequencies,Dominant and Degenerate Modes, Sketches of TE and TM mode fields in the cross-section,PhaseandGroupVelocities,WavelengthsandImpedanceRelations,EquationofPowerTransmission,ImpossibilityofTEMMode.MicrostripLines–Z_oRelations,EffectiveDielectricConstant.

TEXT BOOKS

1. EngineeringElectromagnetics–WilliamH.HaytJr.andJohnA.Buck,8th Ed.,McGrawHill,2014
2. PrinciplesofElectromagnetics–MatthewN.O.sadikuandS.V.Kulkarni,6th Ed.,OxfordUniversityPress,AisanEdition,2015.

REFERENCES

1. ElectromagneticWavesandRadiatingSystems–E.C.JordanandK.G.Balmain,2nd Ed.,PHI,2000.
2. EngineeringElectromagnetics–NathanIda,2nd Ed.,Springer(India)Pvt.Ltd.,NewDelhi,2005.
3. ElectromagneticFieldTheoryFundamentals–BhagSinghGuruandHuseyinR.Hiziroglu,Cambridge UniversityPress,2nd Ed.,2006.

ANALOG AND DIGITAL COMMUNICATIONS

B.Tech. II Year II Sem

L	T	P	C
3	1	0	4

Pre-requisite: SignalsandSystems

Course Objectives

1. Todevelopabilitytoanalyzesystemrequirementsofanalogganddigitalcommunicationsystems.
2. Tounderstandthegeneration,detectionofvariousanalogganddigitalmodulationtechniques.
3. ToacquiretheoreticalknowledgeofeachblockinAM,FMtransmittersandreceivers.
4. Tounderstandtheconceptsofbasebandtransmissions.

Course Outcomes

Uponcompletingthiscourse,thestudentwillbeableto

1. Design and analyzevariousAnalogModulationandDemodulation techniques.
2. Understandtheeffectofnoisepresentincontinuouswave Modulationtechniques.
3. Understand the concept of Superhetrodyne Receiver and Pulse Modulation Techniques
4. AnalyzeanddesignthevariousDigitalModulationTechniquesandBase band Transmission.

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

UNIT I

AmplitudeModulation

Needformodulation,AmplitudeModulation-Timeandfrequencydomaindescription,singletonemodulation, power relations in AM waves, Generation of AM waves - Switching modulator, Detection ofAMWaves-Envelopedetector,DSBSCmodulation-timeandfrequencydomaindescription,Generation of DSBSC Waves - Balanced Modulators, Coherent detection of DSB-SC Modulated waves,COSTAS Loop, SSB modulation - time and frequency domain description, frequency discrimination andPhase discrimination methods for generatingSSB, Demodulation of SSB Waves, Vestigial side bandmodulation– TimeandFrequencydomaindescription.NoiseinAM,DSBandSSBSystems.

UNIT II

AngleModulation

BasicconceptsofPhaseModulation,FrequencyModulation:Singletonefrequencymodulation,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 Waves-ArmstrongMethod,DetectionofFMWaves:Balancedslopedetector,Phaselockedloop,ComparisonofFMandAM .,NoiseinAngleModulationSystem,ThresholdeffectinAngleModulationSystem,Pre-emphasisandde-emphasis.

UNIT III

Transmitters &Receivers

Radio Transmitter Block diagram, **Radio Receiver** - Receiver Types - Tuned radio frequency receiver, Superhetrodynereceiver, RF sectionand Characteristics - Frequency changing and tracking, Intermediate frequency, Image frequency, AGC,Amplitudelimiting,FM Receiver,Comparisonwith AMReceiver.

PulseModulation

TypesofPulsemodulation-PAM,PWMandPPM.ComparisonofFDMandTDM.

PulseCodeModulation

PCMGenerationandReconstruction, TDM PCM hierarchy, QuantizationNoise,Non UniformQuantizationandCompanding,DPCM,AdaptiveDPCM,DMandAdaptiveDM,NoiseinPCMandDM.

UNIT IV

DETECTION AND ESTIMATION: Model of Digital Communication Systems, Geometric Interpretation of Signals,Gram-Schmidt Orthogonalization, Response of Bank of correlators to Noisy Input, Detection of Known Signals in Noise,Probability of error, Optimum Receivers Using Coherent Detection: Matched filter Receiver and its Properties,Correlation receiver, Detection of signals with unknown Phase in Noise

BASE BAND SHAPING FOR DATA TRANSMISSION: Requirements of a line encoding format, various line encoding formats- Unipolar, Polar, Bipolar, Discrete PAM signals, Inter symbol interference, Nyquist's criterion, Correlation coding:Duobinary signalling, Modified Duobinary technique, Generalized form of correlation coding, Eye pattern[3].

UNIT V

DIGITAL MODULATION TECHNIQUES: Digital Modulation formats, Coherent binary modulation techniques (BPSK, BFSK), Coherent quadrature modulation techniques (QPSK), Non-Coherent binary modulation techniques (BFSK,DPSK), QAM, M-ary modulation techniques (PSK, FSK, QAM), Comparison of M-ary digital modulation techniques, power spectra, bandwidth efficiency[3].

TEXTBOOKS

1. ElectronicsCommunicationSystems-FundamentalsthroughAdvanced-WayneTomasi,5th Edition,PHI,2009.
2. PrinciplesofCommunicationSystems-HerbertTaub,Donald LSchiling,GoutamSaha,3rd Edition,Mcgraw-Hill,2008.
3. DigitalCommunications–SimonHaykin,JohnWiley,2005.

REFERENCES

1. ElectronicCommunications–DennisRoddyandJohnCoolean,4th Edition,PEA,2004
2. Electronics&CommunicationSystem–GeorgeKennedyandBernardDavis,TMH,2004
3. AnalogandDigitalCommunication–K.SamShanmugam,Willey,2005

LINEAR AND DIGITAL INTEGRATED CIRCUITS

B.Tech. II Year II Sem

L	T	P	C
3	0	0	3

Pre-requisite: SwitchingTheoryandLogicDesign.

Course Objectives

Themainobjectivesofthecourseare:

1. Tointroducethebasicbuildingblocksoflinearintegratedcircuits.
2. Tointroducethetheoryandapplicationsofanalogmultipliersand PLL.
3. Tointroducetheconceptsofwaveformgenerationandintroducesomespecialfunction ICs.
4. Tounderstandandimplementtheworkingofbasicdigitalcircuits.

Course Outcomes

Uponcompletingthiscourse,thestudentwillbeableto

1. Athoroughunderstandingofoperationalamplifierswithlinearintegratedcircuits.
2. Attaintheknowledgeoffunctionaldiagramsand designapplicationsofIC555andIC565.
3. Acquiretheknowledgeand design theDataconverters.
4. Understandingofthedifferentfamiliesofdigitalintegratedcircuitsandtheircharacteristics.

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

UNIT I

OperationalAmplifier

Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp,ModesofOperation-Inverting,Non-Inverting,Differential,InstrumentationAmplifier,ACAmplifier,DifferentiatorsandIntegrators,Comparators,SchmittTrigger,IntroductiontoVoltageRegulators,Featuresof723Regulator,ThreeTerminalVoltage Regulators.

UNIT II

Op-Amp,IC-555&IC565Applications

IntroductiontoActiveFilters,CharacteristicsofBandpass,BandrejectandAllPassFilters,Analysisof1st order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Sawtooth, Square Wave,IC555Timer-FunctionalDiagram,MonostableandAstableOperations,Applications,IC565PLL-BlockSchematic,principleand Applications.

UNIT III

DataConverters

Introduction,BasicDACtechniques,DifferenttypesofDACs-WeightedresistorDAC,R-2RladderDAC, Inverted R-2R DAC,DifferentTypes of ADCs - ParallelComparator TypeADC,Counter TypeADC,SuccessiveApproximationADCandDualSlopeADC,DACand ADCSpecifications.

UNIT IV

CombinationalLogicICs

Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs - Code Converters, Decoders,LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, PriorityGenerators/Checkers,ParallelBinaryAdder/Subtractor,MagnitudeComparators.

UNIT V

SequentialLogicIC'sandMemories

FamiliaritywithcommonlyavailableXX&CMOS40XXSeriesICs–AllTypesofFlip-flops,SynchronousCounters,DecadeCounters,ShiftRegisters.

Memories-ROMArchitecture,TypesofROMS&Applications,RAMArchitecture,Static&DynamicRAMs.

TEXT BOOKS

1. Op-Amps&LinearICs–RamakanthA.Gayakwad,PHI,2003.
2. DigitalFundamentals–FloydandJain,PearsonEducation,8th Ed.,2005.

REFERENCES

1. LinearIntegratedCircuits–D.RoyChowdhury,NewAgeInternational(p)Ltd,2nd Ed.,2003.
2. DigitalDesignPrinciplesandPractices–John.F.Wakerly,Pearson3rd Ed.,2009.
3. LinearIntegratedCircuitsandApplications–Salivahana,TMH,2008.
4. OperationalAmplifierswithLinearIntegratedCircuits,4th Ed.,WilliamD.Stanley,PearsonEducationIndia,2009.

ANALOG AND PULSE CIRCUITS

B.Tech. II Year II Sem

L	T	P	C
3	1	0	4

Pre-requisite: ElectronicDevicesandCircuits

Course Objectives

1. Learntheconceptsofhighfrequencyanalysisoftransistors.
2. Togiveunderstandingofvarioustypesofamplifiercircuitssuchassmallsignal,cascaded,largesignalandtunedamplifiers.
3. TofamiliarizetheConceptoffeedbackinamplifierssoastodifferentiatebetweennegativeandpositivefeedback.
4. Toconstructvariousmultivibratorsusingtransistorsandsweepcircuits.

Course Outcomes

Uponcompletingthiscourse,thestudentwillbeableto

1. Designthemultistageamplifiersandunderstandtheconceptsof HighFrequencyAnalysisofTransistors.
2. UtilizetheConceptsofnegativefeedbacktoimprovethestabilityofamplifiersandpositivefeedbacktogeneratesustainedoscillations.
3. DesignandrealizedifferentclassesofPowerAmplifiersandtunedamplifiersuseableforaudioandRadioapplications.
4. Designmultivibratorsandsweepcircuitsforvariousapplications.

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

UNIT I

MultistageAmplifiers

ClassificationofAmplifiers,Distortioninamplifiers,Differentcouplingschemesusedinamplifiers,Frequencyresponseand Analysisofmultistageamplifiers,Cascodeamplifier,Darlingtonpair.

TransistoratHighFrequency

Hybrid-πmodelofCommonEmittertransistormodel,f_{α},$_{\beta}$andunitygainbandwidth,Gain-bandwidthproduct.

UNIT II

FeedbackAmplifiers

Conceptsoffeedback–Classificationoffeedbackamplifiers–GeneralcharacteristicsofNegativefeedback amplifiers – Effect of Feedback on Amplifier characteristics – Voltage series, Voltage shunt,CurrentseriesandCurrent shuntFeedbackconfigurations.

UNIT III

Oscillators

ConditionforOscillations, RCtype Oscillators-RCphaseshiftandWien-bridge Oscillators,LCtypeOscillators–GeneralizedanalysisofLCOscillators,HartleyandColpittsOscillators,FrequencyandamplitudestabilityofOscillators,CrystalOscillator.

UNIT IV

LargeSignalAmplifiers

Class A Power Amplifier- Series fed and Transformer coupled, Conversion Efficiency, Class B PowerAmplifier- Push Pull and Complimentary Symmetry configurations, Conversion Efficiency, Principle ofoperationofClassABand ClassCAmplifiers.

TunedAmplifiers

Single Tuned Amplifiers – Q-factor, frequency response of tuned amplifiers, Concept of stagger tuning andsynchronoustuning.

UNIT V

Multivibrators

Typesof Triggering,AnalysisandDesignof Bistable,Monostable, AstableMultivibrators andSchmitttriggerusingTransistors.

TimeBaseGenerators

GeneralfeaturesofaTimebaseSignal,MethodsofGeneratingTimeBaseWaveform,conceptsofTransistorMilleran dBootstrapTimeBaseGenerator,MethodsofLinearity improvement.

TEXT BOOKS

1. IntegratedElectronics,JacobMillman,ChristosCHalkias,McGrawHillEducation,2nd Ed.,2010
2. ElectronicDevicesConventionalandcurrentversion-ThomasL.Floyd,Pearson,2015.

REFERENCES

1. ElectronicDevicesandCircuits,DavidA.Bell–5th Ed.,Oxford,1986.
2. ElectronicDevicesandCircuitstheory–RobertL.Boylestead,LouisNashelsky,11th Ed.,Pearson,2009.
3. Millman'sPulse,DigitalandSwitchingWaveforms–J.Millman,H.Tauband MothikiS.PrakashRao,2 Ed.,TMH,2008.
4. Pulse,SwitchingandDigitalCircuits–DavidA.Bell,5th Ed,Oxford,2015.

ANALOG AND DIGITAL COMMUNICATIONS LAB

B.Tech. II Year II Sem

L	T	P	C
0	0	2	1

CO1: Will be able to design and implement various Analog modulation and demodulation Techniques and observe the time and frequency domain characteristics of these modulated Signals

CO2: Will be able to design and implement various Pulse modulation and demodulation Techniques and observe the time and frequency domain characteristics of these modulated Signals

CO3: Will be able to understand the concept of aliasing and different types of Sampling with various Sampling rates and duty Cycles by implementing practically

CO4: Will be able to design and implement various Digital modulation and demodulation Techniques and observe the waveforms of these modulated Signals practically

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

Note:

- Minimum12experimentsshouldbeconducted.
- AlltheseexperimentsaretobesimulatedfirsteitherusingMATLAB,Commsimoranyother simulationpackageandthentobe realized in hardware

1. Practically generateAmplitudemodulated Signal and demodulate it by designing and implementing the corresponding Demodulator for different modulation indices. Plot the corresponding waveforms and theirspectrum. Also calculate theoretically and practically the modulation index in each case. Plot the effect of modulating Signal frequency and Amplitude on the modulation index.
2. Practically generate and demodulate Frequencymodulated Signal for different modulation indices. Plot the corresponding waveforms and theirspectrum. Also calculate theoretically and practically the modulation index in each case. Plot the effect of modulating Signal frequency and Amplitude on the modulation index.
3. Practically generate and demodulate DSB-SCmodulated Signal for different modulation indices and plot the corresponding waveforms and theirspectrum. Also calculate theoretically and practically the modulation index in each case
4. Practically generate and demodulate SSB-SCmodulated Signal (Phase Shift Method) for different modulation indices and plot the corresponding waveforms and theirspectrum. Also calculate theoretically and practically the modulation index in each case
5. Demonstrate the FrequencyDivisionMultiplexing&Demultiplexing practically by transmitting atleast 4 different signals simultaneously with respect to time and recovering without distortion.
6. Verify Sampling theorem for different sampling rates, Sampling types and Duty Cycles and Plot the sampled and reconstructed Signals. From the practical observations derive the conclusions for each case.
7. Design and implement a PulseAmplitudeModulator&Demodulator Circuit using 555 timer and plot the corresponding waveforms from the practical observations
8. Design and implement a PulseWidthModulator&Demodulator Circuit using 555 timer and plot the corresponding waveforms from the practical observations
9. Design and implement a PulsePositionModulator&Demodulator Circuit using 555 timer and plot the corresponding waveforms from the practical observations
10. Generate practically PCMModulated Signal and demodulate it by designing and implementing the

corresponding Demodulator. Plot the corresponding waveforms from practical observations

11. Generate practically DeltaModulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations.
12. Generate practically FSK modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations.
13. Generate practically Binary PSK modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations.
14. Generate practically DPSK modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations.
15. Generate practically QPSK modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations.

LINEAR AND DIGITAL INTEGRATED CIRCUITS LAB

B.Tech. II Year II Sem **L T P C**
0 0 2 1

CO1:Design and implementation of various analog circuits using 741 ICs.

CO2:Design and implementation of various Multivibrators using 555 timer.

CO3:Design and implement various circuits using digital ICs

CO4:Design and implement ADC, DAC and voltage regulators.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	0	3	3	3	-	-	-	3	3	-	1	1	2
CO2	1	0	3	3	3	-	-	-	3	3	-	1	1	2
CO3	1	0	3	3	3	-	-	-	3	3	-	1	1	2
CO4	1	0	3	3	3	-	-	-	3	3	-	1	1	2

Note:

- Minimum12experimentsshouldbeconducted.
- Verify thefunctionalityoftheICinthegivenapplication.

DesignandImplementationof:

1. Design an InvertingandNon-invertingAmplifierusingOpAmp and calculate gain.
2. Design AdderandSubtractorusingOpAmp and verify addition and subtraction process.
3. Design a ComparatorusingOpAmp and draw the comparision results of A=B, A<B, A>B.
4. Design aIntegratorand DifferentiatorCircuitsusingIC741 and derive the required condition practically..
5. Design aActiveLPF,HPF cutoff frequency of 2KHZ and find the roll off of it.
6. Design aCircuitusingIC741 to generate sine/square/triangular wave with period of 1KHZ and draw the output waveform.
7. ConstructMono-stableMultivibratorusingIC555and draw itsoutput waveform.
8. ConstructAstableMultivibratorusingIC555and draw itsoutput waveform and also find its duty cycle.
9. Design a SchmittTriggerCircuit 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 its efficiency.
14. Design a Gray code converter and verify its truth table.
15. Design an even priority encoder using IC 74xx and verify its truth table.
16. Designa 8x1 multiplexer using digital ICs.
17. Design a 4-bit Adder/ubtractor using digital ICs and Add/Sub the following bits.
    (i)1010 (ii)0101 (iii)1011
    010 0 0010 1001.
18. Design a Decade counter and verify its truth table and draw respective waveforms.
19. Designa Up/down counter usingIC74163and 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. Designa 8x3 encoder/3x8 decoder and verify its truth table.
23.

ANALOG AND PULSE CIRCUITS LAB

B.Tech. II Year II Sem

L	T	P	C
0	0	2	1

CO1:Design and implement various types of feed forward and feed back amplifiers.

CO2:Design and implement various oscillators .

CO3:Design and implement various multivibrators and sweep circuits.

CO4:Design and implement power amplifiers and study its characteristics.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	0	3	3	3	-	-	-	3	3	-	1	1	2
CO2	1	0	3	3	3	-	-	-	3	3	-	1	1	2
CO3	1	0	3	3	3	-	-	-	3	3	-	1	1	2
CO4	1	0	3	3	3	-	-	-	3	3	-	1	1	2

ListofExperiments:

1. Design a two stage RC Coupled amplifier and prove that gain is increased and analyze the effects of coupling capacitance.
2. Practically prove that the Darlington pair have high input impedance.
3. Draw the high frequency response of common emitter transistor amplifier and calculate f_α, f_β and gain bandwidth product.
4. Design four topologies of feedback amplifiers and draw the frequency response of them with and without feedback.
5. Design an RC phase shift oscillator circuit and derive the gain condition for oscillations practically for given frequency.
6. Design a Colpitts oscillator circuit for the given frequency and draw the output waveform.
7. Design transformer coupled class A power amplifier and draw the input and output waveforms ,find its efficiency.
8. Design class B power amplifier and draw the input and output waveforms ,find 2^{nd} order and above harmonics.
9. Prove that the complementary pushpull amplifier eliminate cross over distortion.
10. Designa single tuned amplifier and determine the Q of its tuned circuit practically.
11. DesignaBistable Multivibratorandanalyze the effect of commutating capacitors and draw the wave forms at base and collector of transistors.
12. DesignaAstable Multivibratorand draw the wave forms at base and collector of transistors.
13. Draw theresponse of Schmitt trigger for gain of greater than and less than one.
14. DesignaBootstrap sweep circuit using BJT and draw its output time base waveform.
15. DesignaMiller sweep circuit using BJT and draw its output time base waveform.

ENVIROMENTAL SCIENCE

B.Tech. II Year II Sem **L T P C**
2 0 0 0

Course Objectives:

- Understandingtheimportanceof ecologicalbalanceforsustainabledevelopment.
- Understandingtheimpactsofdevelopmentalactivitiesandmitigationmeasures.
- Understandingtheenvironmentalpoliciesandregulations

Course Outcomes:

- Based on this course, the Engineering graduate will understand /evaluate / develop technologieson the basis ofecological principles and environmental regulations whichin turn helps insustainabledevelopment

UNIT-I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function ofan ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemicalcycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity. Structuralfeatures,Bioticstructure,Abioticstructure,Ecologicalsuccession,TypesofEcosystems,Fieldvisits.

UNIT-II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:**useandoverutilizationofsurfaceandgroundwater,floodsanddroughts,Dams:benefitsandproblems.
Mineral resources: use and exploitation, environmental effects of extracting and usingmineralresources,**Landresources:**Forestresources,**Energyresources:**growingenergyneeds,renewable andnonrenewable energy sources,useofalternate energy source,casestudies.**Foodrecourses**:Desertification, Equitableuseofresourceforsustainableusestyle.

UNIT-III

BiodiversityAndBioticResources: Introduction,Definition,genetic,speciesandecosystemdiversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optionalvalues. 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-situconservation. National Biodiversityact.

UNIT-IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification ofpollution,**AirPollution:**Primaryandsecondarypollutants,AutomobileandIndustrialpollution,Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water qualitystandards.**Soil Pollution:**Sources and types,Impacts of modern agriculture, degradation of soil.Landslides,floods,cyclones.**NoisePollution:**SourcesandHealthhazards,standards,**Thermalpollution:** Introduction, causes and consequences. **Solid waste:** Municipal Solid Waste management,compositionandcharacteristicsofe-Wasteanditsmanagement.**Pollutioncontroltechnologies:**WastewaterTreatment methods: Primary, secondaryand Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation. **Global EnvironmentalIssues and Global Efforts: C**limate change and impacts on human environment. Ozone depletion andOzonedepletingsubstances(ODS).Deforestationanddesertification.Internationalconventions/Protocols:Earth summit,Kyoto protocol,and Montréal Protocol.NAPCC-GoIInitiatives.

UNIT-V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspectsAir 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, biologicaland Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental ManagementPlan (EMP).**Towards Sustainable Future:** Concept of Sustainable Development Goals, Populationanditsexplosion,CrazyConsumerism,EnvironmentalEducation,UrbanSprawl,Humanhealth,EnvironmentalEthics,ConceptofGreenBuilding,EcologicalFootPrint,LifeCycleassessment(LCA),Lowcarbonlifestyle.

TEXT BOOKS:

1 TextbookofEnvironmentalStudiesforUndergraduateCoursesbyErachBharuchaforUniversityGrantsCommission.
2 EnvironmentalStudiesbyR.Rajagopalan,OxfordUniversityPress.

REFERENCEBOOKS:

1. EnvironmentalScience:towardsasustainablefuturebyRichardT.Wright.2008PHL LearningPrivate Ltd. NewDelhi.
2. EnvironmentalEngineeringandsciencebyGilbertM.MastersandWendellP.Ela.2008PHILearningPvt.Ltd.
3. EnvironmentalSciencebyDanielB. Botkin&EdwardA.Keller,WileyINDIAedition.
4. EnvironmentalStudiesbyAnubhaKaushik,4th Edition,Newageinternationalpublishers.
5. TextbookofEnvironmentalScienceandTechnology-Dr.M.AnjiReddy2007,BSPublications.
6. IntroductiontoEnvironmentalSciencebyY.Anjaneyulu,BS.Publications.

DIGITAL SIGNAL PROCESSING

B.Tech.III Year I Semester

L	T	P	C
3	1	0	4

Prerequisite: SignalsandSystems

Course Objectives

The **Course Objectives** are:

1. Toprovidebackgroundandfundamentalconceptsfortheanalysisandprocessingofdigitalsignals.
2. Tounderstandthefast computationofDFSandDFT.
3. Todesigndigitalfiltersandtheirrealizationstructures.
4. Toacquaintin Multi-ratesignalprocessingtechniquesandfinitewordlengtheffects.

Course Outcomes

Uponcompletionofthiscourse,thestudentwillbeableto:

1. Realizevariousdigitalfilters
2. FindDFTS, DFS,DFT andFFTofDigitalSignalandSystem.
3. DesignIIR and FIRdigitalfiltersfromprototype approximations.
4. ImplementMultirateprocessingsystemandanalyzefinitewordlengtheffectsinDSPapplications.

UNIT I

Introduction

IntroductiontoDigitalSignalProcessing:DiscreteTimeSignals&Sequences,conversionofcontinuoustodiscretesignal,NormalizedFrequency**,**LinearShiftInvariantSystems,Stability,andCausality,lineardifferentialequationtodifferenceequation**,**LinearConstantCoefficientDifference Equations, Frequency Domain Representation of Discrete Time Signals and Systems.

RealizationofDigitalFilters

Applications of Z – Transforms, Solution of Difference Equations of Digital Filters, SystemFunction, Stability Criterion, Frequency Response of Stable Systems, Realization of DigitalFilters– Direct,Canonic,CascadeandParallelForms.

UNIT II

Discrete Fourierseries

FourierSeries,FourierTransform,LaplaceTransformandZ-Transformrelation**,**DFSRepresentation of Periodic Sequences, Properties of Discrete Fourier Series, Discrete FourierTransforms: Properties of DFT,Linear Convolution of Sequences using DFT, Computation ofDFT: Over-Lap Add Method, Over-Lap Save Method, Relation between DTFT, DFS, DFT andZ-Transform.

FastFourierTransforms

FastFourierTransforms(FFT)-Radix-2Decimation-in-TimeandDecimation-in-FrequencyFFTAlgorithms,InverseFFT.

UNIT III

IIRDigitalFilters

Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital Filters from AnalogFilters,StepandImpulseInvariantTechniques,BilinearTransformationMethod,SpectralTransformations.

UNIT IV

FIRDigital Filters

CharacteristicsofFIRDigitalFilters,FrequencyResponse.DesignofFIRFilters:FourierMethod, Digital Filters using Window Techniques, Frequency Sampling Technique, ComparisonofIIR& FIRfilters.

UNIT V

MultirateDigitalSignalProcessing

Introduction,DownSampling,Decimation,Upsampling,Interpolation,SamplingRateConversion.

FiniteWordLengthEffects

Limitcycles,OverflowOscillations,Round-offNoise inIIRDigitalFilters,ComputationalOutput Round Off Noise, Methods to Prevent Overflow, Trade Off Between Round Off andOverflowNoise,MeasurementofCoefficientQuantizationEffectsthroughPole-ZeroMovement,DeadBandEffects.

TEXT BOOKS

1. DiscreteTime SignalProcessing– A.V.OppenheimandR.W.Schaffer,PHI,2009
2. DigitalSignalProcessing,Principles,Algorithms,andApplications:JohnG.Proakis,DimitrisG.Manolakis,PearsonEducation/PHI,2007.

REFERENCES

1. DigitalSignalProcessing–Fundamentalsand Applications– LiTan,Elsevier,2008
2. FundamentalsofDigitalSignalProcessingusingMATLAB– RobertJ.Schilling,SandraL.Harris,Thomson,2007
3. DigitalSignalProcessing–K.DeerghaRaoandM.N.S.Swamy,Springer,2018.
4. DigitalSignalProcessing-APracticalapproach,EmmanuelC.IfeachorandBarrieW.Jervis,2nd Edition,PearsonEducation,2009

MICROPROCESSORS AND CONTROLLERS

B.Tech.III Year I Semester

L	T	P	C
3	1	0	4

Pre-requisite:

Course Objectives

1. Tofamiliarizethearchitectureofmicroprocessors andmicrocontrollers
2. Toprovidetheknowledgeaboutinterfacingtechniquesofbus&memory.
3. ToprovidetheconceptsofARMarchitecture
4. ToemphasizethebasicconceptsofAdvancedARMprocessors

Course Outcomes

Uponcompletingthiscourse,thestudentwill beable to

1. To explore the internal architecture, organization and assembly language programming of8086processorsfordesigningmemoryandI/Ointerfaces.
2. To explore the internal architecture, organization and assembly language programming of8051/controllerstodesignmicrocontrollerbasedSDKblocks.
3. ToexploretheinternalarchitectureofARMprocessorsandbasicconceptsofadvancedARMprocessor bandsystems.

UNIT I

8086Architecture

8086Architecture-Functionaldiagram,RegisterOrganization,MemorySegmentation,Programming Model, Memory addresses, Physical Memory Organization, Architecture of 8086,Signaldescriptionsof8086,interruptsof8086.

InstructionSetand AssemblyLanguageProgrammingof8086

Instructionformats,Addressingmodes,InstructionSet,AssemblerDirectives,Macros,andSimpleProgramsinvolvingLogical,Branchand Call Instructions,Sorting,StringManipulations.

UNIT II

IntroductiontoMicrocontrollers

Overviewof8051Microcontroller,Architecture,I/OPorts,MemoryOrganization,AddressingModesandInstruction setof8051.

8051RealTimeControl

ProgrammingTimerInterrupts,ProgrammingExternalHardwareInterrupts,ProgrammingtheSerialCommunicationInterrupts,Programming8051TimersandCounters

UNIT III

I/O AndMemoryInterface

LCD,Keyboard,External MemoryRAM,ROM Interface,ADC,DAC Interfaceto 8051.

SerialCommunication andBusInterface

SerialCommunicationStandards,SerialDataTransferScheme,OnboardCommunicationInterfaces-I2CBus,SPIBus,UART;ExternalCommunicationInterfaces-RS232,USB.

UNIT IV

ARMArchitecture

ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions andinterruptsinterrupt vector table, ARM instruction set – Data processing,Branch instructions,loadstoreinstructions,Softwareinterruptinstructions,Programstatusregisterinstructions,loadingconstants,Conditionalexecution,IntroductiontoThumbinstructions.

UNIT V

ARMProcessors

IntroductiontoCORTEXProcessorandits architecture,OMAPProcessoranditsArchitecture.

TEXT BOOKS

1. AdvancedMicroprocessorsandPeripherals–A.K.RayandK.M.Bhurchandani,TMH,2nd Ed.,2006.
2. ARMSystemDevelopersguide,AndrewNSloss,DominicSymes,ChrisWright,Elsevier,2012

REFERENCES

1. The8051Microcontroller,Kenneth.J.Ayala,CengageLearning,3rdEd,2004.
2. Microprocessorsand Interfacing,D. V.Hall,TMGH,2ndEdition2006.
3. The8051Microcontrollers,ArchitectureandProgrammingandApplications-K.UmaRao,AndhePallavi,Pearson,2009.
4. DigitalSignalProcessingandApplicationswiththeOMAP-L138Experimenter,DonaldReay,WILEY2012.

CONTROL SYSTEMS

B.Tech.III Year I Semester

L	T	P	C
3	1	0	4

Pre-requisite: Network Analysis&Transmissionlines

Course Objectives: Objectivesofcourseare

1. Tointroducetheprinciplesandapplicationsofcontrolsystemsineverydaylife
2. Tointroducethebasicconceptsofblockdiagramreduction,timedomainanalysissolutionstotimeinvariantsystems
3. Tounderstanddifferentaspectsofstabilityanalysisofsystemsinfrequencydomainandtimedomain.

Course Outcomes:

Aftercompletingthiscourse,thestudentwillbeable to

1. KnowledgeonOpenandclosedloopandalsomodelingandtransferfunctionderivationsoftranslational androtationalsystems.
2. Representtransferfunctionsthroughblockdiagramsandsignalflowgraphs.
3. Designingcontrolsystemsusingtimedomainandfrequencydomaintechniques.
4. Timeresponseanalysis,stabilityanalysis,frequencyresponseanalysisofdifferentorderedsystemsthrough theircharacteristicequationandtime-domainspecifications.

UNIT I

Introduction

Concepts of Control Systems- Open Loop and closed loop control systems and their differences-examplesofcontrolsystems-Classificationofcontrolsystems,Feed-BackCharacteristics,Effectsoffeedback. Mathematicalmodels–Differentialequations,ImpulseResponseandtransferfunctions-TranslationalandRotationalmechanicalsystems.

TransferFunctionRepresentation

Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver,Block diagram representation of systems considering electrical systems as examples -Blockdiagramalgebra–RepresentationbySignalflow graph-Reductionusingmason'sgainformula.

UNIT II

TimeResponse Analysis

Standardtestsignals-Timeresponseoffirstordersystems–CharacteristicEquationofFeedbackcontrolsystems,Transientresponseofsecondordersystems-Timedomainspecifications – Steady state response - Steady state errors and error constants – Effects ofproportionalderivative,proportionalintegralsystems.

UNIT III

StabilityAnalysis

Theconceptofstability- Routhstabilitycriterion–qualitativestabilityandconditionalstability.

RootLocusTechnique

Therootlocusconcept-constructionofrootloci-effectsofaddingpolesandzerostoG(s)H(s)ontherootloci.

FrequencyResponseAnalysis

Introduction,Frequencydomainspecifications-Bodediagrams-DeterminationofFrequencydomain specifications and transfer function from the Bode Diagram-Phase margin and Gainmargin-StabilityAnalysisfromBodePlots.

UNIT IV

StabilityAnalysisInFrequencyDomain

PolarPlots,NyquistPlotsandapplicationsofNyquistcriterionforstability–Effectsofaddingpolesandzeros.

ClassicalControlDesignTechniques

Compensationtechniques–Lag,Lead,andLead-LagControllersdesigninfrequencyDomain,PIDControllers.

UNIT V

StateSpaceAnalysisOfContinuousSystems

Conceptsofstate,statevariablesandstatemodel,derivationofstatemodelsfromblockdiagrams, Diagonalization, Solving the Time invariant state Equations, State Transition MatrixanditsProperties.

TEXT BOOKS

1. ControlSystemsEngineering– byI.J.NagrathandM.Gopal,NewAgeInternational(P)Limited,Publishers,2nd edition.
2. ModernControlEngineering–byKatsuhikoOgata–PrenticeHallofIndiaPvt.Ltd.,3rd edition,1998.

REFERENCES

1. ControlSystemsbyN.K.Sinha,NewAgeInternational(P)LimitedPublishers,3rdEdition,1998.
2. AutomaticControlSystems8thedition–byB.C.Kuo2003–Johnwileyandson's.,
3. ControlSystemsEngg.byNISE3rdEdition–Johnwiley
4. ControlSystemsbyS.Kesavan,HitechPublications.
"Modeling&Control OfDynamicSystems"by NarcisoF.Macia
GeorgeJ.Thaler,ThomsonPublishers.

OPERATING SYSTEMS

(PE1)

B.Tech.III Year I Semester

L	T	P	C
3	0	0	3

Prerequisites: ComputerProgrammingandData Structures

Course Objectives

1. Provide an introduction to operating system concepts (i.e., processes, threads, scheduling,synchronization,deadlocks,memorymanagement,fileandI/Osubsystemsandprotection).
2. Introducetheissuesto be consideredinthedesignanddevelopmentofoperatingsystem.
3. ToknowthebasicUnixcommands,systemcallinterfaceforprocessmanagement,interprocesscommunicationandI/OinUnix.

Course Outcomes

Aftercompletingthiscourse,thestudentwillbeable to

1. Gain practicalknowledgeofoperatingsystemsandarchitecturesinteract.
2. KnowledgeonScheduling,deadlocks,process managementandsynchronization.
3. AcquaintancetoMemoryManagementandVirtualMemory.
4. Abilitytorecognize andresolveuserproblemswithstandardoperatingenvironments.

UNIT I

OperatingSystemIntroduction,Structures-SimpleBatch,Multi-programmed,Time-shared,PersonalComputer,Parallel,DistributedSystems,Real-TimeSystems,Systemcomponents,OperatingSystemservices,SystemCalls.

UNIT II

Process and CPU Scheduling - Process concepts and scheduling, Operations on processes,CooperatingProcesses,Threads,andInterposesCommunication,SchedulingCriteria,SchedulingAlgorithms,Multiple-ProcessorScheduling.

Systemcallinterfaceforprocessmanagement-fork,exit,wait,waitpid,exec

UNIT–III

Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks,DeadlockPrevention,DeadlockAvoidance,DeadlockDetection,andRecoveryfromDeadlock.

ProcessManagementandSynchronization-TheCriticalSectionProblem,Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, CriticalRegions,Monitors.

Interprocess Communication Mechanisms: IPC between processes on a single computersystem, IPC between processes on different systems, using pipes, FIFOs, message queues,sharedmemory.

UNIT IV

Memory Management and Virtual Memory - Logical versus Physical Address Space,Swapping,ContiguousAllocation,Paging,Segmentation,SegmentationwithPaging,Deman

dPaging,PageReplacement,PageReplacementAlgorithms.

UNIT V

File System Interface and Operations -Access methods, Directory Structure, Protection,File System Structure, Allocation methods, Free-space Management. Usage of open, create,read,write,close,lseek,stat,ioctl,systemcalls.

TEXT BOOKS

1. OperatingSystemPrinciples-AbrahamSilberchatz,PeterB.Galvin,GregGagne7th Edition,JohnWiley.
2. AdvancedprogrammingintheUnix environment,W.R.Stevens,Pearsoneducation.

REFERENCE

1. OperatingSystems–InternalsandDesignPrinciplesStallings, 5thEd.,PearsonEducation/PHI,2005.
2. OperatingSystemADesignApproach-Crowley, TMH.
3. ModernOperatingSystems,AndrewSTanenbaum,2ndEd.,Pearson/PHI.
4. Unixprogrammingenvironment,Kernighan andPike,PHI./PearsonEducation.
5. UnixInternalsTheNewFrontiers,U.Vahalia,PearsonEducation.

OBJECTORIENTEDPROGRAMMINGTHROUGHJAVA
(PE1)

B.Tech.III Year I Semester

L	T	P	C
3	0	0	3

Prerequisites: ComputerProgramming&DataStructures

Course Objectives

1. Introducesobjectorientedprogrammingconceptsusingthe Javalanguage.
2. Toknowtheprincipleofinheritanceandpolymorphismanddemonstrateshowtheyrelatetothedesignof abstractclasses
3. Abletoimplementpackages,interfaces,exceptionhandling,eventhandlingandmultithreading
4. TodesignofGraphicalUserInterfaceusingappletsandswings

Course Outcomes

Aftercompletingthiscourse,thestudentwillbeable to

1. LearntheobjectorientedconceptsusingtheJAVAprogramming
2. Understandbenefitsofinheritance, creatingpackagesandimplementofinterfaces
3. Differentiatebetweenmultithreadingandmultitasking.
4. UnderstandtheconceptsofException,Eventhandling,AppletsandSwing.

UNIT I

Object oriented thinking and Java Basics- Need for oop paradigm, summary of oop concepts,copingwithcomplexity,abstractionmechanisms.Awayofviewingworld– Agents,responsibility, messages, methods, History of Java, Java buzzwords, data types, variables, scopeand life time of variables, arrays, operators, expressions, control statements, type conversion andcasting, simple java program, concepts of classes, objects, constructors, methods, access control,thiskeyword,garbagecollection,overloadingmethodsandconstructors,methodbinding,inheritance, overriding and exceptions, parameter passing, recursion, nested and inner classes,exploringstringclass.

UNIT II

Inheritance, Packages and Interfaces – Hierarchical abstractions, Base class object, subclass,subtype,substitutability,formsofinheritance-specialization,specification,construction,extension, limitation, combination, benefits of inheritance, costs of inheritance. Member accessrules,superuses,usingfinalwithinheritance,polymorphism-methodoverriding,abstractclasses,theObjectclass.

Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages,differencesbetweenclassesandinterfaces,defininganinterface,implementinginterface,applyinginterfaces,variablesininterfaceandextendinginterfaces.

Exploringjava.io.

UNIT III

ExceptionhandlingandMultithreading--Conceptsofexceptionhandling,benefitsofexception handling, Termination or resumptive models, exception hierarchy, usage of try, catch,throw,throws andfinally,builtinexceptions,creatingownexceptionsubclasses.

String handling,Exploring java.util.Differences between multi-threading and multitasking, threadlife cycle,creating threads, thread priorities, synchronizing threads, interthread communication,threadgroups,daemonthreads.
Enumerations,autoboxing,annotations,generics.

UNIT IV

EventHandling: Events,Eventsources,Eventclasses,EventListeners,Delegationeventmodel,handling mouseandkeyboardevents,Adapterclasses.
The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, textcomponents, check box, check box groups, choices, lists panels – scrollpane, dialogs, menubar,graphics,layoutmanager–layoutmanagertypes–border,grid,flow,cardandgridbag.

UNIT V

Applets – Concepts of Applets, differences between applets and applications, life cycle of anapplet,types ofapplets,creatingapplets,passingparameterstoapplets.
Swing–Introduction,limitationsofAWT,MVCarchitecture,components,containers,exploring swing-JApplet, JFrame and JComponent, Icons and Labels,text fields, buttons – TheJButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees,andTables.

TEXT BOOKS

1. Javathecompletereference,7th editon,HerbertSchildt,TMH.
2. UnderstandingOOPwith Java,updatededition,T.Budd,PearsonEduction.

REFERENCES

1. AnIntroductiontoprogrammingandOOdesignusingJava,J.Ninoand F.A.Hosch,JohnWiley&sons.
2. IntroductiontoJavaprogramming,Y. DanielLiang,PearsonEducation.
3. AnintroductiontoJavaprogrammingandobjectorientedapplicationdevelopment, R.A.Johnson-Thomson.

DATA ANALYTICS

(PE1)

B.Tech.III Year I Semester

L	T	P	C
3	0	0	3

Course Objectives

1. Togaintheknowledgeindatamanagement,ProcessingandAnalytics.
2. ToknowtheconceptsofRegressionanditsmodels.
3. ToknowtheconceptsofSegmentationanditsmodels.
4. TogaintheknowledgeonDataVisualizationanditstechniques.

Course Outcomes

Aftercompletingthiscourse,thestudentwillbeable to

1. Knowthedatamanagement anditsprocessing.
2. Capabletomodelthedata usingtools.
3. DifferentiatebetweenregressionandSegmentationofdata.
4. LearnvariousVisualizationtechniques.

UNIT–I

Data Management: Design Data Architecture and manage the data for analysis, understandvarious sources of Data like Sensors/Signals/GPS etc. Data Management, Data Quality (noise,outliers,missingvalues,duplicatedata)andDataProcessing.

UNIT–II

Data Analytics: Introduction to Analytics, Introduction to Tools and Environment, Applicationof Modeling in Business, Databases & Types of Data and variables, Data Modeling Techniques,MissingImputationsetc.NeedforBusinessModeling.

UNIT–III

Regression–
Concepts,Bluepropertyassumptions,LeastSquareEstimation,VariableRationalization,andMo del Buildingetc.
LogisticRegression:ModelTheory,ModelfitStatistics,ModelConstruction,Analyticsapplicati onstovariousBusinessDomainsetc.

UNIT–IV

Object Segmentation: Regression Vs Segmentation – Supervised and Unsupervised Learning,TreeBuilding–
Regression,Classification,Overfitting,PruningandComplexity,MultipleDecisionTreesetc.
Time Series Methods: Arima, Measures of Forecast Accuracy, STL approach, Extract featuresfromgeneratedmodelasHeight,AverageEnergyetcandAnalyzeforprediction

UNIT–V

DataVisualization:Pixel-
OrientedVisualizationTechniques,GeometricProjectionVisualizationTechniques,Icon-BasedVisualizationTechniques,HierarchicalVisualizationTechniques,VisualizingComplexD ataandRelations.

TEXT BOOKS

1. Student'sHandbookforAssociateAnalytics–II,III.
2. DataMiningConceptsandTechniques,Han,Kamber,3rdEdition,MorganKaufmann Publishers.

REFERENCES

1. IntroductiontoDataMining,Tan,Steinbachand Kumar,AddisionWisley,2006.
2. DataMiningAnalysisandConcepts,M.Zakiand W.Meira
3. MiningofMassiveDatasets,JureLeskovecStanfordUniv.AnandRajaramanMilliway

NETWORKSECURITYANDCRYPTOGRAPHY

(PE-2)

B.Tech.III Year I Semester **L T P C**
3 0 0 3

Pre-requisite:

Nil**Course**

Objectives

1. Understand thebasic requirementofinprovidingsecurityinNetworks.
2. Tounderstandthethreats/vulnerabilitiesinnetworksandcountermeasures.
3. TounderstandAuthenticationfunctionswithMessageAuthenticationCodesandHashFun ctions.
4. ToprovidefamiliarityinIntrusiondetectionand protectionmeasures.

Course Outcomes

Uponcompletingthiscourse,thestudentwill beable to

1. Describenetworksecurityfundamentalconcepts andprinciples.
2. Encryptanddecrypt messagesusingstandardblockciphersmanagement.
3. Analyzekeyalgorithmsandidentifytheirweaknesses.
4. Identifyandassessdifferenttypesofthreats,malware,spyware,viruses,vulnerabilitiesandt hendecidefirewalldesignprinciples.

UNIT I

SecurityServices,MechanismsandAttacks,AModelforInternetworksecurity,ClassicalTechniques: Conventional Encryption model, Steganography, Classical Encryption Techniques.**ModernTechniques** SimplifiedDES,BlockCipherPrinciples,DataEncryptionstandard,StrengthofDES,BlockCipherDesign Principles.

UNIT II

Encryption

TripleDES,InternationalDataEncryptionalgorithm,Blowfish,RC5,CharacteristicsofAdvanced Symmetric block Ciphers. Placement of Encryption function, Traffic confidentiality,Keydistribution,RandomNumberGeneration.

UNIT III

PublicKeyCryptography

Principles,RSAAlgorithm,KeyManagement,Diffie-HellmanKeyexchange,EllipticCurveCryptograpy.

NumberTheory

PrimeandRelativelyprimenumbers,Modulararithmetic,Fermat'sandEuler'stheorems,Testingforprimal ity,Euclid'sAlgorithm,theChineseremaindertheorem, Discrete logarithms.

UNIT IV

MessageAuthenticationandHashFunctions

Authenticationrequirements and functions,MessageAuthentication,Hashfunctions, SecurityofHashfunctionsandMACs.

HashandMacAlgorithms

MD-5,MessagedigestAlgorithm,SecureHashAlgorithm.

DigitalsignaturesandAuthenticationprotocols:Digitalsignatures,AuthenticationProtocols,Digitalsignatures tandards.

AuthenticationApplications

Kerberos,ElectronicMailSecurity:PrettyGoodPrivacy,SIME/MIME.

UNIT V

IPSecurity

Overview,Architecture,Authentication,EncapsulatingSecurityPayload,KeyManagement.Web Security: Web Security requirements, Secure sockets layer and Transport layer security,SecureElectronicTransaction.

Intruders, Viruses and Worms Intruders,Virusesand Relatedthreats.**FireWalls**

FirewallDesignPrinciples,Trustedsystems.

TEXT BOOKS

1. CryptographyandNetworkSecurity-PrinciplesandPractice-WilliamStallings,PearsonEducation.
2. NetworkSecurity-Thecompletereference,RobertBragg,MarkRhodes,TMH,2004.

REFERENCES

1. NetworkSecurityEssentials(ApplicationsandStandards)byWilliamStallingsPearsonEducation.
2. FundamentalsofNetworkSecuritybyEricMaiwald(Dreamtechpress).
3. Principlesof InformationSecurity,Whitman,Thomson.
4. IntroductiontoCryptography,Buchmann,Springer.

ARTIFICIAL NEURAL NETWORKS AND DEEP LEARNING

(PE-2)

B.Tech.III Year I Semester

L	T	P	C
3	0	0	3

UNIT-I :

Fundamental Concepts, Models & Learning Rules of Artificial Neural Systems

Artificial Neuron Models: Biological Neuron, Mcculloch-pitts Neuron Model, Activation Functions, Boltzman Neuron Model, Models of Artificial Neural Networks : Feed forward Network, Feedback Network, Neural Processing, Learning and Adaption : Supervised, Unsupervised and Reinforcement Learning.

Neural Network Learning Rules: Hebbian Learning Rule, Perception Learning Rule, Delta Learning Rule Widrow –Hoff Rule, Correlation Learning Rule, Winner –Take – All Learning Rule, Outstar Learning Rule, Summary of Learning Rules.

Single Layer Feed Forward Networks:

Classification Model, Features and Decision Regions, Discriminant Functions, linear Machine and Minimum Distance Classification, Non – Parametric Training Concept, Training and Classification Using the Discrete Perceptron: Algorithm and Examples. Single Layer Continuous Perceptron Networks for Linearly Separable Classification, Perceptron Convergence Theorem, Multi Category Single Layer Perceptron Networks.

UNIT –II

Multi Layer Feed Forward Networks:

Linearly Non- Separable, Pattern Classification, Delta Learning Rule for Multi Perception, Generalized Delta Learning Rule. Feed Forward Recall and Error Back Propagation Training ; Examples of Error Back Propagation, Training Errors, Learning Factors ; Initial Weights Cumulative Weight Adjustment Versus Incremental Updating, Steepness of Activation Function, Learning Constant, Momentum Method, Network Architecture Versus Data Representation, Necessary Number of Hidden Neurons. Application of Back Propagation Networks in Pattern Recognition and Image Processing.

UNIT –III :

Associative Memories:

Basic Concepts of Linear Associative, Basic Concepts of Dynamical Systems, Mathematical Foundation of Discrete Time Hop field Networks. Mathematical Foundation of Gradient- Type Hop Field Networks, Transient Response of Continuous Time Networks, Example Solution of Optimization Problems; Summing Networks with Digital Outputs, Minimization of the Traveling salesman tour length, Solving Simultaneous Linear Equations, Boltzman machines, Bidirectional Associative Memory; Multidirectional Associative Memory, Associative Memory of Spatio-temporal Patterns.

UNIT – IV :

Matching and Self-Organizing Networks:

Hamming net and MAXNET Unsupervised learning of clusters, Clustering and similarity measures Winner take all learning, recall mode, initializing of weights, separability limitations, Counter propagation networks, Feature mapping: Self organizing feature maps, Cluster discovery networks (ART1).

UNIT – V :

Introduction to Simple Deep Feed forward Neural Network, Hidden Units and their Activation Functions, Architecture Design, Regularization Methods for Deep learning: Early Slopping, Drop out.

Convolutional Neural Networks: Introduction to CNN, Convolution operation, Pooling, Normalization, Application in Computer Vision-Image Net, Sequence Modeling- VGG Net, LeNet.

Recurrent Neural Networks: RNN Topologies, Difficulty in Training RNN, Long Short Term Memory(LSTM):Architecture and Learning Strategy.

TEXT BOOKS:

1. Introduction to Artificial Neural Systems – J.M.Zurada, Jaico Publishers.
2. Ian Good fellow, Yoshva Bengio, Aaron Courville, Deep Learning,MIT Press,2016.
3. Introduction Neural Networks using MATLAB 6.0 – S.N. Shivanandam, S. Sumathi, S. N.Deepa, 1/e, TMH,New Delhi

REFERENCE BOOKS:

1. Elements of Artificial Neural Networks – Kishan Mehrotra, Chelkuri K. Mohan, Sanjay Ranka, Penram International.
2. Artificial Neural Network – Simon Haykin,2nd Ed., Pearson Education
3. Artificial Neural Networks – Dr.B. Yagananarayana, 1999,PHI, New Delhi.
4. Fundamental of Neural Networks- Laurene Fausett.

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

(PE–2)

B.Tech.III Year I Semester

L	T	P	C
3	0	0	3

Pre-requisite: BasicElectrical andElectronicsEngineering

Course Objectives

Itprovidesanunderstandingofvariousmeasuringsystemfunctioningandmetricsforperformanceanalysis.

1. Providesunderstandingofprincipleofoperation,workingofdifferentelectronicinstruments viz.signalgenerators,signalanalyzers,recorders andmeasuringequipment.
2. Understandingtheconceptsofvariousmeasuringbridges andtheirbalancingconditions.
3. Providesunderstandingofuseofvariousmeasuringtechniquesformeasurementofdifferentphysicalparametersusingdifferentclassesoftransducers.

Course Outcomes

Uponcompletingthiscourse,thestudentwill beable to

1. Measureelectricalparameterswithdifferent metersandunderstandthebasicdefinitionofmeasuringparameters.
2. Usevarioustypesofsignalgenerators,signalanalyzersforgeneratingandanalyzingvariousreal-timesignals.
3. OperateanOscilloscopetomeasurevarioussignals.
4. Measurevariousphysicalparametersbyappropriatelyselectingthetransducers.

UNIT I

BlockSchematicsofMeasuringSystems

Performance Characteristics, Static Characteristics, Accuracy, Precision, Resolution, Types ofErrors, Gaussian Error,Root SumSquaresformula, Dynamic Characteristics, Repeatability,Reproducibility, Fidelity, Lag ;Measuring Instruments: DC Voltmeters, D' Arsonval Movement,DCCurrentMeters,ACVoltmetersandCurrentMeters,Ohmmeters,Multimeters,MeterProtection,ExtensionofRange,TrueRMSRespondingVoltmeters,SpecificationsofInstruments.

UNIT II

SignalAnalyzers

AF,HFWaveAnalyzers,HarmonicDistortion,HeterodynewaveAnalyzers,SpectrumAnalyzers, Power Analyzers, Capacitance-Voltage Meters, Oscillators. Signal Generators: AF,RFSignalGenerators,SweepFrequencyGenerators,PulseandSquarewaveGenerators,FunctionGenerators,ArbitraryWaveformGenerator,VideoSignalGenerators,andSpecifications

UNIT III

Oscilloscopes

CRT, Block Schematic of CRO, Time Base Circuits, Lissajous Figures, CRO Probes, HighFrequency CRO Considerations, Delay lines, Applications: Measurement of Time, Period andFrequencySpecifications.

SpecialPurposeOscilloscopes

DualTrace,DualBeamCROs,SamplingOscilloscopes,StorageOscilloscopes,DigitalStorageCROs.

UNIT IV

Transducers

Classification,StrainGauges,Bounded,unbounded;ForceandDisplacementTransducers,Resistance Thermometers, Hotwire Anemometers, LVDT, Thermocouples, Synchros, SpecialResistanceThermometers,DigitalTemperaturesensingsystem,PiezoelectricTransducers,VariableCapacitanceTransducers,MagnetoStrictiveTransducers,gyroscopes,accelerometers.

UNIT V

Bridges

WheatStoneBridge,KelvinBridge,andMaxwellBridge.

MeasurementofPhysicalParameters

FlowMeasurement,DisplacementMeters,LiquidlevelMeasurement,MeasurementofHumidity and Moisture, Velocity, Force, Pressure – High Pressure, Vacuum level, Temperature - Measurements,DataAcquisitionSystems.

TEXT BOOKS

1. ElectricalAndElectronicMeasurementAndMeasuringInstruments– AKSawhney,DhanpatRai&Sons,2013.
2. ElectronicInstrumentation:H.S.Kalsi–TMH,2nd Ed.,2004.

REFERENCES

1. ModernElectronicInstrumentationandMeasurementTechniques:A.D.Helbincs, W.D.Cooper:PHI5th Ed.,2003.
2. ElectronicInstrumentationandMeasurements– DavidA.Bell,OxfordUniv.Press,1997.
3. Industrial Instrumentation:T.R.PadmanabhamSpringer2009.
4. ElectronicMeasurementsandInstrumentation– K.LalKishore,PearsonEducation2010.

MICRO PROCESSORS AND CONTROLLERS LABORATORY

B.Tech.III Year I Semester

L	T	P	C
0	0	3	1.5

Cycle1:Using 8086 ProcessorKitsand/orAssembler(5Weeks)

- AssemblyLanguageProgramsto8086toPerform
  1. Arithmetic,Logical, StringOperationson16 Bitand32Bit Data.
  2. Bit levelLogicalOperations,Rotate,Shift, SwapandBranchOperations.

Cycle 2: UsingMicrocontrollerKit(6weeks)

- IntroductiontoIDE
  1. Assembly Language Programs to Perform Arithmetic (Both Signed and Unsigned) 16Bit Data Operations, Logical Operations (Byte and Bit Level Operations), Rotate,Shift,SwapandBranchInstructions
  2. TimedelayGenerationUsingTimersofMicrocontroller
  3. SerialCommunicationfrom/toMicrocontrollerto/fromI/Odevices.
  4. ProgramUsing Interrupts toGenerateSquareWave10KHZFrequency.
  5. Using Timer Microcontroller in 8bit Auto reload Mode and Connect a 1HZ Pulse toInterruptpinandDisplayonGPIO.AssumeCrystalFrequencyas11.0592MHZ

Cycle3:Interfacing I/ODevices toMicrocontroller(5Weeks)

1. 7SegmentDisplaytoMicrocontrolleranddisplaydigit0to9.
2. 4*4MatrixKeypadtoMicrocontroller.
3. SequenceGeneratorUsingSerialInterfaceinMicrocontroller.
4. 8bitADCInterfacetoMicrocontrollerfordifferentanalogsignals.
5. Triangular,SquareandRampWaveformGeneratorthroughDACinterfacestoMicrocontroller.
6. LocationidentificationthroughGPSinterface.

TEXT BOOKS

1. AdvancedMicroprocessorsAndPeripheralsbyAKRay,TataMcGraw-HillEducation,2006
2. The8051*Microcontrollers*:Architecture,Programming&ApplicationsbyDr.K. UmaRao,AndhePallavi,Pearson,2009.

DIGITAL SIGNAL PROCESSINGLABORATORY

B.Tech.III Year I Semester

L	T	P	C
0	0	3	1.5

- TheProgramsshallbeimplementedinSoftware(UsingMATLAB/LabView/CProgramming/PythonEquivalent)andHardware(UsingTI/AnalogDevices/Motorola /EquivalentDSPprocessors/Arduino/Raspberrypi).
- MATLABorEquivalent LiveScriptsaretobeincorporatedinconductingallsimulations

1. GenerationofSinusoidalWaveform/Signalbased onRecursiveDifferenceEquations.
2. TofindDFT/IDFTofgivenDTSignal.
3. TofindFrequencyResponseofaSystemgiveninTransferFunction/Differentialequationform.
4. ImplementationofFFTofgivenSequence.
5. DeterminationofPower SpectrumofagivenSignal(s).
6. DesignandImplementationofLPFIRFilterforspeechandaudiosignal.
7. DesignandImplementationofHP IIRFilterforspeech andaudiosignal.
8. GenerationofNarrowBandSignalthroughFiltering.
9. GenerationofDTMFSignalsandDecodingofDTMFSignalsusingSpectrogram.
10. ImplementationofDecimation&InterpolationProcess.
11. ImplementationofI/DSamplingRateConvertersonspeech/audiosignalusinganyoftheabovehardware.
12. ImpulseResponseofFirstorderandSecondOrder Systems.
13. ImplementationofImageInversion,EdgeDetection,Colorreplacementusinganyoftheabovehardware.

ADVANCEDENGLISHLANGUAGEANDCOMMUNICATIONSKILLS(AECS)LABORATORY

B.Tech.III Year I Semester

L	T	P	C
0	0	2	1

1.Introduction

The introduction of the Advanced English Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.
The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

2.Objectives

ThisLabfocusesonusingmulti-mediainstructionforlanguagedevelopmenttomeetthefollowingtargets:

- To improve the students' fluency in English, through a well-developed vocabulary andenable them to listen to English spoken at normal conversational speed by educatedEnglish speakers and respond appropriately in different socio-cultural and professionalcontexts.
- Further, they would be required to communicate their ideas relevantly and coherently inwriting.
- Topreparеall thestudents fortheirplacements.

3.Syllabus

ThefollowingcoursecontenttoconducttheactivitiesisprescribedfortheAdvancedEnglis

CommunicationSkills(AECS)Lab:

1. **ActivitiesonFundamentalsofInter-personalCommunicationandBuildingVocabulary**

- Starting a conversation – responding appropriately and relevantly – using the right bodylanguage–RolePlayindifferentsituations&DiscourseSkills-usingvisuals-Synonymsand antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word

origin,businessvocabulary,analogy,idioms andphrases,collocations&usageofvocabulary.

2. **ActivitiesonReadingComprehension**–General VsLocalcomprehension,readingforfacts,guessingmeaningsfromcontext,scanning,skimming,inferringmeaning,criticalreading&effectivegoogling.
3. **Activities on Writing Skills** – Structure and presentation of different types of writing – *letterwriting/Resume writing/ e-correspondence/Technical report writing/* – planning for writing –improvingone'swriting.
4. **Activities on Presentation Skills** – Oral presentations (individual and group) through JAMsessions/seminars/**PPTs**andwrittenpresentationsthroughposters/projects/reports/e-mails/assignmentsetc.
5. **Activities on Group Discussion and Interview Skills** – Dynamics of group discussion,intervention,summarizing,modulationofvoice,bodylanguage,relevance,fluencyandorganizationofideasandrubricsforevaluation-Conceptandprocess,pre-interviewplanning,openingstrategies,answeringstrategies,interviewthroughtele-conference&video-conferenceandMockInterviews.

4. MinimumRequirement:

The Advanced English Communication Skills (AECS) Laboratory shall have the followinginfrastructuralfacilitiestoaccommodateatleast35studentsinthelab:

- **Spaciousroomwithappropriateacoustics.**
- **Round Tableswithmovablechairs**
- **Audio-visualaids**
- **LCDProjector**
- **PublicAddresssystem**
- **P–IVProcessor,HardDisk–80GB,RAM–512MBMinimum,Speed–2.8GHZ**
- **T.V,adigitalstereo&Camcorder**
- **HeadphonesofHighquality**

5. SuggestedSoftware:

Thesoftwareconsistingoftheprescribedtopicselaboratedaboveshouldbeprocuredandused.

- **OxfordAdvancedLearner's Compass**,7th Edition
- **DELTA'skeytotheNextGenerationTOEFLTest:AdvancedSkillPractice.**
- **LinguaTOEFLCBTInsider**,byDreamtech
- **TOEFL&GRE**(KAPLAN,AARCO&BARRONS,USA,CrackingGREbyCLIFFS)

6. BooksRecommended:

1. **Effective Technical Communication** by M Asharaf Rizvi**.** McGraw Hill Education (India)Pvt.Ltd.2nd Edition

2. **AcademicWriting:AHandbookforInternationalStudentsb**yStephenBailey,Routledge,5thEdition

3. **LearnCorrectEnglish–ABookofGrammar,UsageandComposition**byShivK.KumarandHemalathaNagarajan.Pearson2007

4. **ProfessionalCommunication**by ArunaKoneru,McGrawHillEducation(India)Pvt.Ltd,2016.

5. **TechnicalCommunication**byMeenakshiRaman&SangeetaSharma,OxfordUniversityPress2009.

6. **TechnicalCommunication**byPaulV.Anderson.2007.CengageLearningpvt.Ltd.NewDelhi.

7. **EnglishVocabularyinUse**series,CambridgeUniversityPress2008.

8. **HandbookforTechnicalCommunication**byDavidA.McMurrey&JoanneBuckley.2012.CengageLearning.

9. **Communication Skills** byLeenaSen,PHILearningPvtLtd., NewDelhi, 2009.

10. **JobHunting**byColmDownes,CambridgeUniversityPress2008.

11. EnglishforTechnicalCommunicationforEngineeringStudents,AyshaVishwamohan**,TataMcGraw-Hil2009.**

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INTRODUCTION TO CYBER SECURITY

B.Tech.III Year I Semester

L	T	P	C
0	0	2	0

Prerequisites:NIL

Courseobjectives:

- Tofamiliarizevarioustypesofcyber-attacksandcyber-crimes
- Togivean overviewofthecyberlaws
- Tostudythedefensivetechniquesagainsttheseattacks

CourseOutcomes: Thestudentswillbeabletounderstandcyber-attacks,typesofcybercrimes,cyberlawsandalsohowtoprotectthemselfandultimatelytheentireInternetcommunityfrom suchattacks.

UNIT-I

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability,threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIATriad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks,hardwareattacks,Spectrumofattacks,Taxonomyofvariousattacks,IPspoofing,Methodsofdefense,Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism,Cyber Espionage,etc.,ComprehensiveCyberSecurityPolicy.

UNIT-II

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles ofInternationalLaw.TheINDIAN Cyberspace,NationalCyberSecurity Policy.
Introduction,HistoricalbackgroundofCyberforensics,DigitalForensicsScience,TheNeed forComputer Forensics,Cyber Forensics and Digital evidence, Forensics Analysis ofEmail,DigitalForensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special TechniquesforForensicsAuditing.

UNIT-III

Cybercrime:MobileandWirelessDevices: Introduction,ProliferationofMobileandWirelessDevices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, SecurityChallenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication serviceSecurity, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations,OrganizationalMeasuresforHandlingMobile,OrganizationalSecurityPoliciesandMeasuresinMobileComputingEra,Laptops.

UNIT-IV

Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, webthreats for organizations, security and privacy implications, social media marketing: security risks andperilsfororganizations,socialcomputingand theassociated challengesfor organizations.

Cybercrime and Cyber terrorism: Introduction, intellectual property in the cyberspace, the ethicaldimensionofcybercrimesthepsychology,mindsetandskillsofhackersandother cybercriminals.

UNIT-V

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Datalinking and profiling, privacy policies and their specifications, privacy policy languages, privacy indifferentdomains-medical,financial,etc Cybercrime:ExamplesandMini-Cases

Examples: Official WebsiteofMaharashtraGovernmentHacked,IndianBanksLoseMillionsofRupees,ParliamentAttack,PuneCityPoliceBustNigerianRacket,e-mailspoofinginstances.

Mini-Cases: TheIndianCaseofonlineGambling,AnIndianCaseofIntellectualPropertyCrime,FinancialFraudsin CyberDomain.

TEXTBOOKS:

1. NinaGodboleandSunitBelpure,CyberSecurityUnderstandingCyberCrimes,ComputerForensicsand LegalPerspectives,Wiley
2. B.B.Gupta,D.P.Agrawal,Haoxiang Wang,ComputerandCyberSecurity:Principles,Algorithm,Applications,andPerspectives,CRCPress,ISBN9780815371335,2018.

REFERENCES:

1. CyberSecurityEssentials, JamesGraham, RichardHowardandRyanOtson, CRCPress.
2. IntroductiontoCyberSecurity,Chwan-Hwa(john)Wu,J.DavidIrwin,CRCPressT&FGroup.

BUSINESSE CONOMICS AND FINANCIAL ANALYSIS

B.Tech. III Year II Semester

L	T	P	C
3	0	0	3

CourseObjective:

To prepare engineering students to analyze cost/ revenue/ financial data and to make economicand financial analysis in decision making process and to examine the performance of companiesengagedinengineering.

CourseOutcome:

To perform and evaluate present and future worth of the alternate projects and to appraiseprojects by using traditional and DCF Methods. To carry out cost benefit analysis of projects andtocalculateBEPofdifferentalternativeprojects.

Unit-I:IntroductiontoEngineeringEconomics-BasicPrinciplesandMethodologyofEngineering Economics– Fundamental Concepts - Demand – Demand Determinants - Law ofDemand- Demand Forecasting and Methods -Elasticity of Demand - Theory of Firm – Supply-ElasticityofSupply.

Unit- II: Macro Economic Concepts: National Income Accounting -Methods of Estimation-Various ConceptsofNationalIncome -Inflation – Definition – Causes of Inflation andMeasures to Control Inflation - New Economic Policy 1991 (Industrial policy, Trade policy, andFiscalpolicy)ImpactonIndustry.

UNIT-III: Production, Cost,MarketStructures &Pricing:

Production Analysis: Factors of Production, Production Function, Production Function with onevariable 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: NatureofCompetition,FeaturesofPerfectcompetition,Monopoly,Oligopoly,andMonopolisticCompetition. Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis,CostVolumeProfitAnalysis.

Unit- IV: Capital Budgeting Techniques: Significance of Capital Budgeting-cash flows-TimeValueofMoney-ChoosingbetweenalternativeinvestmentproposalsMethodsofAppraisal Techniques- Pay Back Period - Average Rate of Return – Net Present Value- InternalRateofReturn– ProfitabilityIndex.

Unit- V: Introduction to Accounting: Accounting Principles (GAPP), concepts, conventions- - Double entry system of Book keeping – Accounting rules- Journal-ledger-Trial balance-TradingandProfitandLossaccount-BalanceSheet.(SimpleProblems).

SuggestedReadings:

1. HenryMalcomSteinar-EngineeringEconomics,Principles,McGrawHill Pub.
2. D.D.Chaturvedi,S.L.Gupta,BusinessEconomics-TheoryandApplications,InternationalBookHousePvt.Ltd.2013.
3. JainandNarang"Accounting,KalyaniPublishers.
4. Arora,M.N."CostAccounting,VikasPublication.
5. S.N.Maheshwari,FinancialManagement,VikasPublishingHouse.

ANTENNAS AND PROPAGATION

B.Tech.III Year II Semester

L	T	P	C
3	1	0	4

Pre-requisite: Network Analysisand TransmissionLines**,**ElectromagneticFieldsandWaves

Course Objectives

The**Course Objectives**are:

1. Tounderstandthesignificanceofantennaparameters,toderiveandanalyzetheradiationcharacteristicsofvariousantennas
2. Toanalyze the characteristics anddesign relations of UHF,VHFandMicrowaveAntennas and toidentifytheantennaarrayrequirements,todeterminethecharacteristicsofvariousAntennaArrays.
3. Tounderstandtheconceptsandset-uprequirementsformicrowavemeasurements,andfamiliarizewiththeproceduretoenableantennameasurements.
4. Todefineanddistinguishbetweendifferentphenomenonofwavepropagation(ground wave,spacewaveandskywave),their frequency dependence,andestimatetheircharacteristics,identifyingtheirprofilesandparametersinvolved.

Course Outcomes

Uponcompletingthis course,

1. ShouldbeabletoCharacterizetheantennasbased onfrequencyandgeometricalconfiguration
2. Shouldbeabletoplottheradiationpatterns ofVHF,UHFandMicrowaveantennasandalsoantennaarrays.
3. Specifytherequirementsformicrowave measurementsandarrangeasetuptocarryouttheantennafarzonepatternandgainmeasurements inthelaboratory.
4. Classifythedifferentwavepropagationmechanisms,determinethecharacteristicfeaturesofdifferentwavepropagations,andestimatetheparametersinvolved.

UNIT I

AntennaBasics

Basic Antenna Parameters – Radiation Patterns, Beam Area, Beam width , Radiation Intensity,Beam Efficiency, Directivity, Gain, Resolution, Antenna Aperture, Effective Height. AntennaTheorems,RetardedPotentials,HelmholtzTheorem.

ThinLinearWireAntennas

Radiation From- Hertzian Dipole, Small thinDipole, Infinitesimally thin Linear Antenna,HalfWave Dipole and Quarter Wave Monopole – Current Distributions, Field Components- Far FieldandNearField,Radiated Power,RadiationResistance, BeamWidth,Directivity,Gain,EffectiveArea and Effective Height. Loop Antennas - Small Loop, Comparison of Far Fields of SmallLoop and Short Dipole, Radiation Resistances and Directivities of Small Loops (QualitativeTreatment).

UNIT II

AntennaArrays

Point Sources – Definition, Patterns**,** and arrays of two Isotropic Sources - Different Cases.Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, End fire Arrays,EFA with Increased Directivity, Derivation of their Characteristics and Comparison, BSA withNon-uniformAmplitudeDistributions– GeneralConsiderations,andBinomialArrays.

AntennaMeasurements

Introduction,Concepts-Reciprocity,Nearand FarFields,CoordinateSystem,SourcesofErrors.PatternstobeMeasured,DirectivityMeasurement,GainMeasurements(byComparison,Absoluteand3-AntennaMethods).

UNIT III

VHF,UHFandMicrowaveAntennas-I

ArrayswithParasiticElements,Yagi-UdaArray,FoldedDipolesandtheirCharacteristics.HelicalAntennas–HelicalGeometry,HelixModes,PracticalDesignConsiderationsforMonofilar Helical Antenna in Axial and Normal Modes.Horn Antennas – Types, Fermat'sPrinciple,OptimumHorns,DesignConsiderationsofPyramidalHorns.

UNIT IV

VHF,UHFandMicrowaveAntennas–II

Microstrip Antennas – Introduction, Features, Advantages and Limitations. Rectangular PatchAntennas–GeometryandParameters,CharacteristicsofMicrostripAntennas.ReflectorAntennas – Introduction, Flat Sheet and Corner Reflectors, Paraboloidal Reflectors – Geometry,PatternCharacteristics,FeedMethods,ReflectorTypes–RelatedFeatures.

UNIT V

Propagation

Definitions, Categorizations and General Classifications, Different Modes of Wave Propagation,Ray/Mode Concepts. **Ground Wave Propagation** - Plane Earth Reflections, Space and SurfaceWaves,WaveTilt,CurvedEarthReflections.**SpaceWavePropagation**-FieldStrengthVariation with Distance and Height, Effect of Earth's Curvature, Absorption, Super Refraction,M-Curves and Duct Propagation, Scattering Phenomena, Troposphere Propagation. **Sky WavePropagation** - Structure of Ionosphere, Refraction and Reflection of SkyWaves by Ionosphere,Ray Path, Critical Frequency, MUF, LUF, OF, Virtual Height and Skip Distance,RelationbetweenMUFandSkipDistance,Multi-hopPropagation.

TEXT BOOKS

1. AntennasandWavePropagation– J.D.Kraus,R.J.MarhefkaandAhmadS.Khan,TMH,NewDelhi,4thed.,(SpecialIndianEdition),2010.
2. ElectromagneticWavesandRadiatingSystems–E.C.JordanandK.G.Balmain,PHI,2nded.,2000.

REFERENCES

1. AntennaTheory- C.A.Balanis, JohnWiley&Sons, 3rdEd., 2005.
2. AntennasandWavePropagation– K.D.Prasad,SatyaPrakashan,TechIndiaPublications,NewDelhi,2001.
3. RadioEngineeringHandbook-Keithhenney,3rdeditionTMH.
4. AntennaEngineeringHandbook–JohnLeonidasVolakis,3rdedition,2007

COMPUTER NETWORKS

B.Tech.III Year II Semester

L	T	PC
3	1	4

Pre-requisite: DigitalCommunications

Course Objectives

1. Tounderstandthesourceandchannelcodingschemes.
2. Tointroducethefundamentalvarioustypesofcomputernetworks.
3. TodemonstratetheTCP/IPandOSImodelswithmeritsanddemerits.
4. Tointroducetheconceptsofvariouslayers.

Course Outcomes

Uponcompletingthiscourse,thestudentwill beable to

1. Comparenetworkmodels,networktypesandtransmissionmedia.
2. AnalyzetheDatalinklayerProtocols,AndRoutingalgorithms
3. Utilizingtheconnectionorientedandconnectionlessservice,andwebapplications
4. DesignawirelessnetworksusingIEEEstandards.

UNIT I

ComputerNetworksandtheInternet

Internet,NetworkEdge,theNetworkCore,DelayandLossinPacket-SwitchedNetworks,ProtocolLayersandTheirServiceModels.

NetworkModels

LayeredTasks,OSIModel, Layersin OSIModel,TCP/IPProtocolSuite,Addressing.

TransmissionMedia

GuidedMedia,Unguided Media-Wireless.

UNIT II

DataLinkLayer

Channel coding- Hamming coding,Block Coding, Cyclic Codes, Checksum, Framing, Flowand Error Control, Noiseless Channels, Noisy Channels, HDLC, Point-to-Point Protocol (PPP),RandomAccess,ControlledAccess,Channelization.

UNIT III

NetworkLayer

Introduction Virtual Circuit and Datagram Networks, Internet Protocols-IPv4 and IPv6, Router,RoutingAlgorithms,BroadcastandMulticastingRouting.

UNIT IV

TransportLayer

Transport-Layer Services, Multiplexing and Demultiplexing, Connectionless Transport - UDP,PrinciplesofReliableDataTransfer,Connection-OrientedTransport-TCP,PrinciplesofCongestionControl.

Application Layer

Principles of Network Applications, WWW and HTTP, FTP, Electronic Mail in the Internet,DNS—TheInternet'sDirectoryService,Peer-to-PeerApplications,SocketProgramming,CreatingNetworkApplications.

UNIT V

Wirelessand MobileNetworks

Introduction,WirelessLinksandNetworkCharacteristics,Wi-Fi,IEEE802.11WirelessLANs,IEEE802.15,IEEE802.16,ConceptofOFDMwithBlockDiagram.

TEXT BOOKS

1. Data CommunicationsandNetworking–BehrouzA.Forouzan,4th&5thEd.,TMH,2006.
2. ComputerNetworks --AndrewS Tanenbaum,3thEd.,PearsonEducation,1999.

REFERENCES

1. ComputerandCommunicationNetworks,NaderF.Mir,PearsonEducation,2010.
2. ComputerNetworking:ATop-DownApproachFeaturingtheInternet,JamesF.Kurose,K.W.Ross,3rd Ed.,PearsonEducation,2010.
3. DataandComputerCommunications,G.S.HuraandM.Singhal,CRCPress,TaylorandFrancisGroup,2010.
4. Data CommunicationsandComputerNetworks,P.C.Gupta,PHI,2ndEd.,2010.

VLSI DESIGN

B.Tech.III Year II Semester

L	T	P	C
3	1	0	4

Prerequisite: AnalogandPulsecircuits;SwitchingTheoryandLogicDesign

Course Objectives

Theobjectivesofthecourse areto:

1. Giveexposuretodifferentstepsinvolvedinthefabricationof ICs.
2. ExplainelectricalpropertiesofMOSandBiCMOSdevicestoanalyzethebehaviorofinverterswithvariousloads.
3. Giveexposuretothedesignrulestobefollowedtodrawthelayoutofanylogiccircuit.
4. Providedesignconceptstodesignbuildingblocksofdatapathofanysystemusinggates.
5. Understand basicprogrammablelogicdevicesandtestingofCMOScircuits.

Course Outcomes

Uponcompletingthiscourse,thestudentwill beable to

1. AcquirequalitativeknowledgeaboutthefabricationprocessMOS ICs.
2. Drawthelayoutofanylogiccircuittounderstandandestimateparasiticeffectofanylogiccircuit.
3. Designbuildingblocksofdatapathsystems,memoriesandsimplelogiccircuitsusingPLA,PAL,FPGAandCPLD.
4. Understanddifferenttypesoffaultsthatcanoccurinasystemandlearntheconceptoftesting.

UNIT I

Introduction

IntroductiontoICTechnology–MOS,PMOS,NMOS,CMOS&BiCMOS

BasicElectricalProperties

Basic Electrical Properties of MOS and BiCMOS Circuits: I_{ds}-V_{ds} relationships, MOS transistorthreshold Voltage, g_m, g_{ds}, Figure of merit; Pass transistor, NMOS Inverter, Various pull ups,CMOSInverteranalysisanddesign,Bi-CMOSInverters.

UNIT II

VLSICircuitDesignProcesses

VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, Transistors LayoutDiagramsforNMOSandCMOSInvertersandGates,ScalingofMOScircuits.

UNIT III

GateLevelDesign

Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Time delays, Drivinglargecapacitiveloads,Wiringcapacitance,Fan–in,Fan–out.

UNIT IV

Data PathSubsystems

SubsystemDesign,Shifters,Adders,ALUs,Multipliers,Paritygenerators,Comparators,Zero/OneDetectors,Counters.

ArraySubsystems

SRAM,DRAM,ROM,SerialAccessMemories.

UNIT V

ProgrammableLogicDevices

DesignApproach–PLA, PAL,StandardCellsFPGAs,CPLDs.

CMOSTesting

CMOSTesting,TestPrinciples,DesignStrategies fortest,ChiplevelTest Techniques.

TEXT BOOKS

1. EssentialsofVLSIcircuitsandsystems– KamranEshraghian,EshraghianDouglesandA.Pucknell,PHI,2005.
2. CMOSVLSIDesign– ACircuitsandSystemsPerspective,NeilH.EWeste,DavidHarris,AyanBanerjee,3rd Ed.,Pearson,2009.

REFERENCES

1. IntroductiontoVLSISystems:ALogic,CircuitandSystemPerspective–Ming-BOLin,CRCPress,2011.
2. CMOSlogic circuitDesign-John.P.Uyemura,Springer,2007.
3. ModernVLSIDesign-WayneWolf,PearsonEducation,3rdEd.,1997.

System Design through IoT

(OE-1)

B.Tech.III Year II Semester

L	T	P	C
3	0	0	3

Pre-requisite:

CourseObjectives

Theobjectivesofthecourse areto

1. Toprovideinformationontheconceptsof InternetofThingsandapplications.
2. TolearnhowtouseofArduinoandRaspberryPiboards.
3. ToknowaboutdatahandlinginSDN.

CourseOutcomes

Uponcompletingthiscourse,thestudentwill beable to

1. Explorevariousprotocols ofsensornetworks.
2. ProgramandconfigureArduinoboardsforrealworldconnectivity.
3. Pythonprogrammingand interfacingforRaspberryPi.

UNIT I

Introduction to Internet of Things, Characteristics of IoT, Physical design of IoT, Functionalblocks of IoT, Sensing, Actuation, Basics of Networking, Communication Protocols, SensorNetworks.

UNIT II

Machine-to-Machine Communications, Difference between IoT and M2M, Interoperability inIoT,IntroductiontoArduinoProgramming,IntegrationofSensorsandActuatorswithArduino,

UNIT III

IntroductiontoPythonprogramming,IntroductiontoRaspberryPi,InterfacingRaspberryPiwithbasicperipherals,ImplementationofIoTwithRaspberryPi

UNIT IV

ImplementationofIoTwithRaspberryPi,IntroductiontoSoftwaredefinedNetwork(SDN),SDNforIoT,DataHandlingandAnalytics,

UNIT V

CloudComputing,Sensor-Cloud,SmartCitiesandSmartHomes,ConnectedVehicles,SmartGrid,IndustrialIoT.

CaseStudy-Agriculture,Healthcare,ActivityMonitoring.

TEXT BOOKS

1. TheInternetofThings:EnablingTechnologies,Platforms,andUseCases,byPethuruRajandAnupamaC.Raman(CRCPress)
2. Makesensors:Terokarvinen,kemo,karvinenandvilleyvaltokari,1st Ed.,MakerMedia,2014.

REFERENCES

1. InternetofThings:AHands-onApproach,byArshdeepBahgaandVijayMadisetti.
2. Fundamentalsof WirelessSensorNetworks:TheoryandPractice-WaltenegusDargie,ChristianPoellabauer.
3. BeginningSensornetworkswithArduinoandRaspberryPi–CharlesBell, Apress,2013.

COMPUTER NETWORKS LAB

III YearB.Tech.II Semester

L	T	P	C
0	0	2	1

Note:

A. Minimumof12Experimentshavetobeconducted

B. AlltheExperimentsmaybeConductedusingNetworkSimulationsoftwarelikeNS-2/NS3/NSG-2.1/WireSHARK/etc..

Note:ForExperiments2to10Performancemaybeevaluatedthroughsimulationbyusingtheparameters Throughput,PacketDeliveryRatio,Delayetc.

1. WritingaTCLScripttocreatetwonodesandlinksbetweennodes
2. Writinga TCLScripttotransmitdata betweennodes
3. Evaluatetheperformanceofvarious LANTopologies
4. EvaluatetheperformanceofDropTailandRED queuemanagement schemes
5. EvaluatetheperformanceofCBQ andFQSchedulingMechanisms
6. EvaluatetheperformanceofTCPandUDPProtocols
7. EvaluatetheperformanceofTCP,NewRenoandVegas
8. EvaluatetheperformanceofAODVandDSRroutingprotocols
9. EvaluatetheperformanceofAODVandDSDVroutingprotocols
10. EvaluatetheperformanceofIEEE802.11 and IEEE802.15.4
11. EvaluatetheperformanceofIEEE802.11 andSMAC
12. Capturingand AnalysisofTCPandIPPackets
13. SimulationandAnalysisofICMPandIGMPPackets
14. AnalyzetheProtocolsSCTP,ARP,NetBIOS, IPXVINES
15. Analysisof HTTP,DNSandDHCPProtocols

*Simulationoftheaboveexperiments tobeconductedusingNS-2,NSG2.1,WireShark.

VLSI DESIGN LAB

B.Tech.III Year II Semester

L	T	P	C
0	0	3	1.5

Note: Any**SIXof** thefollowingexperimentsfromeachpartaretobeconducted(**Total12**)**Part-I**

The following experiments are to be designed and simulated using HDL and implement usingZync/ Zed boards/ equivalent hardware. Simulate and synthesize at least four experiments to beimplementedonFPGAboards.

1. Realizationofall thelogicgates.
2. Designof8-to-3encoder (withoutandwith priority)and2-to-4decoder.
3. Designof8-to-1multiplexerand1-to-8demultiplexer.
4. Designof4bitbinarytograycodeconverter.
5. Designof4bitcomparator.
6. DesignofFulladderusing3modelingstyles.
7. Designofflipflops:SR,D,JK,T.
8. Designof4-bitbinary,BCDcounters(synchronous/asynchronousreset)oranysequencecounter.
9. DesignofFiniteStateMachines.

Part-II

LayoutusinganyEDAtools.

1. Basiclogicgates.
2. CMOSinverter.
3. CMOSNOR/NANDgates.
4. CMOSXORandMUXgates.
5. Static/Dynamiclogiccircuit(register cell).
6. Latch/Flipflop.
7. Passtransistor.
8. Layout ofanycombinationalcircuit (complex CMOSlogic gate).

COMMUNICATION SYSTEMS LAB FOR IOT

B.Tech.III Year II Semester

L	T	P	C
0	0	3	1.5

1. Introduction to NodeMCU on Arduino IDE and Serial Monitor interfacing
2. Digital and Analog Output taking on LED
3. Digital Input taken from push button
4. Analog Input taken from preset
5. LDR on NodeMCU
6. i2c Scanner for scanning all i2c devices
7. 16×2 LCD interfacing
8. Connecting to internet and Getting MAC address
9. DHT-11 Data upload on cloud (Thingspeak)
10. Weather Station (IOT)
11. RGB LED interfacing
12. Switching Using Transistor
13. IR Proximity and Color detection
14. Seven Segment Display interfacing
15. Servo Control and interfacing and Peizo Buzzer interfacing and control
16. DC motor switching and control through Relay

IRTRODUCTION TO ARTIFICIAL INTELLIGENCE

B.Tech.III Year II Semester

L	T	P	C
2	0	0	0

CourseObjectives: TotrainthestudentstounderstanddifferenttypesofAIagents,variousAIsearchalgorithms, fundamentals of knowledge representation, building of simple knowledge-based systemsand to apply knowledge representation, reasoning.Study of Markov Models enable the student readyto step intoapplied AI.

UNIT-I

Introduction: AI problems, Agents and Environments, Structure of Agents, Problem Solving Agents**BasicSearchStrategies**:ProblemSpaces,UninformedSearch(Breadth-First,Depth-FirstSearch,Depth-firstwithIterativeDeepening),HeuristicSearch(HillClimbing,GenericBest-First,A*),ConstraintSatisfaction(Backtracking,Local Search)

UNIT-II

AdvancedSearch:ConstructingSearchTrees,StochasticSearch,A*SearchImplementation,Minimax Search,Alpha-BetaPruning

BasicKnowledgeRepresentationandReasoning:PropositionalLogic,First-OrderLogic,ForwardChainingand BackwardChaining,Introductionto ProbabilisticReasoning,BayesTheorem

UNIT-III

AdvancedKnowledgeRepresentationandReasoning:KnowledgeRepresentationIssues,Non-monotonic Reasoning,Other Knowledge Representation Schemes

ReasoningUnderUncertainty:Basicprobability,ActingUnderUncertainty,Bayes'Rule,RepresentingKnowledge inan Uncertain Domain,Bayesian Networks

UNIT-IV

Learning: WhatIsLearning?RoteLearning,Learningby TakingAdvice,LearninginProblemSolving,LearningfromExamples,Winston'sLearning Program,Decision Trees.

UNIT-V

ExpertSystems: RepresentingandUsingDomainKnowledge,Shell,Explanation,KnowledgeAcquisition.

TEXTBOOK:

1.Russell,S.andNorvig,P,ArtificialIntelligence:AModernApproach,ThirdEdition,Prentice-Hall,2010.

REFERENCEBOOKS:

1. ArtificialIntelligence,ElaineRich,KevinKnight,ShivasankarB.Nair,TheMcGrawHillpublications,ThirdEdition,2009.
2. GeorgeF.Luger,ArtificialIntelligence:StructuresandStrategiesforComplexProblemSolving,PearsonEducation,6th ed.,2009.

MICROWAVE ENGINEERING

B.Tech IV Year I Semester

L	T	PC	
3	1	0	4

Pre-requisite: AntennasandPropagation

Course Objectives

1. To get familiarizedwith microwave frequency bands, their applications and tounderstandthelimitationsandlossesofconventionaltubesatthesefrequencies.
2. To distinguishbetween different types of microwave tubes, their structures andprinciplesofmicrowavepowergeneration.
3. To impart theknowledgeofScatteringMatrix,itsformulationandutility,andestablishtheS-Matrixforvarioustypesofmicrowavejunctions.
4. Understandthemeasurementconceptsatmicrowavefrequencies.

Course Outcomes

Uponcompletingthiscourse,thestudentwill beable to

1. Usemicrowavecomponentsforvariousapplications.
2. Realizetheneedforsolidstatemicrowavesourcesandunderstandtheprinciplesofsolidstatedevices.
3. Distinguishbetweenthedifferenttypesofwaveguideandferritecomponents,andselectpropercomponentsforengineeringapplications.
4. SetupMicrowave Benchformeasurementofvariousmicrowaveparameters

UNIT I

WaveguideComponents

Coupling Mechanisms – Probe, Loop, Aperture types. Waveguide Discontinuities – WaveguideWindows, Tuning Screws and Posts, Matched Loads. Waveguide Attenuators – Resistive CardandRotaryVanetype;WaveguidePhaseShifters–DielectricandRotaryVanetype, Scattering Matrix Properties - Waveguide Multiport Junctions - E plane and H plane Tees, MagicTee,S- matrix.DirectionalCouplers–2Hole,BetheHole,S-matrix.Ferrites– CompositionandCharacteristics,Faraday rotation,Ferrite Components–Gyrator,Isolator andCirculator,S-matrix.CavityResonators(qualitativetreatment).

UNIT II

MicrowaveTubes

Electromagnetic Spectrum and Microwave bands, Applications of microwaves, Limitations ofconventionalTubesatMicrowaveFrequencies,MicrowaveTubes–Classification.

O-typeTubes:2CavityKlystron–Structure,Re-entrantCavities,VelocityModulationProcess and Applegate Diagram, Bunching Process, Expressions for O/P Power and Efficiency.ReflexKlystrons–Structure,VelocityModulationandApplegateDiagram,MathematicalanalysisofBunching,PowerOutput,Efficiency,OscillatingModesandO/PCharacteristics.

UNIT III

HelixTWTs

TypesandCharacteristicsofSlowWaveStructures;StructureofTWTandAmplificationProcess(qualitativetreatment),SuppressionofOscillations,GainConsiderations.

M-TypeTubes

Introduction, Cross-field Effects, Magnetrons – Different Types, Cylindrical Traveling WaveMagnetron – Hull Cut-off and Hartree Conditions, Modes of Resonance and PI-Mode Operation,SeparationofPI-Mode,o/pcharacteristics,

UNIT IV

MicrowaveSolidStateDevices

Introduction, Classification, Applications. **TE Devices** – Introduction, Gunn Diodes – Principle,RWH Theory,Characteristics,ModesofOperation-GunnOscillationModes,
ATTDevices-IMPATT andTRAPATT.PINdiode,SchottkyBarrierDiode.

UNIT V

MicrowaveMeasurements

DescriptionofMicrowaveBench–
DifferentcomponentsandtheirFeatures,ErrorsandPrecautions,MeasurementofAttenuation,Frequency,MicrowavePowerusingBolometerBridge, Calorimetric method, VSWR meter. Standing Wave Measurements, Measurement ofLowandHighVSWR,CavityQ,ImpedanceMeasurements.

TEXT BOOKS

1. MicrowaveEngineering-
DavidM.Pozar,JohnWiley&Sons(Asia)PvtLtd.,1989,3rdEd.,2011Reprint.
2. MicrowaveDevicesandCircuits–SamuelY.Liao,Pearson,3rdEd.,2003.
3. MicrowaveEngineering-SushrutDas,OxfordUniversityPress,India,2015.

REFERENCES

1. MicrowaveEngineering -G.S.Raghuvanshi,Cengage LearningIndiaPvt. Ltd.,2012.
2. MicrowaveEngineeringPassiveCircuits-PeterA.Rizzi,PHI,1999.

DIGITAL IMAGE PROCESSING
(PE - 3)

B.Tech IV Year I Semester

L	T	PC
3	0	03

Pre-requisite: DigitalSignalProcessing

Course Objectives

Theobjectivesofthiscourseare:

1. Toprovideanapproachtowardsimageprocessingandintroductionabout2Dtransforms.
2. Tounderstandvariousenhancementmethodsintime,frequencydomainsandrestorationtechniques.
3. TounderstandtheconceptsofsegmentationandMorphologicaloperationsonanimage.
4. Toexploretheconcepts ofvariouscompressiontechniques.

Course Outcomes

Uponcompletionofthiscourse,thestudentwillbeableto:

1. Learnthefundamentalsofimageprocessingandimportanttransformationsused.
2. Performspatialand frequencydomainenhancementtechniques.
3. Applytechniquesforsegmentingimageandperformmorphologicaloperations.
4. Understandtheneedforcompressionandvariouscompressiontechniques.

UNIT I

DigitalImageFundamentals&ImageTransforms

DigitalImageFundamentals,SamplingandQuantization,RelationshipbetweenPixels.

ImageTransforms

2-DFFT,Properties,WalshTransform,HadamardTransform,DiscreteCosineTransform,HaarTransform,SlantTransform,HotellingTransform.

UNIT II

Introduction, Image Enhancement in Spatial Domain, Enhancement through Point Processing,Types of Point Processing, Histogram equalization, Gray Level Transformations, Median Filter,SpatialDomainLow-passandHigh-PassFiltering.

ImageEnhancement(FrequencyDomain)

Filteringin FrequencyDomain: LowPass(Smoothing)and HighPass(Sharpening)Filters.

UNIT III

ImageRestoration

Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean SquareFilters,ConstrainedLeastSquaresRestoration,InteractiveRestoration.

UNIT IV

ImageSegmentation

DetectionofDiscontinuities,EdgeLinkingAndBoundaryDetection,thresholding,RegionOrientedSegmentation.

MorphologicalImageProcessing

DilationandErosion:Dilation,StructuringElementDecomposition,Erosion,CombiningDilationandErosion,OpeningandClosing,Hitor MissTransformation.

UNIT V

ImageCompression

RedundanciesandtheirRemovalMethods,FidelityCriteria,ImageCompressionModels,Huffmanand ArithmeticCoding,ErrorFreeCompression,LossyCompression,LossyandLosslessPredictiveCodin g,TransformBasedCompression.

TEXT BOOKS

1. DigitalImageProcessing-RafaelC.Gonzalez,RichardE.Woods,4th Ed.,Pearson,2018.
2. DigitalImageProcessing-S Jayaraman,S Esakkirajan,TVeerakumar-TMH,2010.

REFERENCES

1. DigitalImageProcessingandAnalysis-HumanandComputerVisionApplicationwithusingCVIPTools-ScotteUmbaugh,2nd Ed.,CRCPress,2011.
2. DigitalImageProcessingusingMATLAB–RafaelC.Gonzalez,RichardEWoodsandStevenL.Eddings,2nd Ed.,TMH,2010.
3. DigitalImageProcessingandComputerVision–Somka,Hlavac,Boyle-CengageLearning(Indianedition)2008.
4. IntroductoryComputerVisionImagingTechniquesandSolutions-Adrianlow,2nd Ed.,BSPublication,2008.

SPEECH SIGNAL PROCESSING

(PE-3)

B.Tech IV Year I Semester

L	T	P	C
3	0	0	3

Pre-requisite: SignalsandSystemsandProbabilityTheoryandStochasticProcesses

CourseObjectives

Theobjectivesofthiscoursearetomakethestudent

1. Understand the anatomy and Physiology of Speech Production system and perceptionmodelandtodesign anelectricalequivalentofAcoustic modelfor Speech Production.
2. To analyze the speech in time domain and extract various time domain parameters whichcan be used for various applications likepitch extraction, end point detection, SpeechCompression,SpeechSynthesisetc.,
3. To study the concept of Homomorphic system and its use in extracting the vocal tractinformationfromspeechusingCepstrumwhichisabyeproductofHomomorphicprocessin gofSpeech.
4. TostudyvariousSpeechSignalProcessingapplicationsviz:SpeechEnhancement,SpeechReco gnition,SpeakerRecognition.

CourseOutcomes

Oncompletionofthiscoursestudent willbeableto

1. ModelanelectricalequivalentofSpeechProductionsystem.
2. ExtracttheLPCcoefficientsthatcanbeusedtoSynthesizeorcompressthe speech.
3. Design aHomomorphicVocoderforcodingand decodingofspeech.
4. EnhancethespeechandcandesignanIsolatedwordrecognitionsystemusingHMM.
5. ExtractthefeaturesforAutomaticspeakerrecognitionsystemwhichcanusedforclassification.

UNITI
FundamentalsofDigitalSpeechProcessing

Anatomy & Physiology of Speech Organs, The process of Speech Production, The AcousticTheory of Speech Production – Uniform lossless tube model, effect of losses in vocal tract, effectifradiationatlips,Digitalmodelsforspeechsignals.

UNITII
TimeDomain ModelsforSpeechProcessing

Introduction- Windowconsiderations, Short time energyand average magnitude Short timeaverage zero crossing rate, Speech vs Silence discrimination using energy and zero crossing,Pitch period estimation using a parallel processingapproach. The short time autocorrelationfunction,Theshorttimeaveragemagnitudedifferencefunction,Pitchperiodestimationusin gtheautocorrelationfunction.

UNITIII
LinearpredictiveCoding(LPC)Analysis

Basic principles of Linear Predictive Analysis : The Autocorrelation Method, The CovarianceMethod,SolutionofLPC

Equations:CholeskyDecompositionSolutionforCovarianceMethod,

Durbin's Recursive Solution for the Autocorrelation Equation, comparison between the Methodof Solution of the LPC Parameters: Pitch Detection using LPC Parameters, Formant AnalysisusingLPCParameters.

UNITIV
HomomorphicSpeechProcessing

Introduction Homomrphic Systems for Convolution: Properties of the Complex Cepstrum,ComputationalConsiderations,TheComplex CepstrumofSpeech,pitchDetection,FormantEstimation,andTheHomomorphicVocoder.
Speech Enhancement-Nature of interfering sounds, Speech enhancement techniques: SinglemicrophoneApproach:spectralsubtraction,Enhancementbyre-synthesis,Comb filter,Wienerfilter,MultimicrophoneApproach.

UNITV
AutomaticSpeech&SpeakerRecognition

Basic pattern recognition approaches, parametric representation of speech, evaluating thesimilarityofspeechpatterns,isolateddigitRecognitionSystem,ContinuousdigitRecognitionSystem
HiddenMarkovModel(HMM)forSpeech
HiddenMarkovModel(HMM)forspeechrecognition,Viterbialgorithm,TrainingandtestingusingHMMS .
SpeakerRecognition
Recognitiontechniques,FeaturesthatdistinguishspeakersSpeakerRecognitionSystems:Speaker VerificationSystems,SpeakeridentificationSystems.

TEXTBOOKS

1. DigitalProcessingofSpeechSignals–L.R.RabinerS.W.Schafer.PearsonEducation.
2. Speech Communication : Human & Machine – Douglas O' Shaughnessy, 2nd Ed., EEEPress.
3. DigitalProcessingofSpeechSignals L.RRabinar andRWJhaung,1978,PHI.

REFERENCES

1. DiscreteTimeSpeechSignalProcessing:PrinciplesandPractice–Thomas F.Quateri,1st Ed.,PE.
2. Speech&AudioSignalProcessing– BenGold&NelsonMorgan,1stEd.,Wiley.

BIOMEDICAL SIGNAL PROCESSING

(PE-3)

B.Tech IV Year I Semester

L	T	P	C
3	0	0	3

Prerequisite: AdvancedDigitalSignalProcessing

CourseObjectives

Themain objectivesofthecourse are:

1. Tousebasic probabilitytheorytomodelrandomsignalsintermsof RandomProcesses.
2. Tounderstandvariouscardilogicalsignalprocessingtechniquesandnoisecancellationtechniques.
3. TounderstandestimationofsignalsusingProny'sandleastsquareandlinearpredictionmethods.
4. TocomprehendEEGsignals,modelingandsleep stages.

CourseOutcomes

Afterstudyingthecourse,eachstudentisexpectedtobeable to:

1. Useprobabilitytheorytomodelrandomprocesses.
2. Comparevariouslossless andlossydatacompressiontechniques.
3. ComparevariousECGprocessingandnoisecancellationtechniques.
4. ModelandestimateEEGsignalsandvarioussleepstages.

UNIT-I

RandomProcesses: Stationaryrandomprocess,Ergodicity,Powerspectraldensityandautocorrelationfunctionof randomprocesses.Noisepowerspectraldensity analysis,Noisebandwidthandnoisefigureofsystems.

UNIT-II

DataCompressionTechniques: Lossy andLosslessdatareductionAlgorithms.ECGdatacompressionusing Turning point,AZTEC,CORTES,Huffmancoding,vectorquantisation,DICOMStandards

UNIT-III

Cardiological Signal Processing: Pre-processing, QRS Detection Methods, Rhythm analysis,ArrhythmiaDetectionAlgorithms,AutomatedECGAnalysis,ECGPatternRecognition.
Adaptive Noise Cancelling: Principles of Adaptive Noise Cancelling, Adaptive Noise Cancellingwith the LMS Adaptation Algorithm, Noise Cancelling Method to Enhance ECG Monitoring,FetalECGMonitoring.

UNIT-IV

Signal Averaging, Polishing: Mean and trend removal, Prony's method, Prony's Method basedon the Least Squares Estimate, Linear prediction, Yule – Walker (Y –W) equations, Analysis ofEvokedPotentials.

UNIT-V

Neurological Signal Processing: Modelling of EEG Signals, Detection of spikes and spindlesDetection of Alpha, Beta and Gamma Waves. Auto Regressive (A.R.) modelling of seizure EEG.SleepStageanalysis,InverseFiltering,Leastsquaresandpolynomialmodelling.

TEXTBOOKS

1. Probability,RandomVariables&RandomSignalPrinciples–PeytonZ.Peebles,4th Ed.,TMH,2009.
2. BiomedicalSignalProcessing-Principlesand Techniques-D.C. Reddy,TMH,2005.

REFERENCES

1. DigitalBioDignalProcessing-WeitkunatR,Elsevier, 1991,.
2. BiomedicalSignalProcessing-Vol.ITime&FrequencyAnalysis-Cohen.A,,CRCPress,1986.
3. BiomedicalDigitalSignalProcessing:C-LanguageExperimentsandLaboratoryExperiments,WillisJ.Tompkins,PHI,1998.

MICRO-CHIP FABRICATION TECHNIQUES

(PE-4)

B.Tech IV Year I Semester

L	T	P	C
3	0	0	3

LOWPOWER VLSI

(PE–4)

B.Tech IV Year I Semester	L	T	P	C
	3	0	0	3

Pre-

Requisite:VLSICourseObj

ectives

Theobjectivesofthiscourseareto:

1. IdentifysourcesofpowerinanIC.
2. IdentifythepowerreductiontechniquesbasedontechnologyindependentandtechnologydependentPowerdissipationmechanisminvariousMOSlogicstyle.
3. Identifysuitabletechniquestoreducethepowerdissipation.
4. Design adders,Multipliersandmemorycircuitswithlowpowerdissipation.

CourseOutcomes

Students able to

1. Understand the need of c VLSI designing.
2. Acquire a knowledge in consideration of various dissipations.
3. Design various lowpoweradders,multipliers and memories.
4. Get knowledge in various design approaches.

UNITI

Fundamentals

NeedforLowPowerCircuitDesign,SourcesofPowerDissipation–SwitchingPowerDissipation,ShortCircuitPowerDissipation,LeakagePowerDissipation,GlitchingPowerDissipation,ShortChannelEffects–DrainInducedBarrierLoweringandPunchThrough,Surface Scattering,VelocitySaturation,Impact Ionization,HotElectronEffect.

UNITII

Low-PowerDesignApproaches

Low-PowerDesignthroughVoltageScaling**–**VTCMOScircuits,MTCMOScircuits,ArchitecturalLevelApproach–PipeliningandParallelProcessingApproaches.

SwitchedCapacitanceMinimizationApproaches

SystemLevelMeasures,Circuit LevelMeasures,MasklevelMeasures.

UNITIII

Low-VoltageLow-PowerAdders

Introduction, Standard Adder Cells, CMOS Adder's Architectures – Ripple Carry Adders, CarryLook-AheadAdders,CarrySelectAdders,CarrySaveAdders,Low-VoltageLow-PowerDesignTechniques–Trendsof Technology andPower Supply Voltage,Low-VoltageLow-PowerLogicStyles.

UNITIV

Low-VoltageLow-PowerMultipliers

Introduction,OverviewofMultiplication,TypesofMultiplierArchitectures,BraunMultiplier,Baugh-WooleyMultiplier,BoothMultiplier,IntroductiontoWallaceTreeMultiplier.

UNITV

Low-VoltageLow-PowerMemories

Basics of ROM,Low-Power ROM Technology, FutureTrendandDevelopment of ROMs,BasicsofSRAM,MemoryCell,PrechargeandEqualizationCircuit,Low-PowerSRAMTechnologies,BasicsofDRAM,Self-RefreshCircuit,FutureTrendandDevelopmentofDRAM.

TEXTBOOKS

1. CMOSDigitalIntegrated Circuits–AnalysisandDesign–Sung-MoKang,YusufLeblebici,TMH,2011.
2. Low-Voltage,Low-PowerVLSISubsystems–Kiat-SengYeo,KaushikRoy, TMHProfessionalEngineering.

REFERENCES

1. Introductionto VLSISystems:A Logic,Circuit andSystemPerspective–Ming-BOLin,CRCPress,2011.
2. LowPowerCMOSDesign –AnanthaChandrakasan, IEEEPress/WileyInternational,1998.
3. LowPowerCMOSVLSICircuitDesign–KaushikRoy,SharatC.Prasad,JohnWiley&Sons,2000.
4. Practical Low PowerDigitalVLSIDesign–GaryK.Yeap,KluwerAcademicPress,2002

TESTING AND TESTABILITY
(PE–4)

B.Tech IV Year I Semester	L	T	P	C
	3	0	0	3

RADAR SYSTEMS

(PE-5)

B.Tech IV Year I Semester

L	T	P	C
3	0	0	3

Pre-requisite- AnalogandDigitalCommunications

CourseObjectives

1. Toexploretheconceptsofradaranditsfrequencybands.
2. TounderstandDopplereffectandgetacquaintedwiththeworkingprinciplesofCWradar,FM-CWradar.
3. Toimparttheknowledgeoffunctioningof MTIandTrackingRadars.
4. Toexplainthedeigningofa MatchedFilterinradarreceivers.

CourseOutcomes

Uponcompletingthiscourse,thestudentwill beable to

1. Derivethe completeradarrangeequation.
2. UnderstandtheneedandfunctioningofCW,FM-CWandMTIradars.
3. KnownvariousTrackingmethods.
4. Derivethematchedfilter responsecharacteristicsforradarreceivers.

UNITI

Basicsof Radar

Maximum Unambiguous Range, Simple form of Radar Equation, Radar Block Diagram andOperation, Radar Frequencies and Applications. Prediction of Range Performance, MinimumDetectableSignal,ReceiverNoise,ModifiedRadarRangeEquation.

RadarEquation

SNR, Envelope Detector – False Alarm Time and Probability, Integration of Radar Pulses, RadarCross Section of Targets, Transmitter Power, PRF and Range Ambiguities, System Losses(qualitativetreatment).

UNITII

CWand FrequencyModulatedRadar

Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zeroIFReceiver,ReceiverBandwidthRequirements,ApplicationsofCWradar.

FM-CWRadar

RangeandDopplerMeasurement,BlockDiagramandCharacteristics,FM-CW altimeter.

UNITIII

MTIandPulseDopplerRadar

Principle, MTI Radar- Power Amplifier Transmitter and Power Oscillator Transmitter, DelayLine Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, Staggered PRFs.Range

Gated Doppler Filters. MTI Radar Parameters, Limitations to MTI Performance, MTIversusPulseDopplerRadar.

UNITIV

Tracking Radar

Tracking with Radar, Sequential Lobing, Conical Scan, Mono pulse Tracking Radar – AmplitudeComparison Mono pulse (one- and two- coordinates), Phase Comparison Mono pulse, TrackinginRange,AcquisitionandScanningPatterns,ComparisonofTrackers.

UNITV

DetectionofRadarSignalsin Noise

Matched Filter Receiver – Response Characteristics and Derivation, Correlation Function andCross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-whiteNoise.

RadarReceivers

Noise Figure and Noise Temperature, Displays – types. Duplexers – Branch type and Balancedtype,CirculatorsasDuplexers.IntroductiontoPhasedArrayAntennas– BasicConcepts,RadiationPattern,BeamSteeringandBeamWidthchanges,Applications,Advantagesand Limitations.

TEXTBOOKS

1. IntroductiontoRadarSystems–MerrillI.Skolnik,TMHSpecialIndianEdition,2nd Ed.,2007.

REFERENCES

1. Radar:Principles,Technology,Applications– ByronEdde,PearsonEducation,2004.
2. RadarPrinciples–Peebles,Jr.,P.Z.,Wiley,NewYork,1998.
3. PrinciplesofModernRadar:BasicPrinciples–MarkA.Richards,JamesA.Scheer,William A.Holm,Yesdee,2013.
4. RadarHandbook-MerrillI.Skolnik,3rd Ed.,McGrawHillEducation,2008.

SATELLITE COMMUNICATIONS

(PE-5)

B.Tech IV Year I Semester

L	T	P	C
3	0	0	3

Pre-requisite AnalogandDigitalCommunications

CourseObjectives

1. Toacquiredfoundationinorbitalmechanicsandlaunchvehiclesforthesatellites.
2. Toprovidebasic knowledgeof linkdesignofsatellite.
3. Tounderstandmultipleaccesssystemsand earthstationtechnology.
4. Tounderstandtheconceptsofsatellitenavigationand GPS.

CourseOutcomes

Uponcompletingthiscourse,thestudentwill beable to

1. Understandbasicconceptsandfrequencyallocationsforsatellitecommunication,orbitalmechanicsandlaunchvehicles.
2. Envisionthesatellitesubsystemsanddesignsatellitelinksforspecified C/N.
3. Understandthevariousmultipleaccesstechniquesforsatellitecommunicationsystemsandearthstationtechnologies.
4. ExploretheLEO,GEOStationarySatellite Systemsandsatellitenavigation.

UNITI

Introduction

OriginofSatelliteCommunications,HistoricalBack-ground,BasicConceptsofSatelliteCommunications, Frequency Allocations for Satellite Services, Applications, Future Trends ofSatelliteCommunications.

OrbitalMechanicsandLaunchers

OrbitalMechanics,LookAngledetermination,OrbitalPerturbations,Orbitdetermination,LaunchesandLaunchvehicles,OrbitalEffectsinCommunicationSystemsPerformance.

UNITII

SatelliteSubsystems

Attitude and Orbit Control System, Telemetry, Tracking, Command And Monitoring, PowerSystems,CommunicationSubsystems,SatelliteAntennas,EquipmentReliabilityandSpaceQualification.

UNITIII

SatelliteLink Design

Basic Transmission Theory, System Noise Temperature and G/T Ratio, Design of Down Links,UpLinkDesign,DesignOfSatelliteLinksForSpecifiedC/N,SystemDesignExamples.

MultipleAccess

Frequency DivisionMultipleAccess(FDMA),Intermodulation,CalculationofC/N,TimeDivisionMultipleAccess(TDMA),FrameStructure,Examples,SatelliteSwitchedTDMAOnboardProcessing,DAMA,CodeDivisionMultipleAccess(CDMA),SpreadSpectrumTransmissionandReception.

UNITIV

EarthStationTechnology

Introduction,Transmitters,Receivers,Antennas,TrackingSystems,TerrestrialInterface,PrimaryPowerTestMethods.

UNITV

LowEarthOrbitandGeo-StationarySatelliteSystems

OrbitConsiderations,CoverageandFrequencyConsideration,Delay&ThroughputConsiderations,SystemConsiderations,OperationalNGSOConstellationDesigns.

SatelliteNavigation&GlobalPositioning System

Radio and Satellite Navigation, GPS Position Location Principles, GPS Receivers and Codes,SatelliteSignalAcquisition,GPSNavigationMessage,GPSSignalLevels,GPSReceiverOperation,GPSC/ACodeAccuracy,DifferentialGPS.

TEXTBOOKS

1. SatelliteCommunications–TimothyPratt,CharlesBostianandJeremyAllnutt,WSE,WileyPublications,2ndEd.,2003.
2. SatelliteCommunicationsEngineering–WilburL.Pritchard,RobertANelsonandHenriG.Suyderhoud,2ndEd.,PearsonPublications,2003.

REFERENCES

1. SatelliteCommunications:DesignPrinciples–M.Richharia,BSPublications,2nd Ed.,2003.
2. SatelliteCommunication-D.CAgarwal,KhannaPublications,5th Ed.
3. Fundamentals ofSatelliteCommunications–K.N.RajaRao,PHI,2004
4. SatelliteCommunications–DennisRoddy,McGrawHill,4thEd.,2009.

OPTICAL COMMUNICATIONS

(PE-5)

B.Tech IV Year I Semester

L	T	P	C
3	0	0	3

Prerequisite: AnalogCommunicationsandDigitalCommunications

CourseObjectives

Theobjectivesofthe course are:

1. Torealizethesignificanceofopticalfibercommunications.
2. Tounderstandtheconstructionandcharacteristicsofopticalfibercable.
3. Todeveloptheknowledgeofopticalsignalsources,detectorsandcouplingintoopticalfibers.
4. Tounderstandthedesignofopticalsystems and WDM.

CourseOutcomes

Attheendofthecourse,thestudentwillbeableto:

1. Understand and analyzetheconstructionalparametersofoptical fibers.
2. Beabletodesignanopticalsystem.
3. Estimatethelossesdueto attenuation,absorption, scatteringandbending.
4. Comparevariousopticaldetectorsand choosesuitableonefordifferent applications

UNITI

Overview of Optical Fiber Communication: - Historical development, The general system,Advantages of Optical Fiber Communications, Optical Fiber Wave Guides- Introduction, RayTheory Transmission, Total Internal Reflection, Acceptance Angle, Numerical Aperture, SkewRays, Cylindrical Fibers- Modes, Vnumber, Mode Coupling, Step Index Fibers, Graded IndexFibers.

Single Mode Fibers- Cut Off Wavelength, Mode Field Diameter, Effective Refractive Index,FiberMaterialsGlass,Halide,ActiveGlass,ChalgenideGlass,PlasticOpticalFibers.

UNITII

Signal Distortion in Optical Fibers: Attenuation, Absorption, Scattering and Bending Losses,CoreandCladdingLosses,InformationCapacityDetermination,GroupDelay,TypesofDispersion -MaterialDispersion,Wave-GuideDispersion,PolarizationModeDispersion,Intermodal Dispersion, Pulse Broadening, Optical Fiber Connectors- Connector Types, SingleModeFiberConnectors,ConnectorReturnLoss.

UNITIII

Fiber Splicing: Splicing Techniques, Splicing Single Mode Fibers, Fiber Alignment and JointLoss-MultimodeFiberJoints,SingleModeFiberJoints.

Optical Sources- LEDs, Structures, Materials, Quantum Efficiency, Power, Modulation, PowerBandwidth Product, Injection Laser Diodes- Modes, Threshold Conditions, External QuantumEfficiency,LaserDiodeRateEquations,ResonantFrequencies,ReliabilityofLED&ILD.

Source to Fiber Power Launching: - Output Patterns, Power Coupling, Power Launching,EquilibriumNumericalAperture,LaserDiodetoFiberCoupling.

UNITIV

Optical Detectors: Physical Principles of PIN and APD, Detector Response Time, TemperatureEffectonAvalancheGain,ComparisonofPhotoDetectors,OpticalReceiverOperation-FundamentalReceiverOperation,DigitalSignalTransmission,ErrorSources,ReceiverConfiguration,DigitalReceiverPerformance,Probability ofError,QuantumLimit,AnalogReceivers.

UNITV

Optical System Design: Considerations, ComponentChoice, Multiplexing,Point-to- PointLinks, System Considerations, Link Power Budget with Examples,Overall Fiber Dispersion inMulti-ModeandSingleModeFibers,RiseTimeBudgetwithExamples.

Transmission Distance, Line Coding in Optical Links, WDM, Necessity, Principles, Types ofWDM,MeasurementofAttenuationandDispersion,EyePattern.

TEXTBOOKS

1. OpticalFiberCommunications–GerdKeiser,TMH,4th Edition,2008.
2. Optical FiberCommunications –John M.Senior, PearsonEducation, 3rd Edition,2009.

REFERENCES

1. FiberOpticCommunications–D.K.Mynbaev,S.C.GuptaandLowellL.Scheiner,PearsonEducation,2005.
2. TextBookonOpticalFibreCommunicationanditsApplications–S.C.Gupta,PHI,2005.
3. FiberOpticCommunicationSystems–GovindP.Agarwal,JohnWiley,3rdEdiition,2004.
4. IntroductiontoFiberOpticsbyDonaldJ.SterlingJr.–Cengagelearning,2004.
5. OpticalCommunicationSystems–JohnGowar,2nd Edition,PHI,2001.

ELECTRONIC SENSORS
(OE-2)

B.Tech IV Year I Semester

L	T	P	C
3	0	0	3

CourseObjectives

1. Learnthecharacteristicsofsensors.
2. KnowtheworkingofElectromechanical,Thermal,Magnetic andradiationsensors.
3. UnderstandtheconceptsofElectroanalyticandsmartsensors.
4. Abletousesensorsindifferent applications.

CourseOutcomes

Uponcompletingthiscourse,thestudentwill beable to

1. LearnaboutsensorPrinciple,ClassificationandCharacterization.
2. ExploretheworkingofElectromechanical,Thermal,Magnetic,radiationandElectroanalyticsensors.
3. Understand thebasicconceptsofSmartSensors.
4. Design asystemwithsensors.

UNITI

Sensors/ Transducers

Principles,Classification,Parameters,Characteristics,EnvironmentalParameters(EP),Characterization

ElectromechanicalSensors

Introduction, Resistive Potentiometer, Strain Gauge, Resistance Strain Gauge, SemiconductorStrain Gauges -Inductive Sensors: Sensitivity and Linearity of the Sensor –Types-CapacitiveSensors: Electrostatic Transducer, Force/Stress Sensors Using Quartz Resonators, UltrasonicSensors.

UNITII

ThermalSensors

Introduction,GasthermometricSensors,ThermalExpansionTypeThermometricSensors,Acoustic Temperature Sensor, Dielectric Constant and Refractive Index thermo sensors, HeliumLowTemperatureThermometer,NuclearThermometer,MagneticThermometer,ResistanceChange Type Thermometric Sensors, Thermo EMF Sensors, Junction Semiconductor Types,ThermalRadiationSensors,QuartzCrystalThermoelectricSensors,NQRThermometry,Spectroscopic Thermometry,NoiseThermometry,HeatFluxSensors.

UNITIII

Magneticsensors

Introduction,SensorsandthePrinciplesBehind,Magneto-resistiveSensors,AnisotropicMagnetoresistiveSensing,SemiconductorMagnetoresistors,HallEffectandSensors
,InductanceandEddyCurrentSensors,Angular/RotaryMovement Transducers,Synchros.

UNITIV

Radiation Sensors

Introduction,BasicCharacteristics,TypesofPhotoresistors/Photodetectors,X-rayandNuclearRadiationSensors,FibreOpticSensors.

ElectroanalyticalSensors

TheElectrochemicalCell,TheCellPotential-StandardHydrogenElectrode(SHE),LiquidJunction and Other Potentials, Polarization, Concentration Polarization, Reference Electrodes,SensorElectrodes,ElectroceramicsinGasMedia.

UNITV

SmartSensors

Introduction,Primary Sensors,Excitation,Amplification,Filters,Converters,Compensation,InformationCoding/Processing-DataCommunication,StandardsforSmartSensor Interface,theAutomation

SensorsApplications

Introduction, On-board Automobile Sensors (Automotive Sensors), Home Appliance Sensors,AerospaceSensors,SensorsforManufacturing–SensorsforenvironmentalMonitoring

TEXTBOOKS

1. "SensorsandTransducers-D.Patranabis"–PHILearningPrivateLimited.,2003.
2. Introductiontosensors-Johnveteline,aravindraghu,CRCpress,2011

REFERENCES

1. SensorsandActuators,D.Patranabis ,2nd Ed.,PHI,2013.
2. Makesensors:Terokarvinen,kemo,karvinenandvilleyvaltokari,1stedition,makermedia,2014.

Sensorshandbook-Sabriesoloman,2nd Ed.TMH,2009

ANTENNAS AND MICROWAVE DEVICES LAB

B.Tech IV Year I Semester	**L**	**T**	**P**	**C**
	0	**0**	**2**	**1**

Tosetup MicrowaveBenchforany10of thefollowingExperimentsandobtainrelevantmeasurement/characteristics.

1. ReflexKlystronCharacteristics.
2. GunnDiodeCharacteristics.
3. MagicTCharacteristics.
4. CirculatorCharacteristics.
5. Attenuationmeasurement.
6. DirectionalcouplerCharacteristics.
7. Scatteringparametersofwaveguidecomponents.
8. Frequencymeasurement.
9. DirectFrequencymeasurement.
10. SlotSectionFrequencymeasurement.
11. Impedancemeasurement.
12. VSWRmeasurement.
13. CharacterizationofDirectionalcouplers/ TJunctionsusingVectorNetwork Analyzer
14. Design, simulate, fabricate and Testing using network analyzer of Horn Antenna

WIRELESS COMMUNICATIONS AND NETWORKS
(PGC-1)

B.Tech IV Year I Semester

L	T	P	C
3	0	0	3

Prerequisite:DigitalCommunications

Course Objectives

TheCourse Objectivesare:

1. To provide the students with the fundamental treatment about many practical and theoreticalconceptsthat formsbasicofwirelesscommunications.
2. Toequipthestudentswithvarious kindsofwirelessnetworksanditsoperations.
3. Toprovideananalyticalperspectiveonthedesignandanalysisofthetraditionalandemerging wireless networks,and todiscuss the nature of, and solution methods to, thefundamentalproblemsinwirelessnetworking.
4. To train students to understand the architecture and operation of various wireless wide areanetworks.

Course Outcomes

Uponcompletionofthecourse,thestudentwillbeableto:

1. Understandcellularsystemdesignconcepts.
2. Analyzeandestimatepropagationpathlossandfading.
3. DesignEqualizationandDiversitytechniques.
4. Analyzeandimplement theWLAN,WPAN,802.16standards**.**

UNIT-I

TheCellularConcept-SystemDesignFundamentals

Introduction, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies-PrioritizingHandoffs, Practical Handoff Considerations, Interference and system capacity – Co channelInterference and system capacity, Channel planning for Wireless Systems, Adjacent Channelinterference,PowerControlforReducinginterference,TrunkingandGradeofService,ImprovingCoverage&CapacityinCellularSystems-CellSplitting,Sectoring.

UNIT–II

MobileRadioPropagation:Large-ScalePathLoss

Introduction to Radio Wave Propagation, Free Space Propagation Model, Relating Power toElectricField,TheThreeBasicPropagationMechanisms,Reflection-ReflectionfromDielectrics, Brewster Angle, Reflection from prefect conductors, Ground Reflection (Two-Ray)Model, Diffraction-Fresnel Zone Geometry, Knife-edgeDiffraction Model, Multiple knife-edgeDiffraction, Scattering, Outdoor Propagation Models- Longley-Rice Model,Okumura Model,HataModel,PCSExtensiontoHataModel,WalfischandBertoniModel,WidebandPCSMicrocellModel,Indoor Propagation Models-Partition losses (SameFloor), Partition lossesbetween Floors, Log-distance path loss model, Ericsson Multiple Breakpoint Model, AttenuationFactorModel,Signalpenetrationintobuildings,RayTracingandSiteSpecific Modeling.

UNIT–III

MobileRadioPropagation:Small –ScaleFadingandMultipath

SmallScaleMultipathpropagation-Factorsinfluencingsmallscalefading,Dopplershift,Impulse Response Model of a multipath channel- Relationship between Bandwidth and Receivedpower, Small-Scale Multipath Measurements-Direct RF Pulse System, Spread Spectrum SlidingCorrelatorChannelSounding,FrequencyDomainChannelsSounding,ParametersofMobile

Multipath Channels-Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread andCoherence Time, Types of Small-Scale Fading-Fading effects Due to Multipath Time DelaySpread, Flat fading, Frequency selective fading, Fading effects Due to Doppler Spread-Fastfading, slow fading, Statistical Models for multipath Fading Channels-Clarke's model for flatfading, spectral shape due to Doppler spread in Clarke's model, Simulation of Clarke and GansFadingModel,Levelcrossingandfadingstatistics,Two-rayRayleighFadingModel.

UNIT-IV

EqualizationandDiversity

Introduction, Fundamentals of Equalization, Training A Generic Adaptive Equalizer,Equalizersin a communication Receiver, Linear Equalizers, Non linear Equalization-Decision FeedbackEqualization (DFE), Maximum Likelihood Sequence Estimation (MLSE) Equalizer, Algorithmsfor adaptiveequalization-ZeroForcing Algorithm,LeastMeanSquareAlgorithm,Recursiveleast squares algorithm. Diversity Techniques-Derivation of selection Diversity improvement,Derivation of Maximal Ratio Combining improvement, Practical Space Diversity Consideration-Selection Diversity, Feedback or Scanning Diversity, Maximal Ratio Combining, Equal GainCombining,PolarizationDiversity,FrequencyDiversity,TimeDiversity,RAKEReceiver.

UNIT-V

WirelessNetworks

IntroductiontowirelessNetworks,AdvantagesanddisadvantagesofWirelessLocalAreaNetworks, WLAN Topologies, WLAN StandardIEEE 802.11,IEEE 802.11 Medium AccessControl, Comparision of IEEE 802.11 a,b,g and n standards, IEEE 802.16 and its enhancements,WirelessPANs,HiperLan,WLL.

TEXT BOOKS

1. WirelessCommunications,Principles,Practice–Theodore,S.Rappaport,2nd Ed.,2002,PHI.
2. WirelessCommunications-AndreaGoldsmith,2005CambridgeUniversityPress.
3. PrinciplesofWirelessNetworks–KavehPah LavenandP. KrishnaMurthy,2002,PE
4. MobileCellularCommunication–Gottapu SasibhushanaRao,PearsonEducation,2012.

REFERENCES

1. WirelessDigitalCommunications–KamiloFeher,1999,PHI.
2. WirelessCommunicationandNetworking–WilliamStallings,2003,PHI.

SCRIPTINGLANGUAGESLABORATORY

(PGLAB1)

B.Tech IV Year I Semester

L	T	P	C
0	0	4	2

Prerequisites:Students shouldinstallPythonon Linux platform.

ListofProgramsPart:I

PreliminaryExercises:

1. TodemonstratedifferentnumberdatatypesinPython.
2. ToperformdifferentArithmeticOperationsonnumbersin Python.
3. Tocreate,concatenateandprintastringandaccessingsub-stringfromagivenstring.
4. Writeapythonscripttoprintthecurrentdateinthefollowingformat“SunMay2902:26:23IST2017”
5. Todemonstrateworkingwithdictionariesinpython.
6. Tofindlargestofthreenumbers.
7. WriteaPythonprogramtoconstructtheapattern,usinganestedforloop.
8. WriteaPythonscriptthatprintsprimenumberslessthan20.
9. ToconverttemperaturestoandfromCelsius,Fahrenheit.

Part:II

10. Tocreate,append,andremovelistsinpython.
11. Todemonstrateworkingwithtuplesinpython.
12. TofindfactorialofanumberusingRecursion.
13. WriteaPythonclasstoimplementpow(x,n)
14. Writeascriptnamedcopyfile.py.Thisscriptshouldprompttheuserforthenamesoftwotextfiles. Thecontentsofthefirstfile shouldbeinputandwrittentothesecondfile.
15. Writeaprogramthatinputsatextfile.Theprogramshouldprintalloftheuniquewordsinthefileinalphabetical order.
16. Write a Python class to find the frequency of each alphabet (of any language) in the giventextdocument.

ADVANCED DIGITAL SIGNAL PROCESSING
(PGC-2)

B.Tech IV Year II Semester

L	T	P	C
3	0	0	3

Prerequisite: DigitalSignalProcessing

Course Objectives

Theobjectivesofthiscourseareto:

1. Understandtheimplementationofdigitalfiltersusingvariousstructuresandstudytheadvantages&disadvantages ofimplementationstructures.
2. Studyvariousparametric andnon-parametricmethodsofpowerspectrumestimation.
3. Understand the effects of finite word length in hardware implementation of IIR filters andFFT.
4. UnderstandtheconceptsandneedforMultiratesignalProcessingandtheirapplications.

Course Outcomes

Oncompletionofthiscoursestudent willbeableto:

1. Implementafilterinvarious forms.
2. EstimatethepowerspectrumofsignalcorruptedbynoiseusingNon-ParametricorParametricmethods.
3. Analyzefinitewordlength effectsin IIR filtersandFFT.
4. ImplementvariousapplicationsofMultiratesignalprocessing.

UNIT–I

Review of DFT, FFT, IIR Filters and FIR Filters: Introduction to filter structures (IIR &FIR).Implementation of Digital Filters, specifically 2^{nd} Order Narrow Band Filter and 1^{st} OrderAll Pass Filter. Frequency sampling structures of FIR, Lattice structures, Forward predictionerror,Backwardpredictionerror,Reflectioncoefficientsforlatticerealization,Implementationoflatticestructuresfor IIRfilters,Advantagesoflatticestructures.

UNIT-II

Non-Parametric Methods: Estimation of spectra from finite duration observation of signals,Non-parametric Methods: Bartlett, Welch & Blackman-Tukey methods, Comparison of all Non-Parametricmethods

UNIT-III

Parametric Methods: Autocorrelation & Its Properties, Relation between auto correlation &modelparameters,ARModels-Yule-Walker& Burg Methods,MA& ARMAmodelsforpower spectrum estimation, Finite word length effect in IIR digital Filters – Finite word-lengtheffectsinFFTalgorithms.

UNIT–IV

Multi Rate Signal Processing: Introduction, Decimation by a factor D, Interpolation by a factorI, Sampling rate conversion by a rational factorI/D, Multistage Implementation of SamplingRate Conversion, Filter design & Implementation for sampling rate conversion. Examples of up-samplingusinganAllPassFilter.

UNIT–V

Applications of Multi Rate Signal Processing: Design of Phase Shifters, Interfacing of DigitalSystems with Different Sampling Rates, Implementation of Narrow Band Low Pass Filters,Implementation of Digital Filter Banks, Subband Coding of Speech Signals, Quadrature MirrorFilters,Transmultiplexers,OverSamplingA/DandD/AConversion.

TEXT BOOKS

1. DigitalSignalProcessing:Principles,Algorithms&Applications-
   J.G.Proakis&D.G.Manolakis,4thEd.,PHI.
2. DiscreteTimesignalprocessing-AlanVOppenheim &RonaldW Schaffer,PHI.

REFERENCES

1. ModernspectralEstimation:Theory&Application–S.M.Kay,PHI,1988.
2. Multi RateSystemsandFilterBanks–P.P.Vaidyanathan–PearsonEducation.
3. DSP–APracticalApproach–EmmanuelC.Ifeacher,Barrie.W.Jervis,2Ed.,PearsonEducation.

ADAPTIVE SIGNAL PROCESSING
(PGC-3)

B.Tech IV Year II Semester

L	T	P	C
3	0	0	3

Prerequisite: DigitalSignalProcessing

CourseObjectives

Themain objectivesofthecourse are:

1. Thiscoursefocusesonproblemsalgorithmsandsolutionsforprocessingsignalsinanmannerthatisresponsivetoachangingenvironment.
2. Todevelopsystemsonrecursive,modelbasedestimationmethodstakingtheadvantageofthestatisticalpropertiesofthereceivedsignals.
3. Toanalyzetheperformanceofadaptivefilters andconsiderstheapplicationofthetheorytoavarietyofpracticalproblemssuchasbeamformingandechocancellationsignal.
4. Tounderstandinnovationprocess,Kalmanfiltertheoryandestimationofstateusingtheinnovationprocess,conceptofKalmanGainandFiltering.

CourseOutcomes

Afterstudyingthecourse,thestudentisexpectedtobeableto:

1. Designandapply optimalminimummeansquareestimatorsandinparticularlinearestimators.
2. Design,implementandapplyWienerFilters(FIR,non-casual,causal)andevaluatetheirperformance.
3. Tounderstandinnovationprocess,Kalmanfiltertheoryand estimationofstateusingtheInnovationProcess
4. Design,implementandapplyLMS,RLS andKalmanfiltersto givenapplications.

UNIT–I

IntroductiontoAdaptiveSystemsAdaptiveSystems

Definitions, Characteristics, Applications, Example of an Adaptive System. The Adaptive LinearCombiner - Description, Weight Vectors, Desired Response Performance function - Gradient &MeanSquareError.

UNIT–II

DevelopmentofAdaptiveFilterTheory&SearchingthePerformancesurface

IntroductiontoFiltering-SmoothingandPrediction–Linear OptimumFiltering,Problemstatement, Principle of Orthogonally - Minimum Mean Square Error, Wiener- Hopf equations,ErrorPerformance-MinimumMeanSquare Error,Estimationofphase shiftbetweentwonarrow bandsignalsusingOrthogonalDecomposer.

UNIT–III

SteepestDescentAlgorithms

Searching the performance surface – Methods & Ideas of Gradient Search methods - GradientSearchingAlgorithm&itsSolution-Stability&RateofconvergenceLearningCurvesGradient Search by Newton's Method, Method of Steepest Descent, Comparison of LearningCurves.

UNIT–IV

LMSAlgorithm&Applications

Overview - LMS Adaptation algorithms, Stability & Performance analysis of LMS Algorithms - LMSGradient&Stochasticalgorithms-ConvergenceofLMSalgorithm.**Applications:**Adaptive BFSK,BPSK,ASKdemodulatorsanddelay estimation.AdaptiveBeam forming,concept of IQ channels, Adaptive filter implementation of Hilbert Transform. Introduction toMUSIC

UNIT–V

StateEstimators

Introduction to RLS Algorithm, Statement of Kalman filtering problem, The Innovation Process,Estimation of State using the Innovation Process- Expression of Kalman Gain, Filtering Exampleestimation of state from observations of noisy observed narrow band signals. Target trackingusingonlyDOA.

TEXTBOOKS

1. AdaptiveSignalProcessing-BernardWidrow,SamuelD.Strearns,PE,2005.
2. AdaptiveFilterTheory-SimonHaykin-,4th Ed.,PEAsia2002.

REFERENCES

1. DigitalSignalProcessing:APractitioner'sApproach,KaluriV.Rangarao,RanjanK.MallikISBN:978-0-470-01769-2,210pages,JohnWeley(UK),November2006.
2. Optimumsignalprocessing:Anintroduction-Sophocles.J.Orfamadis,2Ed.,McGraw-Hill,Newyork,1988.
3. Adaptivesignalprocessing-TheoryandApplications,S.ThomasAlexander,Springer–Verlag,1986.
4. Siganlanalysis– Candy, McGraw HillInt.StudentEdition

JamesV.Candy,SignalProcessing:AModernApproach,McGraw-Hill,InternationalEdition,1988.

RANDOMPROCESSESANDQUEUINGTHEORY
(PGE-1)

B.Tech IV Year II Semester

L	T	P	C
3	0	0	3

Prerequisite: ProbabilityTheory&StochasticProcesses

Course Objectives

Themain objectivesofthecourse are:

1. Toexploreintherandomprocessandqueuingtheoryusefulfor ComputerandcommunicationNetworks.
2. Understand Randomvariablesasanintrinsicneedfortheanalysisofrandomphenomena.
3. Tounderstandthemodelingoftelecommunicationnetworksusingappropriatequeuingprocess.
4. ToknowtheneedofMarkovchainsandqueuingtheoryincommunicationnetworks.

Course Outcomes

Studentswillbeableto**:**

1. FindvariousmomentsandCharacteristicfunctionsofRandomVariablesalongwithtransformationmethods.
2. Estimatethepowerspectraldensity,ACFandotherhigherorderstatisticsofRandomProcess.
3. AnalyzevariousQueuingprocessesviz M|M|1,M|M|1|K,M|G|1conceptsofMarkovChains.
4. ApplytheconceptofQueuingTheoryforimplementingvariouscontentionbasedandfixedassignment protocols.

UNIT I

RandomVariable

RandomVariables-BasicDefinitionsandproperties,Sumofindependentrandomvariables,MinimumandMaximumofrandomvariables,Comparisonsbetweenrandomvariables,Momentsoftherandomvariables,Randomvariablesinthefieldoftelecommunications,Transformationsofrandomvariables-Theprobabilitygeneratingfunction,thecharacteristicfunction of a pdf, The Laplace Transform of a pdf, Methods for the generation of randomvariables-Methodoftheinverseofthedistributionfunction,Methodofthetransformation.

UNIT II

RandomProcesses

The Random Process Concept, Concept of Stationarity and Statistical Independence, First OrderStationary Processes, Second Order and Wide Sense Stationary, (N-Order) and Strict SenseStationarity,TimeAveragesandErgodicity,MeanErgodicProcesses,CorrelationErgodicProcesses,AutocorrelationFunctionanditsProperties,CrossCorrelationfunctionanditsproperties, Covariance Functions, The Power Spectrum- Properties, Relationship between PowerspectrumandAutocorrelationfunction.

UNIT III

MarkovChainsandQueuing Theory

Queues, Poisson arrival process- Sum of independent Poisson processes, Random splitting of aPoissonprocess,CompoundPoissonprocesses,BirthdeathMarkovchains,FormulationofHidden Markov Model(HMM), building, evaluation and decoding of HMM, Notations forQueuingsystems,TheLittleTheorem,M/M/1queueanalysis,M/M/1/Kqueueanalysis,M/M/S

queueanalysis,M/M/S/Squeueanalysis,TheM/M/∞queueanalysis,Distributionofthequeuingdelaysi ntheFIFOcase-M/M/1case,M/M/Scase.

UNIT IV

M/G/1QueuingTheory

M/G/1 queue, M/G/1 system delay distribution in the FIFO case, Laplace Transform numericalinversion method, Generalizations of the M/G/1 theory, Different imbedding instants in theM/G/1theory,M/G/1withgeometricallydistributedmessages.

UNIT V

LocalAreaNetworkAnalysis

Introduction,Contentionbasedprotocols-Aloha,SlottedAloha,AlohaProtocolwithidealcapture effect, CSMA Schemes, Demand assignment protocols-Polling protocol, Token passingprotocol,AnalysisoftokenandpollingSchemes,R-Aloha,PRMAprotocol,ComparisonsbetweenCSMA/CDandTokenProtocols,FixedassignmentProtocols-FDMA,TDMA,Resourcereuseincellularsystems,CDMA.

TEXTBOOKS

1. Probability,RandomVariables&RandomSignalPrinciples-PeytonZ.Peebles,TMH,4thEdition,2001.
2. QueuingTheoryandTelecommunicationsNetworksandApplications,Springer,GiovanniGiambene,2014.

REFERENCES

1. Probability,RandomVariablesandStochasticProcesses–AthanasiosPapoulis,S.UnnikrishnaPillai–TMH,2008
2. ProbabilityandRandomProcesseswithApplicationsto SignalProcessing–HenryStark,JohnW.Woods,3rdEdition,Pearson,2003
3. ProbabilityandStochasticProcesses–AFriendlyIntroductionforElectricalandComputerEngineers–RoyD.Yates,DavidJ.Goodman.2014
4. DigitalProcessingofSpeechSignals. L.RRabinarandRWJhaung,1978, PHI.

BIO-MEDICALSIGNALPROCESSING

(PGE-1)

B.Tech IV Year II Semester

L	T	P	C
3	0	0	3

Prerequisite: AdvancedDigitalSignalProcessing

Course Objectives

Themain objectivesofthecourse are:

1. Tousebasic probabilitytheorytomodelrandomsignalsintermsof RandomProcesses.
2. Tounderstandvariouscardilogicalsignalprocessingtechniquesandnoisecancellationtechniques.
3. TounderstandestimationofsignalsusingProny'sandleastsquareandlinearpredictionmethods.
4. TocomprehendEEGsignals,modelingandsleep stages.

Course Outcomes

Afterstudyingthecourse,eachstudentisexpectedtobeable to:

1. ExtractthefeaturesofECGsignal.
2. Comparevariousdatacompressiontechniques.
3. ComparevariousnoisecancellationtechniquesforECGandEEGSignal.
4. ModelEEGsignalsandestimatevarioussleepstages.

UNIT-I

RandomProcesses: Stationaryrandomprocess,Ergodicity,Powerspectraldensityandautocorrelation functionof randomprocesses.Noisepowerspectraldensity analysis,Noisebandwidthandnoisefigureofsystems.

UNIT-II

DataCompressionTechniques: Lossy andLosslessdatareductionAlgorithms.ECGdatacompressionusing Turning point,AZTEC,CORTES,Huffmancoding,vectorquantisation,DICOMStandards

UNIT-III

Cardiological Signal Processing: Pre-processing, QRS Detection Methods, Rhythm analysis,ArrhythmiaDetectionAlgorithms,AutomatedECGAnalysis,ECGPatternRecognition.

Adaptive Noise Cancelling: Principles of Adaptive Noise Cancelling, Adaptive Noise Cancellingwith the LMS Adaptation Algorithm, Noise Cancelling Method to Enhance ECG Monitoring,FetalECGMonitoring.

UNIT-IV

Signal Averaging, Polishing: Mean and trend removal, Prony's method, Prony's Method basedon the Least Squares Estimate, Linear prediction, Yule – Walker (Y –W) equations, Analysis ofEvokedPotentials.

UNIT-V

Neurological Signal Processing: Modelling of EEG Signals, Detection of spikes and spindlesDetection of Alpha, Beta and Gamma Waves. Auto Regressive (A.R.) modelling of seizure EEG.SleepStageanalysis,InverseFiltering,Leastsquaresandpolynomialmodelling.

TEXT BOOKS

1. Probability,RandomVariables&RandomSignalPrinciples– PeytonZ.Peebles,4th Ed.,TMH,2009,.
2. BiomedicalSignalProcessing-Principlesand Techniques-D.C. Reddy,TMH,2005.

REFERENCES

1. DigitalBioDignalProcessing-WeitkunatR,Elsevier, 1991,.
2. BiomedicalSignalProcessing-Vol.ITime&FrequencyAnalysis-Cohen.A,,CRCPress,1986.
3. BiomedicalDigitalSignalProcessing:C-LanguageExperimentsandLaboratoryExperiments,WillisJ.Tompkins,PHI,1998.

ADVANCED DATA COMMUNICATIONS

(PGE–1)

B.Tech IV Year II Semester

L	T	P	C
3	0	0	3

Prerequisite: DigitalCommunication

Course Objectives

Themain objectivesofthecourse are:

1. Tolearnaboutbasicsofdatacommunicationnetworks,differentprotocols,standardsandlayeringconcepts.
2. Tostudyabouterrordetectionandcorrectiontechniques.
3. Toknowaboutlinklayer,pointtopoint,mediumaccessandcontrolsublayer protocols.
4. Tolearnaboutcharacteristicsofnetworklayerprotocolsandfunctionsofinterconnectingdevices.
5. Tostudyaboutphysicalandelectricalcharacteristicsof WiredLAN,serialbusesandtoknowaboutarchitecture&layersofCAN.

Course Outcomes

Attheendofthecourse,thestudentwillbeableto:

1. Understand various transmission modes, configurations and topologies of datacommunicationnetworks.
2. Analyze and compare various error detection and correction techniques of datacommunicationnetworks.
3. Acquiretheknowledgeaboutthefeaturesandfunctionsofvariousmediumaccesscontrolandnetworklayerprotocols.
4. UnderstandthefeaturesofWLAN, significanceofcommunicationbuses,interfacesandinterconnectingdevicesofdatacommunicationnetworks.

UNIT I

DataCommunications,NetworksandNetworkTypes,InternetHistory,StandardsandAdministration, ProtocolLayering,TCP/IPprotocolsuite,OSIModel,DigitalDataTransmission,DTE-DCEinterface.

Multiplexing

Multiplexing,FrequencyDivisionMultiplexing,SynchronousandStatisticalTimeDivisionMultiplexing,OFDM.

DataLinkLayer

Introduction,DataLinkLayer,NodesandLinks,Services,CategoriesofLinks,sublayers,LinkLayerAddressing,AddressResolutionProtocol.

UNIT II

ErrorDetection andCorrection

TypesofErrors,Redundancy,DetectionversusCorrection,Coding,BlockCoding-ErrorDetection, Vertical Redundancy Checks, Longitudinal Redundancy Checks, Error Correction-SinglebitErrorCorrection,HammingCode.

CyclicCodes

CyclicRedundancyCheck,Polynomials,CyclicCodeEncoderUsingPolynomials,CyclicCodeAnalysis,AdvantageofCyclicCodes,Checksum

DataLink Control:DLCServices,Data Link LayerProtocols,HDLC,PointtoPointProtocol

UNIT III

MediaAccessControl (MAC)SubLayer

RandomAccess,ALOHA,Carrier SenseMultipleAccess(CSMA),Carrier SenseMultipleAccesswithCollisionDetection(CSMA/CD),CarrierSenseMultipleAccesswithCollisionAvoidance(CSMA/CA),ControlledAccess-Reservation, Polling-TokenPassing, Channelization

-FrequencyDivisionMultipleAccess(FDMA),Time-DivisionMultipleAccess(TDMA),Code-DivisionMultipleAccess(CDMA).

UNIT IV

N**etworksLayer**

Packetizing, Routing and Forwarding,PacketSwitching,NetworkLayer Performance,IPv4Address,AddressSpace,ClassfulAddressing,ClasslessAddressing,DynamicHost Configuration Protocol(DHCP), Network Address Resolution(NATF), Forwarding of IP Packets,ForwardingbasedonDestinationAddress,ForwardingbasedonLabel,RouterasPacketSwitches.

Connectingdevices

Passive Hubs, Repeaters, Active Hubs, Bridges, Two Layer Switches, Routers, Three LayerSwitches,Gateway,BackboneNetworks.

UNIT V

WiredLANS

EthernetProtocol,Standard Ethernet,FastEthernet,GigabitEthernet,10 GigabitEthernet

Serial Busses- Cables, Serial busses, serial versus parallel, Data and Control Signal- data frame,datarate,features,LimitationsandapplicationsofRS232,RS485,I^2C,SPI

CAN

Architecture- ISO 11898-2, ISO 11898-3, Data Transmission- ID allocation, Bit timing, Layers-Application layers, Objectlayer, Transfer layer, Physical layer, Frame formats- Data frame,Remoteframe,Errorframe,Overloadframe,Ackslot,Interframespacing,Bitspacing,Applications.

TEXT BOOKS

1. Data CommunicationsandNetworking-B.A.Forouzan,**5th Ed.&2nd ,**TMH,2013.
2. AComprehensiveGuideto controllerAreaNetwork–WilfriedVoss,CopperhillMediaCorporation,2nd Ed.,2005.

REFERENCES

1. ComputerNetworking:ATop-DownApproach-JamesKurose&KeithRoss,7thEd.,Pearson,2017.
2. SerialPortComplete-COMPorts,USBVirtualComPortsandPortsforEmbeddedSystems-JanAxelson,LakeviewResearch,2nd Ed.
3. Data CommunicationsandComputerNetworks-BrijendraSingh,2nd Ed.,2008.
4. WirelessDigitalCommunications-KamiloFeher,PrenticeHall,2003.

DETECTION AND ESTIMATION THEORY
(PGE-1)

B.Tech IV Year II Semester

L	T	P	C
3	0	0	3

Prerequisite: ProbabilityTheoryandStochasticProcesses

Course Objectives

Themain objectivesofthecourse are:

1. Themainobjectiveofthiscourseistoprovidebasicestimationanddetectionbackgroundforengineeringapplications.
2. Thiscourseprovidesthe mainconceptsand algorithmsfordetectionandestimationtheory.
3. Students learnthestatisticsandestimatingtheparametersof RandomProcess fromdetection.
4. Toapplyestimationmethodsforrealtimeengineeringproblems.

Course Outcomes

Oncompletionofthiscoursestudent willbeableto

1. Understand thebasicRandomProcessanddetectionmethods.
2. FindtheProbabilityoferrorofvariousdetection techniques.
3. Learnaboutbasicestimationmethodsandfilters
4. Measurethestatisticalparametersforrandomprocesses

UNIT–I

RandomProcesses

DiscreteLinearModels,MarkovSequencesandProcesses,PointProcesses,andGaussianProcesses.

UNIT–II

DetectionTheory

Basic Detection Problem, Maximum A posteriori Decision Rule, Minimum Probability of ErrorClassifier, Bayes Decision Rule, Multiple-Class Problem (Bayes)- minimum probability error withandwithoutequalaprioriprobabilities,Neyman-PearsonClassifier,GeneralCalculationofProbabilityofError,GeneralGaussianProblem,Composite Hypotheses.

UNIT–III

LinearMinimumMean-SquareErrorFiltering

LinearMinimumMeanSquaredErrorEstimators,NonlinearMinimumMeanSquaredErrorEstimators.Innovations,DigitalWienerFilterswithStoredData,Real-timeDigitalWienerFilters,KalmanFilters.

UNIT–IV

Statistics

Measurements, Nonparametric Estimators of Probability Distribution and Density Functions, PointEstimatorsofParameters,MeasuresoftheQualityofEstimators,IntroductiontoIntervalEstimates, Distribution of Estimators, Tests of Hypotheses, Simple Linear Regression, MultipleLinearRegression.

UNIT–V

EstimatingtheParametersofRandomProcessesfromData

TestsforStationarityandErgodicity,Model-freeEstimation,Model-basedEstimationofAutocorrelationFunctions,PowerSpecialDensityFunctions.

TEXT BOOKS

1. RandomSignals:Detection,EstimationandDataAnalysis– K.SamShanmugan&A.M.Breipohl,WileyIndiaPvt.Ltd,2011.
2. RandomProcesses:Filtering,EstimationandDetection– LonnieC.Ludeman,WileyIndiaPvt.Ltd.,2010.

REFERENCES

2. FundamentalsofStatisticalSignalProcessing:VolumeIEstimationTheory– Steven.M.Kay,PrenticeHall,USA,1998.
3. IntroductiontoStatisticalSignalProcessingwithApplications– Srinath,Rajasekaran,Viswanathan,2003,PHI.
4. StatisticalSignalProcessing:Detection,EstimationandTimeSeriesAnalysis– LouisL.Scharf,1991,AddisonWesley.
5. SignalProcessing:DiscreteSpectralAnalysis–Detection&Estimation– MischaSchwartz,LeonardShaw,1975,McGrawHill.

DIGITAL SIGNAL PROCESSORS AND ARCHITECTURES
(PGE-2)

B.Tech IV Year II Semester

L	T	P	C
3	0	0	3

Prerequisite: DigitalSignalProcessing

Course Objectives

Themain objectivesofthecourse are:

1. Toprovideacomprehensiveunderstandingofvariousprogramsof DigitalSignalProcessors.
2. Todistinguishbetweenthearchitecturaldifferencesof ARMandDSPsalongwithfloatingpointcapabilities.
3. Toexplorearchitectureandfunctionalityofvarious DSPProcessorsandcanabletowriteprograms.
4. Toknownabouttheconnectivityofinterfacingdeviceswithprocessors.

Course Outcomes

Uponcompletingthiscourse,thestudent willbeable to:

1. Performvarioussignaloperationson TIDSPProcessor.
2. ComputetheimplementationerrorsinDSPprocessors.
3. Performvarioussignalprocessingoperationonanalogdeviceprocessors.
4. InterfacememoryandI/ODeviceswith Processors.

UNIT–I

FundamentalsofDigitalSignalProcessing

Digital signal-processing system, Sampling process, Discrete time sequences, Discrete FourierTransform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digitalfilters,DecimationandInterpolation,ComputationalAccuracyinDSPImplementations- Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision,Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors,D/AConversionErrors,Compensatingfilter.

UNIT–II

Architecturesfor ProgrammableDSPDevices

BasicArchitecturalfeatures,DSPComputationalBuildingBlocks,BusArchitectureandMemory,Data AddressingCapabilities,AddressGenerationUNIT,ProgrammabilityandProgramExecution,SpeedIssues,Features forExternalinterfacing.

UNIT-III

ProgrammableDigitalSignalProcessors

CommercialDigitalSignal-Processing Devices,DataAddressingmodesof TMS320C54XXDSPs,DataAddressingmodesofTMS320C54XXProcessors,MemoryspaceofTMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming,On-ChipPeripherals,InterruptsofTMS320C54XXprocessors,PipelineoperationofTMS320C54XXProcessors.

UNIT–IV

AnalogDevicesFamilyofDSPDevices

Analog Devices Family of DSP Devices – ALU and MAC block diagram, Shifter Instruction,Base Architecture of ADSP2100, ADSP-2181 high performance Processor. Introduction toBlackfinProcessor-TheBlackfinProcessor,IntroductiontoMicroSignalArchitecture,Overview of Hardware Processing Units and Register files, Address Arithmetic Unit, ControlUnit,BusArchitectureandMemory,BasicPeripherals

UNIT–V

InterfacingMemoryandI/O Peripherals toProgrammableDSPDevices

Memory space organization, External bus interfacing signals, Memory interface, Parallel I/Ointerface,ProgrammedI/O,InterruptsandI/O,Directmemoryaccess(DMA).

TEXT BOOKS

1. DigitalSignalProcessing:Principles,Algorithms&Applications– J.G.Proakis&D.G.Manolakis,4th Ed.,PHI,2006.
2. DigitalSignalProcessing–AvtarSingh andS.Srinivasan,ThomsonPublications,2004.

REFERENCES

1. A Practical Approach to Digital Signal Processing - K Padmanabhan, R.Vijayarajeswaran,Ananthi.S,NewAgeInternational,2009.
2. Digital Signal Processors, Architecture, Programming and Applications – B.VenkataramaniandM.Bhaskar,TMH,2002.
3. DSPProcessorFundamentals,Architectures&Features–Lapsleyetal.,S.Chand&Co.2000.

RADAR SIGNAL PROCESSING
(PGE-2)

B.Tech IV Year II Semester

L	T	P	C
3		**0**	**3**

Prerequisite: RadarSystems

Course Objectives

Themain objectivesofthecourse are:

1. Thiscourseemphasison theprinciplesofRadarSystemsand SignalProcessingtechniques.
2. AbilitytounderstandthevariousparametersofRadarlikepdf,prf.
3. AcquireknowledgeaboutpulsecompressionRadar.
4. TostudythephasecodingTechniques.

Course Outcomes

Uponthecompletionofthiscourse,thestudentwillbeableto

1. KnowtheprinciplesofRadarSystems.
2. Modelthesystemand calculatesystemperformanceparameters.
3. Understand theconceptsofpulsecompressionRadar.
4. DesignthephasecodesforRadar.

UNIT-I

Introduction

Radar,RadarBlockDiagram,RadarEquation,DetectionofSignalsinNoise,ReceiverNoiseandtheSignaltoRatio.

UNIT–II

RadarEquation

ProbabilityDensityFunction,ProbabilityofDetectionandFalseAlarm,RadarCrossSectionofTargets, TransmitterPower,PRFandAntennaParameters,CFARReceiver.

UNIT–III

WaveformSelection

RadarAmbiguityFunctionandAmbiguityDiagram–PrinciplesandProperties;SpecificCases – IdealCase,SinglePulseofSineWave,Periodic PulseTrain,SingleLinearFMPulse.

UNIT-IV

PulseCompressioninRadarSignals

Introduction,Significance,Types,LinearFMPulseCompression–BlockDiagram,Characteristics, Reduction of Time Side lobes, Stretch Techniques, Generation and Decoding ofFMWaveforms.

UNIT–V

PhaseCodingTechniques

Principles, Binary Phase Coding, Barker Codes, Maximal Length Sequences (MLS/LRS/PN),BlockDiagramofaPhaseCodedCWRadar.

TEXT BOOKS

1. RadarHandbook-M.I.Skolnik,2nd Ed.,1991,McGrawHill.
2. Radar DesignPrinciples:SignalProcessingandthe Environment- FredE. Nathanson, 2nd Ed.,1999,PHI.
3. IntroductiontoRadarSystems-M.I.Skolnik,3rd Ed.,2001,TMH.

REFERENCES

1. RadarPrinciples-PeytonZ.Peebles,Jr.,2004,JohnWiley.
2. RadarSignalProcessingandAdaptiveSystems-R.Nitzberg,1999,ArtechHouse.
3. RadarDesignPrinciples-F.E.Nathanson,1st Ed.,1969,McGrawHill.

VLSI SIGNAL PROCESSING
(PGE-2)

B.Tech IV Year II Semester

L	T	P	C
3	0	0	3

Prerequisite: VLSITechnology,DigitalSignalProcessing

Course Objectives

Theobjectivesofthiscourseareto:

1. IntroducetechniquesfortheexistingDSPstructurestosuitVLSIimplementations.
2. IntroduceefficientdesignofDSP architecturessuitableforVLSI.
3. Understandvariousfastconvolutiontechniques.
4. Understand lowpowerprocessorsforsignalprocessingandwirelessapplications

Course Outcomes

Onsuccessfulcompletionofthemodule,studentswillbeableto:

1. AbilitytomodifytheexistingornewDSParchitecturessuitableforVLSI.
2. Understandtheconceptsoffoldingandunfoldingalgorithmsand applications.
3. implementfastconvolutionalgorithms.
4. Lowpowerdesignaspectsofprocessorsforsignalprocessingand wirelessapplications.

UNIT-I

IntroductiontoDSP

TypicalDSP algorithms,DSPalgorithmsbenefits,RepresentationofDSP algorithms

Pipeliningand ParallelProcessing

Introduction,PipeliningofFIRDigitalfilters,ParallelProcessing,PipeliningandParallelProcessingfor LowPower

Retiming

Introduction,DefinitionsandProperties,SolvingSystemofInequalities,RetimingTechniques

UNIT–II

FoldingandUnfolding

Folding-

Introduction,FoldingTransform,RegisterminimizationTechniques,Registerminimizationinfoldedarchit ectures,foldingofMultiratesystems

Unfolding-

Introduction,AnAlgorithmforUnfolding,PropertiesofUnfolding,criticalPath,UnfoldingandRetimin g,ApplicationsofUnfolding

UNIT-III

SystolicArchitectureDesign

Introduction, Systolic Array Design Methodology, FIR Systolic Arrays, Selection of SchedulingVector,MatrixMultiplicationand2DSystolicArrayDesign,SystolicDesignforSpaceRepr esentationscontainDelays.

UNIT-IV

FastConvolution

Introduction – Cook-Toom Algorithm – Winogard algorithm – Iterated Convolution – CyclicConvolution–DesignofFastConvolutionalgorithmbyInspection

UNIT-V

Low PowerDesign

ScalingVsPowerConsumption,PowerAnalysis,PowerReductiontechniques,PowerEstimationApproaches

ProgrammableDSP

EvaluationofProgrammableDigitalSignal Processors,DSPProcessorsforMobileandWirelessCommunications,ProcessorsforMultimediaSignalProcessing

TEXT BOOKS

1. VLSIDigitalSignalProcessing-SystemDesignandImplementation– KeshabK.Parthi,WileyInterScience,1998.
2. VLSIandModernSignalprocessing– KungS.Y,H.J.WhileHouse,T.Kailath,PrenticeHall,1985.

REFERENCES

1. Design ofAnalog –DigitalVLSICircuits forTelecommunications andSignal Processing –JoseE.France, YannisTsividis, PrenticeHall,1994.
2. VLSIDigitalSignalProcessing–MedisettiV.K,IEEEPress(NY),1995.

TCP/IP AND ATM NETWORKS
(PGE-2)

B.Tech IV Year II Semester

L	T	P	C
3	0	0	3

Prerequisite: ComputerNetworks

Course Objectives

Themain objectivesofthecourse are:

1. TostudythefeaturesandfunctionsofNetworkLayerProtocols
2. TolearnaboutUserDatagramProtocol,TransmissionControlProtocolandstreamcontrolTransmission protocol.
3. TounderstandthetechniquestoimproveQoSinDataCommunicationNetworks
4. Tolearn aboutTransportLayerProtocolsforAdHocWirelessNetworks .
5. Tostudythefeaturesof ATMnetworksandvariousInterconnectionNetworks

Course Outcomes

Attheendofthecourse,thestudentwillbeableto:

1. UnderstandthefunctionsofNetworkLayerProtocols andTransportlayerprotocols.
2. Acquiretheknowledgeabouttheoperationandperformanceofmodifiedversionof TCPprotocol sinAd-hocwirelessnetworks.
3. Learnabout variousmechanismstoimproveQoSindatacommunicationnetworks
4. Understand thefeatures ofATMnetworksSONETand ArchitecturesofvariousInterconnectionNetworks

UNIT I

NetworkLayer

NetworkLayerServices**,**Packetswitching**,**NetworkLayerPerformance,IPv4Addresses,Internet protocol(IP), ICMPv4,IPv6 Addressing,IPv6 protocol,ICMPv6 protocol, TransitionfromIPv4toIPv6,MobileIP,ForwardingofIPPackets,Delivery-DirectVersusIndirectDelivery,Forwarding-Forwarding Techniques,Forwarding Process, Routing Table, Unicastrouting-Routingalgorithms,Unicastroutingprotocols,Multicastrouting-Introduction,Multicastingbasics.

UNIT II

TransportLayer

Introduction to Transport Layer, Transport layer services,Connectionless Versus ConnectionOriented Protocols, Transport Layer Protocols-Simple Protocols, Stop and Wait Protocols, GoBack N Protocol, Selective Repeat Protocol, Bidirectional Protocols-Piggybacking, Transportlayerprotocols:UserDatagramProtocol(UDP)-UserDatagram,UDPServices,UDPApplications, Transmission Control Protocol(TCP)-TCP Services, TCP Features, Segments, TCPConnection, State Transition Diagram, Windows in TCP, Flow and Error Control, TCP Timers,SCTP-SCTP Services, SCTP Features, Packet Format, An SCTP Association SCTP Flow andErrorControl

UNIT III

TraditionalTCP

CongestionControl,AdditiveIncreaseMultiplicativeDecrease(AIMD),SlowStart,Fastrecovery,fast retransmit.

TCP in Wireless Domain -Traditional TCP, TCP over wireless**,**Snoop TCP , TCP-UnawareLink LayerIndirect TCP,Mobile TCP, Explicit Loss Notification,WTCP,TCP SACK ,Transaction-OrientedTCP

TransportLayerProtocolsforAdHocWirelessNetworks

TCP Over Ad Hoc Wireless Networks-Feedback-Based TCP, TCP with Explicit Link FailureNotification,TCP-Bus,AdHocTCP,SplitTCP.

UNIT IV

Congestion Control and Quality of Service: Data Traffic, Congestion, Congestion Control,Quality ofService-flow characteristics, flow classes,Techniques to Improve QoS - Scheduling,Traffic Shaping, Resource Reservation, Admission control. Integrated Services-Signaling,
FlowSpecification,Admission,ServiceClasses,RSVP,ProblemswithIntegratedServices,DifferentiatedServices-DSField,Per-hopBehavior,Trafficconditioners.

Queue Management-Passive-Drop trial, Drop front, Random drop, Active- early Random drop,RandomEarlydetection(RED)algorithm

UNIT V

ATMNetworks

ATM-DesignGoals,Problems,Architecture,Switching,ATMLayers

SONET/SDH

Architecture,SONETLayers,SONETFrames,STSMultiplexing,SONETNetworks

InterconnectionNetworks

Introduction,BanyanNetworks,Properties,Crossbarswitch,ThreestageNetworks,Rearrangeable Networks, Folding algorithm, Benes Networks, Lopping algorithm, Bit allocationalgorithm.

TEXT BOOKS

1. TCP/IPProtocol Suite-BehrouzA.Forouzan-4thEdition,McGraw-Hill,2010.
2. Data CommunicationsandNetworking-B.A.Forouzan,5th edition,TMH,2013
3. AdHocWirelessNetworksArchitecturesandProtocolsC.SivaRamMurthyB.S.Manoj,PrenticeHall,6thEdition,2008.

REFERENCES

1. ATMFundamentals–N.NBiswas,AdventureBooks,1998.
2. ComputerNetworking:ATop-DownApproach-JamesKurose&KeithRoss,5thEd.,Pearson,2017.
3. Mobile CommunicationsbyJochenH.Schiller,2nd Edition,Pearson-Wesley,2003.

VIDEO PROCESSING
(PGE-3)

B.Tech IV Year II Semester

L	T	P	C
3	0	0	3

Prerequisite: DigitalSignalProcessing

Course Objectives:

1. Thestudentwillbeabletounderstandthequalityimprovementmethodsof Image.
2. Tostudythebasicdigitalimageandvideofilteroperations.
3. Understandthefundamentalsof ImageCompression.
4. Understand theRepresentationofvideo,principlesandmethodsofmotionestimation.

Course Outcomes:

Oncompletionofthiscoursestudent willbeableto

1. Learntheimagerepresentation,andfundamentalprocessingstepsofanimage.
2. Knowthedifferentenhancementtechniquesinbothspatialandfrequencydomains.
3. Understand theimportanceofcompressionanddifferentcompressiontechniques.
4. Represent,modelthevideoandlearnmotionestimationmethods.

UNIT–I

BasicSteps ofVideoProcessing

AnalogVideo,DigitalVideo,Time-VaryingImageFormationmodels-Three-DimensionalMotionModels,GeometricImageFormation,PhotometricImageFormation.

SPATIOTEMPORALSAMPLING: SamplingforAnalogandDigitalVideo,2Drectangularsampling,2-Dperiodicsampling,samplingon3-D structures,reconstructionforsamples,samplingstructureconversion

UNIT-II

2-DMotionEstimation

Optical flow method, Pixel Based Motion Estimation, Block- Matching Algorithm, Mesh basedMotionEstimation,GlobalMotionEstimation,RegionbasedMotionEstimation,Multiresolutionmotionestimation.

3-DMotionEstimation

Orthographicdisplacementfieldmodel,perspectivedisplacementfieldmodel,orthographicvelocityfieldmodel,,perspectivevelocityfieldmodel,TsaiHuangmodel.

UNIT–III

Segmentation

Thresholdmethod,modifiedHoughTransformmodel,Bayesianmethod

Tracking

Basicprinciples,2Dmotiontracking,3 Drigidtracking

UNIT-IV

NoiseFiltering

Intraframefiltering,Motionadaptivefiltering,Motioncompensatedfilter.

Restoration

Intraframeshiftinvariantrestoration,Intraframeshiftvaryingrestoration,Multiframerestoration.

UNIT–V

Compression

waveformcoding,Motioncompensatedwaveformcoding,modelbasedcodin g,compressionstandars.

TEXT BOOKS

1. DigitalVideoProcessing–A.M.Tekalp,2ndEdition,PrenticeHall,2015.

REFRENCES

1. VideoProcessing andCommunication–YaoWang, Joem OstermannandYa–quinZhang.1st Ed.,PHInt.
2. DigitalImageProcessing–S.Jayaraman,S.Esakkirajan,T.VeeraKumar–TMH,2009

PATTERN RECOGNITION AND MACHINE LEARNING
(PGE-3)

B.Tech IV Year II Semester

L	T	P	C
3	0	0	3

Prerequisite:NIL

Course Objectives:

1. Thestudentwill beabletounderstandthemathematicalformulationofpatterns
2. Tostudythevariouslinearmodels
3. Understand thebasicclassifiers
4. Canbeabletodistinguishdifferentmodels.

Course Outcomes:

Oncompletionofthiscoursestudent willbeableto

1. Identifyvariouspatternclassesandtheirfunctionalities
2. Constructthevariouslinearmodelsforclassification
3. BuildvariousKernelsforclassification
4. Constructgraphical modelsforpattern recognition

UNIT-I

IntroductiontoPatternrecognition

MathematicalFormulationandBasicFunctionalEquation,ReductionofDimensionality,ExperimentsinPatternClassification,BackwardProcedureforBothFeatureOrdering-andPattern Classification,SuboptimalSequentialPattern Recognition,Nonparametric DesignofSequentialPatternClassifiers,AnalysisofOptimal PerformanceandaMulticlass Generalization

UNIT-II

LinearModels

LinearBasisFunctionModels-Maximumlikelihoodandleastsquares,Geometryofleastsquares , Sequential learning, Regularized least squares, Multiple outputs , The Bias-VarianceDecomposition, Bayesian Linear Regression -Parameter distribution, Predictive ,Equivalent ,Bayesian Model Comparison, Probabilistic Generative Models-Continuous inputs , Maximumlikelihood solution, Discrete features, Exponential family, Probabilistic Discriminative Models -Fixed basis functions,Logistic regression, Iterative reweighted least squares,Multiclass logisticregression,Probitregression,Canonicallinkfunctions.

UNIT-III

KernelMethods

Constructing Kernels, Radial Basis Function Networks - Nadaraya-Watson model, GaussianProcesses -Linear regression revisited, Gaussian processes for regression, Learning the hyperparameters, Automatic relevance determination, Gaussian processes for classification, Laplaceapproximation, Connection to neural networks,Sparse Kernel Machines- Maximum MarginClassifiers, Overlapping class distributions, Relation to logistic regression, Multiclass SVMs,SVMs for regression, Computational learning theory, Relevance Vector Machines- RVM forregression,Analysisofsparsity,RVMforclassification

UNIT-IV

GraphicalModels

Bayesian Networks, Example: Polynomial regression,Generative models, Discrete variables,Linear-Gaussianmodels,ConditionalIndependence-Threeexamplegraphs,D-separation,MarkovRandomFields-Conditionalindependenceproperties,Factorizationproperties,Illustration:Imagede-noising,Relationtodirectedgraphs,InferenceinGraphicalModels-Inferenceona chain,Trees,Factorgraphs,Thesum-productalgorithm,Themax-sumalgorithm,Exactinferenceingeneralgraphs,Loopybeliefpropagation,Learningthegraphstructure.

UNIT-V

MixtureModelsandEM

K-means Clustering-Image segmentation and compression, Mixtures of Gaussians-Maximumlikelihood, EM for Gaussian mixtures, An Alternative View of EM- Gaussian mixtures revisited,RelationtoK-means,MixturesofBernoullidistributions,EMforBayesianlinearregression,The EM Algorithm in General, Combining Models- Tree-based Models, Conditional MixtureModels-Mixturesoflinearregressionmodels,Mixturesoflogisticmodels,Mixturesofexperts.

TEXT BOOKS

1. SequentialmethodsinPatternRecognitionandMachineLearning-K.S.Fu,AcademicPress,volumeno.52.
2. PatternRecognitionand MachineLearning-C.Bishop-Springer,2006.

REFERENCES

1. PatternClassification-Richardo.Duda,PeterE.hart,DavidG.Stork,JohnWiley&Sons,2nd Ed.,2001.
2. TheelementsofStatisticalLearning-TrevorHastie,RobertTibshirani,JeromeH.Friedman,Springer,2nd Ed.,2009.

CODING THEORY AND TECHNIQUES
(PGE-3)

B.Tech IV Year II Semester

L	T	P	C
3	0	0	3

Prerequisite: DigitalCommunications

Course Objectives

1. Toacquirethe knowledgeinmeasurementofinformationanderrors.
2. Tstudythegenerationof variouscodemethods.
3. Tostudythevariousapplicationofcodes.

Course Outcomes

Oncompletionofthiscoursestudent willbeableto

1. Learningthemeasurementofinformationanderrors.
2. ObtainknowledgeindesigningLinearBlockCodesandCycliccodes.
3. Constructtreeandtrelliesdiagramsforconvolutioncodes
4. DesigntheTurbocodesandSpacetimecodesandalsotheirapplications

UNIT–I

CodingforReliableDigitalTransmissionand storage

MathematicalmodelofInformation,ALogarithmicMeasureofInformation,AverageandMutualInformationandEntropy,TypesofErrors,ErrorControlStrategies.

LinearBlockCodes

Introduction to Linear Block Codes, Syndrome and Error Detection, Minimum Distance of aBlock code, Error-Detecting and Error-correcting Capabilities of a Block code, Standard arrayand Syndrome Decoding, Probability of an undetected error for Linear Codes over a BSC,HammingCodes.ApplicationsofBlockcodesforErrorcontrolindatastoragesystem

UNIT-II

CyclicCodes

Description, Generator and Parity-check Matrices, Encoding, Syndrome Computation and ErrorDetection, Decoding ,Cyclic Hamming Codes, Shortened cyclic codes, Error-trapping decodingforcycliccodes,Majoritylogicdecodingforcycliccodes.

UNIT–III

ConvolutionalCodes

Encoding of Convolutional Codes, Structuraland Distance Properties, maximum likelihooddecoding, Sequential decoding, Majority- logic decoding ofConvolution codes. Application ofViterbiDecodingandSequentialDecoding,ApplicationsofConvolutionalcodesinARQsystem.

UNIT–IV

TurboCodes

LDPCCodes-Codesbasedonsparsegraphs,Decodingforbinaryerasurechannel,Log-likelihoodalgebra,Briefpropagation,Productcodes,Iterativedecodingofproductcodes,Concatenated convolutionalcodes-Parallelconcatenation,TheUMTSTurbocode,Serialconcatenation,Parallelconcatenation,Turbodecoding

UNIT-V

Space-TimeCodes

Introduction,Digitalmodulationschemes,Diversity,Orthogonalspace-TimeBlockcodes,Alamouti'sschemes,ExtensiontomorethanTwoTransmitAntennas,SimulationResults,Spatial Multiplexing : General Concept, Iterative APP Preprocessing and Per-layer Decoding,LinearMultilayerDetection,OriginalBLASTDetection,QLDecompositionandInterfaceCancellation, Performance of Multi – Layer Detection Schemes, Unified Description by LinearDispersionCodes.

TEXT BOOKS

1. ErrorControlCoding-FundamentalsandApplications– ShuLin,DanielJ.Costello,Jr,PrenticeHall,Inc.
2. ErrorCorrectingCodingTheory-ManYoungRhee,McGraw-Hill,1989.

REFERENCES

1. DigitalCommunications-Fundamental andApplication-BernardSklar,PE.
2. DigitalCommunications- JohnG.Proakis,5th ed.TMH,2008.
3. ErrorCorrectionCoding–MathematicalMethodsandAlgorithms– ToddK.Moon,WileyIndia,2006.
4. InformationTheory,CodingandCryptography–RanjanBose,2nd Edition,TMH,2009.

SOFTWARE DEFINED RADIO
(PGE-3)

B.Tech IV Year II Semester

L	T	P	C
3	0	0	3

Prerequisite:TCP/IP,DigitalSignalProcessing

Course Objectives

Theobjectivesofthiscourseis

1. Toprovidefundamentaldesignprinciplesandstateoftheartconceptsinsoftwaredefinedradio.
2. Understand theanalogRFcomponents asfront endblockin implementationofSDR.
3. Understanddigitalhardwarearchitecturesanddevelopmentmethods.
4. Understandtheradiorecoursemanagementin heterogeneousnetworks.
5. Understandtheobjectorientedrepresentationof radioand networkresources.

Course Outcomes

Oncompletionofthiscourse,thestudents:

1. DesignRFFrontEndSystemforSDRbyunderstandingvariousimplementationissues.
2. Provideresourcemanagementstrategiesinvariousnetworks.
3. Designoptimizedreconfigurationstrategiesforbasestations,mobileterminalbasedonworkloadphysicallayer.
4. Understandvariouscase studiesinSDRDesign.

UNIT–I

Introduction

TheNeedforSoftwareRadios,WhatisSoftwareRadio,Characteristicsandbenefitsofsoftwareradio-DesignPrinciplesofSoftwareRadio,RFImplementationissues-ThePurposeofRFFront – End, Dynamic Range- The Principal Challenge of Receiver Design – RF Receiver Front-EndTopologies- Enhanced Flexibility of the RF Chain with Software Radios- Importance of theComponents to Overall Performance- Transmitter Architectures and Their Issues- Noise andDistortionintheRFChain,ADCandDACDistortion.

UNIT–II

ProfileandRadioResourceManagement

CommunicationProfiles-Introduction,CommunicationProfiles,TerminalProfile,ServiceProfile,NetworkProfile,UserProfile, CommunicationProfileArchitecture,ProfileDataStructure, XML Structure, Distribution of Profile Data,Access to Profile Data, Management ofCommunication Profiles,Communication Classmarks, Dynamic Classmarks for ReconfigurableTerminals,CompressionandCoding,MetaProfile Data

UNIT–III

RadioResourceManagementin HeterogeneousNetworks

Introduction, Definition of Radio Resource Management,Radio Resource Units over RRMPhases,RRMChallengesandApproaches,RRMModellingandInvestigationApproaches,InvestigationsofJRRMinHeterogeneousNetworks,MeasuringGainintheUpperBoundDuetoJRRM,Circuit-SwitchedSystem,Packet-SwitchedSystem,FunctionsandPrinciplesofJRRM, General Architecture of JRRM, Detailed RRM Functions in Sub-Networks and OverallSystems

UNIT–IV

ReconfigurationoftheNetworkElements

Introduction, Reconfiguration of Base Stations and Mobile Terminals, Abstract Modelling ofReconfigurable Devices, the Role of Local Intelligence in Reconfiguration, Performance Issues,ClassificationandRatingofReconfigurableHardware,ProcessingElements,ConnectionElements, Global Interconnect Networks, Hierarchical Interconnect Networks, Installing a NewConfiguration,ApplyingReconfigurationStrategies,ReconfigurationBasedonComparison,ResourceRecycling,FlexibleWorkloadManagementatthePhysicalLayer,OptimizedReconfiguration, Optimization Parameters and Algorithms, Optimization Algorithms, SpecificReconfigurationRequirements,ReconfiguringBaseStations,ReconfiguringMobileTerminals

UNIT–V

Object–OrientedRepresentationofRadiosandNetworkResources

Networks-ObjectOrientedProgramming-ObjectBrokers-MobileApplicationEnvironments-JointTacticalRadioSystem.

CaseStudiesinSoftwareRadioDesign

IntroductionandHistoricalPerspective,SPEAKeasy-JTRS,WirelessInformationTransferSystem,SDR-3000DigitalTransceiverSubsystem,SpectrumWare,CHARIOT.

TEXT BOOKS

1. SoftwareDefinedRadioArchitectureSystemandFunctions-MarkusDillinger,KambizMadani,WILEY,2003.
2. SoftwareDefinedRadio:EnablingTechnologies-WalterTuttleBee,WileyPublications,2002.

REFERENCES

1. SoftwareRadio:AModernApproachtoRadioEngineering- Jeffrey H.Reed,PEAPublication,2002.
2. SoftwareDefinedRadiofor3G-PaulBurns,ArtechHouse,2002.
3. SoftwareDefinedRadio:Architectures,SystemsandFunctions-MarkusDillinger,Kambiz Madani,NancyAlonistioti,Wiley,2003.
4. SoftwareRadio Architecture: ObjectOrientedApproachestowirelessSystemEnginering –JosephMitola,III,JohnWiley&Sons,2000.

ADVANCED DSP LAB

B.Tech IV Year II Semester

L	T	P	C
3	0	0	3

Note:

A.Minimumof10Experimentshavetobeconducted

1. BasicOperationsonSignals,GenerationofVariousSignalsandfindingits FFT.
2. ProgramtoverifyDecimationand Interpolationof agivenSequences.
3. ProgramtoConvert CDdataintoDVDdata
4. GenerationofDualTone MultipleFrequency(DTMF)Signals
5. PlotthePeriodogramofaNoisySignalandestimatePSD usingPeriodogramandModifiedPeriodogrammethods
6. EstimationofPowerSpectrumusingBartlettandWelchmethods
7. VerificationofAutocorrelationTheorem
8. Parametricmethods(Yule-WalkerandBurg)ofPowerSpectrumEstimation
9. EstimationofdataseriesusingNthorderForwardPredictorandcomparingtotheOriginalSignal
10. DesignofLPCfilterusingLevinson-DurbinAlgorithm
11. ComputationofReflectionCoefficientsusingSchurAlgorithm
12. TostudyFiniteLengthEffectsusingSimulink
13. ECGsignalcompression
14. Design andverificationofMatchedfilter
15. AdaptiveNoiseCancellationusingSimulink
16. DesignandSimulationofNotchFiltertoremove60HzHum/anyunwantedfrequencycomponento fgivenSignal(Speech/ECG)

RESEARCH METHODOLOGY AND IPR

B.Tech IV Year II Semester **L T PC**
2 0 0 2

Course Objectives

1. Understandthattoday'sworldiscontrolledbyComputer,InformationTechnology,buttomorrowworldwillberuledbyideas,concepts,andcreativity.
2. Toffollowresearchrelatedinformation
3. Understand thatwhenIPRtake importantplaceinthegrowthofindustryinthecontemporaryworld.

Course Outcomes

Attheendofthiscourse,studentswillbeableto

1. Toidentifyresearchproblemfromtherealworld.
2. Toanalyzeresearchproblemformulationiniterativeprocess.
3. ToexploreIPR andFollowtheLawaccordingly.

UNIT I

Meaning of research problem, sources of research problem, Criteria Characteristics of a goodresearch problem, Errors in selecting a research problem, Scope and objectives of researchproblem,approachesofinvestigationofsolutionsforresearchproblem.

UNIT II

Datacollection,analysis,interpretation,necessaryinstrumentations,Effectiveliteraturestudiesapproaches,analysisPlagiarism,andResearchethics

UNIT III

Effective technical writing, how to write report, paper, Developing a research proposal,Formatofresearchproposal,apresentationandassessmentbyareviewcommittee.

UNIT IV

NatureofIntellectualproperty

Form of IPR: Patents, Designs, Trade, Copyright, Copy left, Creative Commence, IPR andDevelopment-
technologicalresearch,innovation,patenting,development,IPRLaws.InternationalScenario-Internationalcooperationonintellectualproperty,Procedureforgrantsofpatents.

UNIT V

PatentsRights

ScopeofPatentsRights,Licensing andtransfer of technology,Patentsinformationanddatabases, Geographical Indications, New developments in IPR - IPR of Biological Systems,ComputerSoftwareetc.,

CaseStudies:Barriers of IPRin caseoftraditionalknowledge.

REFERENCES

1. StuartMelvilleandWayneGoddard,"Researchmethodology:Anintroductionforscience& engineeringstudents"
2. WayneGoddardandStuartMelville,"Researchmethodology:Anintroduction"
3. RanjitKumar,2ND Edition,"Researchmethodology:AStepby StepGuideforbeginners"
4. Halbert,"ResistingIntellectualProperty",Taylor&Francis Ltd,2007.
5. Mayall, " IndustrialDesign",McGrawHill,1992.
6. Niebel,"ProductDesign",McgRAW Hill,1974.
7. Asimov," IntroductiontoDesign",PrenticeHall, 1962.
8. RobertP.Merges,PeterS.Menell,MarkA.Lemley,"IntellectualPropertyinNewTechnologicalAge".2016.
9. T.Ramappa,"IntellectualPropertyRightsUnder WTO",S.Chand,2008
10. https://www.gnu.org/
11. https://creativecommons.org/
12. GPLver2.0,30;CCby,CCBySA,CCbyNC,CCbyND.

TRANSFORM TECHNIQUES
(PGC4)

B.Tech V Year I Semester

L	T	P	C
3	0	0	3

Prerequisite: None

Course Objectives

1. Toexplorethevarioustwodimensionaltransformdefinition,propertiesandapplications.
2. Tounderstandtheneedof thewaveletsandlearnthedesignofCWT
3. Todesignthe filterBankstructure.
4. Toknowthespecialwavelets.

Course Outcomes

Oncompletionofthiscoursestudent willbeableto:

1. Knowthedefinition,propertiesand applicationsofvarioustwodimensionaltransform.
2. ConstructtheDWTbandonMRA
3. Understand thebasicconceptsofwavelettransform.
4. Explorewaveletpackets,Bi-orthogonalwavelets

UNIT-I

FourierAnalysis: Vectorspace,Hilbertspaces,Fourierbasis,FT-LimitationsofFourierAnalysis,Needfortime-frequencyanalysis,DFT,2D-DFT:Definition,PropertiesandApplications,IDFT,HilbertTransform,STFT.

UNIT-II

Transforms: Walsh, Hadamard, Haarand Slant Transforms, DCT, DST, KLT,–definition,propertiesandapplications

UNIT-III

Continuous Wavelet Transform (CWT): Short comings of STFT, Need for wavelets, WaveletBasis- Concept of Scale and its relation with frequency, Continuous time wavelet TransformEquation-SeriesExpansionusingWavelets-CWT-TilingoftimescaleplaneforCWT.ImportantWavelets:Haar,MexicanHat,Meyer,Shannon,Daubechies.

UNIT-IV

Multi Rate Analysis and DWT: Need for Scaling function – Multi Resolution Analysis, Two-Channel Filter Banks, Perfect Reconstruction Condition, Relationship between Filter Banks andWaveletBasis,DWT,StructureofDWTFilterBanks,DaubechiesWaveletFunction,ApplicationsofDWT.

UNIT-V

SpecialTopics: WaveletPacketTransform,MultidimensionalWavelets,Bi-orthogonalbasis-B-Splines,LiftingSchemeofWaveletGeneration,MultiWavelets

TEXT BOOKS

1. WaveletTransforms-Introductiontheoryandapplications-RaghuveerM.RaoandAjitS.Bopardikar,PearsonEdu,Asia,NewDelhi,2003.
2. “InsightintoWaveletsfromTheorytopractice“,Soman.K.P,Ramachandran.K.I,PrinticeHallIndia,FirstEdition,2004.

REFERENCES

1. "FundamentalsofWavelets-Theory,AlgorithmsandApplications",JaidevaCGoswami,AndrewKChan,JohnWiley&Sons,Inc,Singapore,1999.
2. "Waveletsandsub-band coding",VetterliM.Kovacevic,PJI,1995.
3. "IntroductiontoWaveletsandWaveletTransforms",C.SydneyBurrus,PHI,FirstEdition,1997.
4. "AWaveletTourofSignalProcessing",StephenG.Mallat,.AcademicPress,SecondEdition,2008.

COMMUNICATION TECHNOLOGIES
(PGE-4)

B.Tech V Year I Semester

L	T	P	C
3	0	0	3

Pre-requisite: None

Course Objectives

1. ToknowaboutSecondGenerationand ThirdGenerationCellulartechnologies
2. TostudytheEvolutionGeneration(2.5G)technologyplatforms,
3. TolearnaboutOFDMmodulationtechniqueandtheirevaluationparameters.
4. TounderstandUWBwirelesschannels,datamodulationanditsfeatures.

Course Outcomes

Uponcompletingthiscourse,thestudentwill beable to

1. ComparevariousGenerationtechnologiesandtheirarchitectures.
2. Understandevolutionofdatatransmission.
3. GettheknowledgeofOFDMandevaluatetheperformanceusingchannelmodelandSNR,issuesregardingOFDM.
4. AcquiretheknowledgeaboutUWBwirelesschannels,datamodulationandtheirfeatures.

UNIT I

Second Generation (2G) Overview, Enhancements over 1G Systems, Integration with Existing1G Systems, GSM, IS-136 System Description, IS-95 System Description, iDEN (IntegratedDispatchEnhancedNetwork),CDPD

UNIT II

Evolution Generation (2.5G) Enhancements over 2G, Technology Platforms, General PacketRadio Service, (GPRS), Enhanced Data Rates for Global Evolution (EDGE),High-Speed CircuitSwitchedData(HSCSD),CDMA2000(1XRTT),WAP,MigrationPathfrom2G to2.5Gto3G,

UNIT III

ThirdGeneration(3G)-UniversalMobileTelecommunicationsService(UMTS),UMTSServices, The UMTS Air Interface, Overview of the 3GPP Release 1999 Network Architecture,Overview of the 3GPP Release 4 Network Architecture, Overview of the 3GPP Release 5 All-IPNetworkArchitecture,OverviewCDMA2000,CommonalityBetween,DMA/CDMA2000/CDM

UNIT IV

OFDM : Introduction to OFDM, Multicarrier Modulation and Cyclic Prefix, Channel model andSNRperformance,OFDMIssues–PAPR,FrequencyandTimingOffsetIssues,4Gstandards. Introductionto5G.

UNIT V

UWB:UWBDefinitionandFeatures,UWBWirelessChannels,UWBDataModulation,UniformPulse Train.

TEXT BOOKS

1. 3GWirelessNetworks-ClintSmith,P.E.DanielCollins,2nd Ed.,2013.

REFERENCES

1. 3GNetworksArchitecture-ProtocolsandProcedures-SumithKaseara,NishitNarang,MGH,2004.
2. MobileCellularCommunication,Gottapu SasibhuhsanaRao,PEARSON,2013.

SPREAD SPECTRUM COMMUNICATIONS
(PGE–4)

B.Tech V Year I Semester

L	T	P	C
3	0	0	3

Prerequisite: DigitalCommunications

Course Objectives

Theobjectivesofthiscoursearetomakethestudent

1. UnderstandtheconceptofSpreadSpectrumandstudyvarioustypesofSpreadspectrumsequencesandtheirgeneration.
2. UnderstandtheprinciplesofCodeDivisionMultipleAccess(CDMA)anduseofSpreadspectrumconceptinCDMA
3. UnderstandvariousCodetracingloopsforoptimumtrackingofwidebandsignalsvizspreadspectrumsignals
4. Understandtheprocedureforsynchronizationofreceiverforreceivingthe Spreadspectrumsignal.
5. Studytheperformanceofspreadspectrumsystemsin Jammingenvironment,systemswithForward ErrorCorrectionandMultiuserdetectioninCDMAcellularradio.

Course Outcomes

Oncompletionofthiscoursestudent willbeableto

1. GeneratevarioustypesofSpreadspectrumsequences.
2. Optimizetrackerandsynchronizerforspread code.
3. Canprovidedetectionandcancellationschemesfor Multi-user'sinCDMAcellularradio
4. AnalyzetheperformanceofSpreadspectrumsystemsinJammingenvironmentandsystemswithForwardErrorCorrection

UNIT-I

IntroductiontoSpread SpectrumSystems

Fundamental Concepts of Spread Spectrum Systems, Pseudo Noise Sequences, Direct SequenceSpread Spectrum, Frequency Hop Spread Spectrum, Hybrid Direct Sequence Frequency HopSpreadSpectrum,CodeDivisionMultipleAccess.

BinaryShiftRegisterSequencesforSpreadSpectrumSystems

Introduction,Definitions,MathematicalBackgroundandSequenceGeneratorFundamentals,MaximalLengthSequences,GoldCodes.

UNIT-II

CodeTrackingLoops

Introduction, Optimum Tracking of Wideband Signals, Base Band Delay-Lock Tracking Loop,Tau-DitherNon-CoherentTrackingLoop,DoubleDitherNon-CoherentTrackingLoop.

UNIT-III

InitialSynchronizationoftheReceiverSpreadingCode

Introduction, Problem Definition and the Optimum Synchronizer, Serial Search SynchronizationTechniques, Synchronization using a Matched Filter, Synchronization by Estimated the ReceivedSpreadingCode.

UNIT-IV

CellularCodeDivisionMultipleAccess(CDMA)Principles

Introduction,WideBandMobileChannel,TheCellularCDMASystem,SingleUserReceiverinaMulti UserChannel,CDMASystemCapacity,

Multi-UserDetectioninCDMACellularRadio

OptimalMulti-UserDetection,LinearSuboptimalDetectors, InterferenceCombatDetectionSchemes,InterferenceCancellationTechniques.

UNIT-V

PerformanceofSpread SpectrumSystemsinJammingEnvironments

SpreadSpectrum CommunicationSystem Model,PerformanceofSpreadSpectrumSystems withoutCoding.

PerformanceofSpreadSpectrumSystemswithForwardErrorCorrection

ElementaryBlockCodingConcepts,OptimumDecodingRule,CalculationofErrorProbability,Eleme ntaryConvolutionCodingConcepts,ViterbiAlgorithm,DecodingandBit-ErrorRate.

TEXT BOOKS

1. RodgerEZiemer,RogerL.PetersonandDavidEBorth- "IntroductiontoSpreadSpectrumCommunication-Pearson,1stEdition,1995.
2. MosaAliAbu-Rgheff– "IntroductiontoCDMAWirelessCommunications."ElsevierPublications,2008.

REFERENCES

1. GeorgeR.Cooper,ClareD.McGillem- "ModernCommunicationandSpreadSpectrum,"McGrawHill,1986.
2. Andrewj.Viterbi-"CDMA:Principlesofspreadspectrumcommunication,"PearsonEducation,1st Edition,1995.
3. KamiloFeher-"WirelessDigitalCommunications,"PHI,2009.
4. AndrewRichardson-"WCDMADesignHandbook,"CambridgeUniversityPress,2005.
5. SteveLee-SpreadSpectrumCDMA,McGrawHill,2002.

AD-HOCANDWIRELESSSENSORNETWORKS

(PGE-4)

B.Tech V Year I Semester

L	T	P	C
3	0	0	3

Prerequisite: WirelessSensorNetworks

Course Objectives

Theobjectivesofthiscoursearetomakethestudent

1. TostudythefundamentalsofWLANs&WPANs.
2. TostudythefundamentalsofwirelessAd-HocNetworks.
3. TostudytheoperationandperformanceofvariousAd-Hocwirelessnetworkprotocols.
4. TostudythearchitectureandprotocolsofWirelesssensornetworks.

Course Outcomes

Oncompletionofthiscoursestudent willbeableto

1. Understandthedesignissues,protocolarchitectureandfunctionsofvariousprotocolsofWLANs& WPANs.
2. UnderstandthedesignissuesofAd-Hocnetworksandoperationof MAC,routingandtransportprotocols.
3. Analyzeandcompare variousMACprotocols,Routingprotocolsandtransportlayerprotocols ofAd-Hocnetworks.
4. Understandvarioussensornetworkarchitectures,datadisseminationanddata gatheringmethods

UNIT I

WirelessLANsand PANs

Introduction,FundamentalsofWLANS,IEEE802.11Standards,HIPERLANStandard,Bluetooth,HomeRF.

ADHOCWIRELESSNETWORKS

Introduction,IssuesinAdHocWirelessNetworks.

UNIT II

MACProtocols

Introduction, Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goalsofaMACProtocolforAdHocWirelessNetworks,ClassificationsofMACProtocols,Contention-BasedProtocols,Contention-BasedProtocolswithreservationMechanisms,Contention–BasedMACProtocolswithSchedulingMechanisms,MACProtocolsthatuseDirectionalAntennas,OtherMACProtocols.

UNIT III

RoutingProtocols

Introduction,IssuesinDesigningaRoutingProtocolforAd-HocWirelessNetworks,ClassificationofRoutingProtocols,Table–DrivenRoutingProtocols,On–DemandRoutingProtocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms,HierarchicalRoutingProtocols,Power–AwareRoutingProtocols.

UNIT IV

TransportLayerProtocols

Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks,Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification ofTransportLayerSolutions,TCPOverAdHocWirelessNetworks,OtherTransportLayerProtocolfor AdHocWirelessNetworks.

UNIT V

WirelessSensorNetworks

Introduction, Sensor Network Architecture-Layered Architecture, Clustered Architecture, DataDissemination-Flooding, Gossiping, Rumor Routing, Sequential Assignment Routing, DirectedDiffusion, Sensor Protocols for Information via Negotiation, Cost Field Approach, GeographicHashTable,SmallMinimumEnergyCommunicationNetwork,DataGathering-DirectTransmission, Power Efficient Gathering for Sensor Information Systems, Binary Scheme, Chainbased Three Level Binary Scheme, MAC Protocols for Sensor Networks-Self Organizing MACfor Sensor Networks and Eavesdrop and register, Hybrid TDMA/FDMA, CSMA based MACprotocols, Location Discovery- Indoor localization, Sensor network localization, Quality of aSensorNetwork-Coverage,Exposure,EvolvingStandards.

TEXT BOOKS

1. AdHocWirelessNetworksArchitecturesandProtocolsC.SivaRamMurthyB.S.Manoj,PrenticeHall,6th Edition,2008.
2. WirelessAd-hocandSensorNetworks:Protocols,PerformanceandControl-JagannathanSarangapani,CRCPress.

REFERENCES

1. Ad-HocMobileWirelessNetworks:Protocols&Systems,C.K.Toh,1st Ed.PearsonEducation.
2. AdHocandSensorNetworksTheoryandAppications-CarolsdeMoraisCordeiroandDharmaprakashAgrawal,WorldScientific
3. WirelessSensorNetworks-C.S.Raghavendra,KrishnaM.Sivalingam,2004,Springer

MULTI-MEDIA AND SIGNALCODING

(PGE-4)

B.Tech V Year I Semester

L	T	P	C
3	0	0	3

Prerequisite: NIL

CourseObjectives

ThiscoursemakesthestudentstoUnderstand:

1. Variousimage &videoprocessingalgorithms.
2. Variousvideocompressiontechniques.
3. Variousaudiocompressiontechniques.

CourseOutcomes

Oncompletionofthiscoursethestudentswillbeableto:

1. Representandconvertvariouscolourmodels.
2. Simulatevariousvideocompressionimagetechniquesandcansuggesttheappropriatevideocompression techniquesforspecificapplication.
3. Simulatevariousaudiocompressiontechniquesandcansuggesttheappropriateaudiocompression methodforspecificapplication.

UNIT-I

IntroductiontoMultimedia

Multimedia,WorldWideWeb,OverviewofMultimediaTools,MultimediaAuthoring,Graphics/ImageDataTypes,andFileFormats.

ColorinImageandVideo

ColorScience–ImageFormation,CameraSystems,GammaCorrection,ColorMatchingFunctions,CIEChromaticity Diagram,ColorMonitorSpecifications,Out-of-GamutColors,White Point Correction, XYZ to RGB Transform, Transform with Gamma Correction, L*A*B*ColorModel.ColorModelsinImages–RGBColorModelforCRTDisplays,SubtractiveColor:CMY Color Model, Transformation from RGB to CMY, Under Color Removal: CMYK System,Printer Gamuts, Color Models in Video – Video Color Transforms, YUV Color Model, YIQColorModel,YcbcrColorModel.

UNIT-II

VideoConcepts

TypesofVideoSignals, AnalogVideo, DigitalVideo.

AudioConcepts

DigitizationofSound,QuantizationandTransmissionofAudio.

UNIT-III

CompressionAlgorithms

LosslessCompressionAlgorithms

RunLengthCoding,VariableLengthCoding,ArithmeticCoding,LosslessJPEG,ImageCompression.

LossyImageCompressionAlgorithms: TransformCoding:KLTAndDCTCoding,WaveletBasedCoding.

ImageCompressionStandards: JPEGandJPEG2000.

UNIT-IV

VideoCompressionTechniques

IntroductiontoVideoCompression,VideoCompressionBasedonMotionCompensation,Search for Motion Vectors, H.261- Intra-Frame and Inter-Frame Coding, Quantization, EncoderandDecoder,OverviewofMPEG1andMPEG2.

UNIT-V

AudioCompressionTechniques

ADPCM in Speech Coding, G.726 ADPCM, Vocoders – Phase Insensitivity, Channel Vocoder,FormantVocoder,LinearPredictiveCoding,CELP,HybridExcitationVocoders,MPEGAudio –MPEGLayers,MPEGAudioStrategy,MPEGAudioCompressionAlgorithms,MPEG-2AAC,MPEG-4Audio.

TEXTBOOKS

1. FundamentalsofMultimedia– Ze-NianLi, Mark S. Drew,PHI,2010.
2. MultimediaSignals&Systems–MrinalKr.MandalSpringerInternationalEdition1st Edition,2009

REFERENCES

1. MultimediaCommunicationSystems– Techniques,Stds&Netwroks K.R.Rao, Zorans.Bojkoric,DragoradA.Milovanovic,1st Edition,2002.
2. FundamentalsofMultimediaZe-NianLi,MarkS.Drew,PearsonEducation(LPE),1st Edition,2009.
3. MultimediaSystemsJohnF.KoegelBufondPearsonEducation(LPE),1st Edition,2003.
4. DigitalVideoProcessing–A.MuratTekalp,PHI,1996.
5. VideoProcessingandCommunications–Yaowang,JornOstermann,Ya-QinZhang, Pearson,2002.
6. JudithJeffocate,"*Printmediainpractice(TheoryandApplications)*",PHI, 1998.

ADVANCE COMMUNICATIONS LAB

B.Tech V Year I Semester

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3	0	0	3

Note:

Minimum of 10 Experiments have to be conducted

1. Plotting the Sensor data over a specific time interval
2. Simulate spatially separated target signal in the presence of Additive Correlated White Noise.
3. Simulate spatially separated target signal in the presence of Additive Uncorrelated White Noise.
4. Simulate spatially separated target signal in the presence of Additive Correlated Colored Noise.
5. Design a two class classifier using SVM/ Bayes classifier
6. Evaluate the performance of Bayes/ MAP estimator.
7. Error correcting coding in CDMA Mobile communication system.
8. Capturing and tracking of GOLD sequence in CDMA system.
9. Study of Satellite Azimuth & Elevation using sky Plot Window.
10. Study of Global Positioning System Applications.
11. Estimation of data series using Nth order forward predictor and comparing to the original signal.

PRINCIPLES OF SIGNAL PROCESSING
(PG-OE)

B.Tech V Year I Semester

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Pre-requisite:

NILCourseObjecti

ves:

1. ThisgivesthebasicsofSignalsandSystemsrequiredforall Engineeringrelatedcourses.
2. TounderstandthebasiccharacteristicsofLTIsystems
3. Toknowthesignaltransmissionrequirements.
4. Thisgivesbasicunderstandingofsignalstatistical propertiesand noisesourceconcepts.

CourseOutcomes:

Uponcompletingthiscourse,thestudentwill beable to

1. Differentiatevarioussignalfunctions.
2. Characterizethelineartimeinvariantsystems.
3. Applysamplingtheoremonanytypeofsignals.
4. DeterminetheSpectralandtemporalcharacteristicsofSignals.
5. CharacterizeNoisein Communicationsystems.

UNITI

SignalAnalysis: AnalogybetweenVectorsandSignals,OrthogonalSignalSpace,SignalapproximationusingOrthogonalfunctions,MeanSquareError,ClosedorcompletesetofOrthogonalfunctions,OrthogonalityinComplexfunctions,ClassificationofSignalsandsystems, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function,Signumfunction.

UNITII

SignalTransmissionthrough LinearSystems

Linear System, Impulse response, Response of a Linear System, Linear Time Invariant(LTI)System,LinearTimeVariant(LTV)System,TransferfunctionofaLTISystem,Filtercharacteristic of Linear System, Distortion less transmission through a system, Signal bandwidth,System Bandwidth, Ideal LPF, HPF, and BPF characteristics, Convolution and Correlation ofSignals,ConceptofconvolutioninTimedomainandFrequencydomain,GraphicalrepresentationofConvolution.

UNITIII

Samplingtheorem:GraphicalandanalyticalproofforBandLimitedSignals,ImpulseSampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect ofundersampling–Aliasing,IntroductiontoBandPassSampling.

UNITIV

Temporalcharacteristics ofsignals: Conceptof Stationarity and Statistical Independence.First-Order Stationary Processes, Time Averages and Ergodicity, Cross Correlation and AutoCorrelation of Functions, Properties of Correlation Functions, Cross-Correlation Function andIts Properties. Power Spectrum and its Properties, Relationship between Power Spectrum andAutocorrelationFunction.

UNITV

Noise sources: Resistive/Thermal Noise Source, Arbitrary Noise Sources, Effective NoiseTemperature, Noise equivalent bandwidth, Average Noise Figures, Average Noise Figure ofcascaded networks, Narrow Band noise, Quadrature representation of narrow band noise & itsproperties.

TEXTBOOKS

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

REFERENCES

1. SignalsandSystems-A.V.Oppenheim,A.S.WillskyandS.H.Nawabi,2 Ed.
2. FundamentalsofSignalsandSystems- MichelJ.Robert,2008,MGHInternationalEdition.
3. RandomProcessesforEngineers-BruceHajck,Cambridgeunipress,2015

StatisticalTheoryof Communication– S.PEugeneXavier,NewAgePublications,2003