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

I YEAR **I SEMESTER**

S. No.	Course Code	Course Title	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	Engineering Chemistry	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	Engineering Chemistry Lab	0	0	2	1
7	HSMC-LC	English Language and Communication Skills Lab	0	0	2	1
8	ESC-LC	Engineering Workshop practice	0	0	3	1.5
Total Credits						18

I YEAR **II SEMESTER**

S. No.	Course Code	Course Title	L	T	P	Credits
1.	BSC	Applied and Multi Variable Calculus	3	1	0	4
2.	BSC	Applied Physics	3	1	0	4
3.	ESC	Basic Electrical Engineering	3	0	0	3
4.	ESC	Engineering Graphics	1	0	3	2.5
5.	BSC-LC	Applied Physics Lab	0	0	3	1.5
6.	ESC-LC	Basic Electrical Engineering Lab	0	0	2	1
7.	ESC	Applied Python Programming Lab	0	1	2	2
Total Credits						18

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COURSE STRUCTURE

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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COURSE STRUCTURE

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

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

Open Elective – 1

Electronic Sensors

J.N.T.U.H COLLEGE OF ENGINEERING HYDERABAD
(AUTONOMOUS)
B.TECH HONOURS COURSE
(ELECTRONICS AND COMMUNICATION ENGINEERING)
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

I Year B.Tech. I Sem

L	T	P	C
3	1	0	4

Pre-requisites: Mathematical Knowledge of 12th / 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 $x\,V(x)$ - method of variation of parameters, Equations reducible to linear ODE with constant coefficients, Legendre's equation, Cauchy-Euler equation. Applications: Electrical circuits.

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.

PROGRAMMING FOR PROBLEM SOLVING

I Year B.Tech. I Sem

L	T	P	C
3	0	0	3

Prerequisites: Nil

Course Objectives:

1. To learn the fundamentals of computers.
2. To understand the various steps in Program development.
3. To learn the syntax and semantics of C Programming Language.
4. To learn the usage of structured programming approach in solving problems.

Course Outcomes:

The student will learn

1. To write algorithms and to draw flowcharts for solving problems.
2. To translate the algorithms/flowcharts to programs (in C language).
3. To code and test, a given logic in C programming language.
4. To formulate simple algorithms for arithmetic and logical problems.
5. To decompose a problem into functions and to develop modular reusable code.
6. To use arrays, pointers, strings and structures to formulate algorithms and programs. Searching and sorting problems.

UNIT – I:

Introduction to Computers: Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development Method, Algorithms, Pseudo code, flow charts, applying the software development method.

Introduction to C Language: Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output, Operators. Expressions, Precedence and Associatively, Expression Evaluation, Type conversions, Bit wise operators, Statements, Simple C Programming examples.

UNIT – II:

Statements: if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to, Simple C Programming examples.

Designing Structured Programs: Functions, basics, user defined functions, inter function communication, Scope, Storage classes-auto, register, static, extern, scope rules, type qualifiers, recursion- recursive functions, Preprocessor commands, example C programs

UNIT – III:

Arrays and Strings: Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, multidimensional arrays, C program examples. Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion, C program examples.

UNIT – IV:

Pointers: Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, memory allocation functions, array of pointers, programming applications, pointers to void, pointers to functions, command –line arguments.

Input and Output: Concept of a file, streams, standard input / output functions, formatted input / output functions, text files and binary files, file input / output operations, file status functions (error handling), C program examples.

UNIT – V:

Derived types: Structures – Declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, bit fields, enumerated types, C programming examples.

Sorting and Searching: Selection sort, Bubble sort, Insertion sort, Linear search and Binary search methods.

Text Books:

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

Reference Books:

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

ENGINEERING CHEMISTRY

I Year B.Tech. 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

I Year B.Tech. 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/learning in 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"*** by Board 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

I Year B.Tech. 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

I Year B.Tech. 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

I Year B.Tech. I Sem

L	T	P	C
0	0	2	1

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

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: Basic Rules 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

I Year B.Tech. 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 Cengage Learning
2. Elements of Workshop Technology–S. K.Hajra Choudhury and A. K. Hajra Choudhury.

APPLIED AND MULTIVARIABLE CALCULUS

I Year B.Tech. 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

I Year B.Tech. 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. Carrier concentration and recombination process of 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. Wave particle duality and quantization of energy levels.
2. Fundamentals concepts of semiconductor technology.
3. Principles of Lasers and their categorization and properties and categorization of Optical fibres.
4. Characteristics of dielectric and magnetic materials.
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 and Germer experiment, Heisenberg's uncertainty 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: Estimation of carrier-concentration, Dependence of Fermi level on carrier-concentration and variation with temperature, Carrier generation and recombination, Carrier transport: diffusion and drift, Hall Effect, p-n junction diode: I-V Characteristics, Zener diode: I-V Characteristics, Bipolar JunctionTransistor (BJT): Construction, Principle of operation and characteristics.

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: DIELECTRIC AND MAGNETIC MATERIALS

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, Ionic and Orientation Polarizations, Internal fields in a solid - Clausius-Mossotti relation, Piezoelectrics, Ferroelectrics and Pyroelectric materials.

Magnetism: Introduction, Bohr magneton, classification of Dia, Para and Ferro magnetic materials on the basis of magnetic moment, Hysteresis curve based on domain theory, Soft and hard magnetic materials, Properties of anti-Ferro and ferri magnetic 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_C Superconductors, Applications.

TEXT BOOKS:

1. Principles of Physics, Jearl Walker, David Halliday and Robert Resnick-Wiley publications.
2. Engineering Physics, 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, Semiconductor Optoelectronics: Physics and Technology, Mc Graw-Hill inc. (1995).
3. Introduction to Solid State Physics by Charles kittel, wiley student edition.
4. S.M. Sze, Semiconductor Devices: Physics and Technology, wiley (2008).

BASIC ELECTRICAL ENGINEERING

I Year B.Tech. 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.

ENGINEERING GRAPHICS

I Year B.Tech. II Sem

L	T	P	C
1	0	3	2.5

Pre-requisites: Nil

Course objectives:

- To provide basic concepts in engineering drawing
- To impart knowledge about standard principles of orthographic projection of objects
- To draw sectional views and pictorial views of solids

Course Outcomes:

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

- Prepare working drawings to communicate the ideas and information.
- Read, understand and interpret engineering drawings.

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 principles only

TEXT BOOKS:

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

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, Pearson Edu.
3. Engineering Graphics by K R Mohan, Dhanpat Rai.
4. Text book on Engineering Drawingby KL Narayana, P Kannaih, Scitech

APPLIED PHYSICS LAB

I Year B.Tech. 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: At the end of the course students will be able:

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.

LIST OF EXPERIMENTS:

1. Energy gap of P-N junction diode: Determination of energy gap of a semiconductor diode.

2. Solar Cell: V-I Characteristics of solar cell.
3. Light emitting diode: V-I and P-I characteristics of light emitting diode.
4. Stewart – Gee's experiment: Determination of magnetic field along the axis of a currentcarrying coil.
5. Hall Effect: Determination of Hall co-efficient of a given semiconductor.
6. Photoelectric effect: Determination of work function of a given material.
7. LASER: Characteristics of LASER sources.
8. Optical fibre: Determination of the bending losses of Optical fibres.
9. LCR Circuit: Quality factor of LCR Circuit.
10. R-C Circuit: Time constant of R-C circuit.
11. BJT: Characteristics of NPN transistor.
12. Zener diode: To study the V-I Characteristics, zener effect - doping concentration

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

BASIC ELECTRICAL ENGINEERING LAB

I Year B.Tech. 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

I Year B.Tech. 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 x 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 DEVICES AND CIRCUITS

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

Pre-Requisites: Physics

Course Objectives

1. To introduce components such as diodes, BJTs and FETs.
2. To know the applications of components.
3. To know the switching characteristics of components.
4. To give understanding of various types of amplifier circuits.

Course Outcomes

Upon completion of the Course, the students will be able to:

1. Acquire the knowledge of various semiconductor devices and their use on real life.
2. Understand the 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, Diffusion and Transition Capacitances, Diode Applications: Switch-Switching times.

Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers With Capacitive Filter, Clippers-Clipping at two independent levels, Clampers-Clamping Operation, types, Clamping Circuit Theorem, Comparators.

UNIT II

Bipolar Junction Transistor (BJT): Principle of Operation and characteristics - Common Emitter, Common Base, Common Collector Configurations, Operating point, DC & AC load lines, Transistor Hybrid parameter model, Determination of h-parameters from transistor characteristics, Conversion of h-parameters.

UNIT III

Transistor Biasing and Stabilization : Bias Stability, Fixed Bias, Collector to Base bias, Self Bias, Bias Compensation using Diodes and Transistors.

Analysis and Design of Small Signal Low Frequency BJT Amplifiers: Analysis of CE, CC, CB Amplifiers and CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors on CE Amplifier.

UNIT IV

Junction Field Effect Transistor: Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, Biasing of FET, FET as Voltage Variable Resistor, MOSFET Construction and its Characteristics in Enhancement and Depletion modes.

UNIT V

FET Amplifiers: Small Signal Model**,** Analysis of CS, CD, CG JFET Amplifiers.

Special Purpose Devices: Zener Diode **-** Characteristics, Voltage Regulator; Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode.

TEXTBOOKS

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

REFERENCES

1. The Art of Electrionics , Horowitz, 3rdEdition Cambridge University Press, 2018
2. Electronic Devices and Circuits, David A. Bell – 5th Edition, Oxford.
3. Pulse, Digital and Switching Waveforms –J. Millman, H. Taub and Mothiki S. Prakash Rao, 2 Ed., McGraw Hill, 2008.
4. Electronic Devices and Circuits, S. Salivahanan, N.Suresh Kumar, A Vallvaraj, 2nd Edition, TMH.

NETWORK ANALYSIS AND TRANSMISSION LINES

II Year B.Tech. I Sem

L	T	P	C
3	0	0	3

Pre-Requisites: Nil

Course Objectives

1. To understand the basic concepts on RLC circuits.
2. To know the behavior of the steady states and transients states in RLC circuits.
3. To understand the two port network parameters.
4. To study the propagation, reflection and transmission of plane waves in bounded and unbounded media.

Course Outcomes

Upon successful completion of the course, students will be able to:

1. Gain the knowledge on basic RLC circuits behavior.
2. Analyze the Steady state and transient analysis of RLC Circuits.
3. Characterization of two port network parameters.
4. Analyze the Design aspect of transmission line parameters and configurations.

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 set matrices for planar networks, Magnetic Circuits, Self and Mutual inductances, dot convention, impedance, reactance concept, Impedance transformation and coupled circuits, co-efficient of coupling, equivalent T for Magnetically coupled circuits, Ideal Transformer.

UNIT II

Transient and Steady state analysis of RC, RL and RLC Circuits, Sinusoidal, Step and Square responses. 2^{nd} order series and parallel RLC Circuits, Root locus, damping factor, over damped, under damped, critically damped cases, quality factor and bandwidth for series and parallel resonance, resonance curves.

UNIT III

Two port network parameters, Z, Y, ABCD, h and g parameters, Characteristic impedance, Image transfer constant, image and iterative impedance, network function, driving point and transfer functions – using transformed (S) variables, Poles and Zeros. Standard T, π, L Sections, Characteristic impedance, image transfer constants, Design of Attenuators, impedance matching network.

UNIT IV

Transmission Lines - I: Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Equivalent Circuit, Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Lossless / Low Loss Characterization, Types of Distortion, Condition for Distortion less line, Minimum Attenuation, Loading - Types of Loading.

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, Single Stub Matching.

TEXT BOOKS

1. Network Analysis – Van VelKen Burg, 3rd Ed., Pearson, 2016
2. Networks, Lines and Fields - JD Ryder, PHI, 2nd Edition, 1999.

REFERENCES

1. Electric Circuits – J. Edminister and M.Nahvi – Schaum's Outlines, MCGRAW HILL EDUCATION, 1999.
2. Engineering Circuit Analysis – William Hayt and Jack E Kemmerly, MGH, 8th Edition, 1993.
3. Electromagnetics with Applications – JD. Kraus, 5th Ed., TMH
4. Transmission Lines – Richard Collier, Cambridge University Press, 2013.

SIGNALS AND SYSTEMS

II Year B.Tech. I Sem

L	T	P	C
3	0	0	3

Pre-Requisites: Mathematics

Course Objectives

This subject gives the basics of Signals and Systems required for all Electrical Engineering related courses.

The objectives of this subject are to:

1. Classify signals and systems and their analysis in time and frequency domains.
2. Study the concepts of distortion less transmission through LTI systems, convolution and correlation properties.
3. Understand Laplace and Z-transforms their properties for analysis of signals and systems.
4. Identify the need for sampling of CT signals, types and merits and demerits of each type.

Course Outcomes

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

1. Characterize various signals, systems and their time and frequency domain analysis, using transform techniques.
2. Identify the conditions for transmission of signals through systems and conditions for physical realization ofsystems.
3. Understand the significance of sampling theorem for baseband and band pass signals for various types of sampling and for different duty cycles.
4. Understand the 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

Signal Analysis

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

UNIT II

Fourier series

Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet's conditions, Trigonometric Fourier Series and Exponential Fourier Series, Complex Fourier spectrum.

Fourier Transforms

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

UNIT III

Signal Transmission through Linear Systems

Linear System, Impulse response, Response of a Linear System, Concept of convolution inTime domain and Frequency domain, Graphical representation of Convolution. Extraction of Signal from Noise by Filtering. Linear Time Invariant(LTI) System, Linear Time Variant (LTV) System, Transfer function of a LTI System, Filter characteristic of Linear System, Distortion less transmission through a system, Signal bandwidth, System Bandwidth, Ideal LPF, HPF, and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between Bandwidth and rise time. Extraction of Signal from Noise by Filtering

UNIT IV

Laplace Transforms

Laplace Transforms (L.T), Inverse Laplace Transform, Concept of Region of Convergence (ROC) for Laplace Transforms, Properties of L.T, Relation between L.T and F.T of a signal, Laplace Transform of certain signals using waveform synthesis.

Correlation

Auto Correlation and Cross Correlation Functions, Relation between Convolution and Correlation, Properties of Correlation Functions, Energy Density Spectrum, Power Density Spectrum, Relation between Autocorrelation Function and Energy/Power Spectral Density Function, Parseval's Theorem, Detection of Periodic Signals in the presence of Noise by Correlation.

UNIT V

Sampling theorem

Graphical and analytical proof of Sampling Theorem for Base band/Band Limited and Band Pass Signals, Types of Sampling: Impulse Sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing,

Z–Transforms

Concept of Z- Transform of a Discrete Sequence, Distinction between Laplace, Fourier and Z Transforms, Region of Convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-transform, Properties of Z-transforms.

TEXT BOOKS

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

REFERENCES

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

SWITCHING THEORY AND LOGIC DESIGN

II Year B.Tech. I Sem

L	T	P	C
3	1	0	4

Pre-Requisites: Engineering Mathematics

Course Objectives

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

Course Outcomes

Upon completing this course, the student will be able to

1. Acquire the knowledge on numerical information in different forms and Boolean Algebra theorems.
2. Define Postulates of Boolean algebra and to minimize combinational functions,and design the combinational circuits.
3. Design and analyze sequential circuits for various cyclic functions.
4. Characterize logic families and analyze 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

Number Systems

Number systems, Conversion and Complements Codes- Weighted and Non-weighted codes and their Properties, Parity check code and Hamming code.

Boolean Algebra

Basic Theorems and Properties, Switching Functions- Canonical and Standard Forms, Function Simplification using Theorems,Digital Logic Gates, EX-OR gates, Universal Gates, Two level NAND/NOR realization of Boolean Function, Multilevel realization of Boolean Function.

UNIT II

Minimization with Theorems

Karnaaugh Map Method - Up to five Variables, Don't Care Map Entries, Tabular Method,

Combinational Logic Circuit 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

Sequential Circuits Fundamentals

Architectural difference of Combinational and Sequential circuits, SR Latch,Types of Traditional Clocked Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops, Excitation Tables of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.

Design and Application of Registers and Counters
Shift Registers – Left, Right and Bidirectional Shift Registers, Counters-Ring and Twisted Ring Counter, Frequency Devider, Pseudo Random Sequence generator, Operation of Asynchronous and Synchronous Counters.

UNIT IV
Sequential Machines
Finite State Machines, State Diagram,Analysis of Synchronous Sequential Circuits, Design Steps of Synchronous Sequential Circuits .Synthesis of Synchronous Sequential Circuits- Serial Binary Adder, Sequence Detector, Parity-bit Generator, Synchronous Modulo -N Counters. State minimization capabilities and limitations, Mealy and Moore models.

UNIT V
Realization of Logic Gates Using Diodes & Transistors
AND, OR and NOT Gates using Diodes and Transistors, DCTL, RTL, DTL, TTL and CML Logic Families and its Comparison, Classification of Integrated Circuits.Transfer characteristics of TTL,Various forms of TTL family LS,H,S,Open Collector logic,Tristate logic.

TEXT BOOKS

1. Switching and Finite Automata Theory - Zvi Kohavi & Niraj K. Jha, 3rdEdition, Cambridge, 2010.
2. Modern Digital Electronics – R. P. Jain, 3rd edition, Tata McGraw-Hill, 2007.

REFERENCE

1. Digital Design- Morris Mano, PHI, 4th Edition,2006
2. Introduction to Switching Theory and Logic Design – Fredriac J. Hill, Gerald R. Peterson, 3rd Ed,John Wiley & Sons Inc.
3. Fundamentals of Logic Design- Charles H. Roth, Cengage Learning, 5th, Edition, 2004.
4. Switching Theory and Logic Design – A Anand Kumar, PHI,2013
5. An Engineering approach to Digital Design-William I.Fletcher,PHI,2013.

PROBABILITY THEORY AND STOCHASTIC PROCESSES

II Year B.Tech. I Sem

L	T	P	C
3	1	0	4

Pre-requisite: Mathematics

Course Objectives

1. This gives basic understanding of random variables and operations that can be performed on them.
2. To known the Spectral and temporal characteristics of Random Process.
3. To Learn the Basic concepts of Information theory Noise sources and its representation for understanding its characteristics.

Course Outcomes

Upon completing this course, the student will be able to

1. Perform operations on single and multiple Random variables.
2. Determine the Spectral and temporal characteristics of Random Signals.
3. Characterize LTI systems driven by stationary random process by using ACFs and PSDs.
4. Understand the concepts of Noise and Information theory in Communication systems.

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 & Random variables: Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Joint Probability, Conditional Probability, Total Probability, Bay's Theorem, Independent Events.

Random Variables- Definition, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Methods of defining Conditioning Event, Conditional Distribution, Conditional Density and their Properties.

Operations on single Random Variable: Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable - Monotonic and Non-monotonic Transformations of Continuous and Discrete Random 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, Joint Distribution Function and its Properties, Marginal Distribution Functions, Conditional Distribution and Density – Point and Interval conditioning, Statistical Independence, Sum of Two and more Random Variables, Central Limit Theorem, Equal and Unequal Distribution (Proof not expected).

Expected Value of a Function of Random Variables- Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT III

Random processes – Temporal characteristics: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second- Order and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationarity, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation Function and Its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process. Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output.

UNIT IV

Random processes – Spectral characteristics: The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function. Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output.

UNIT V

Noise sources: Resistive/Thermal Noise Source, Arbitrary Noise Sources, Effective Noise Temperature, Noise equivalent bandwidth, Average Noise Figures, Average Noise Figure of cascaded networks, Narrow Band noise, Quadrature representation of narrow band noise & its properties.

Information theory: Entropy, Information rate, Source coding: Huffman coding, Shannon Fano coding, Mutual information, Channel capacity of discrete channel, Shannon-Hartley law; Trade -off between bandwidth and SNR.

TEXT BOOKS

1. Probability, Random Variables & Random Signal Principles - Peyton Z. Peebles, TMH, 4th Edition, 2001.
2. Principles of Communication systems by Taub and Schilling (TMH),2008

REFERENCES

1. Probability, Random Variables and Stochastic Processes – Athanasios Papoulis and S. UnnikrishnaPillai, PHI, 4th Edition, 2002.
2. Random Processes for Engineers-Bruce Hajck, Cambridge unipress,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

II Year B.Tech. I Sem

L	T	P	C
0	0	2	1

CO1: Acquire the knowledge of various semiconductor devices and their use in real life.

CO2: Understand the 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

List of Experiments (Twelve experiments to be done):

Design and Simulation following using Multisim or Pspice or Equivalent Simulation Software and verify Through experiment,

1. Draw the VI Characteristics of given PN Junction diode. Determine the Static and Dynamic resistance the Diode.
2. Determine the VI Characteristics of Zener diode and also Design voltage Regulator Circuit for the given voltage.
3. Determine the Ripple factor, %Regulation PIV and TUF of the given Rectifier with & without filter.
4. Obtain the I/O Characteristics of CE, CB, CC configurations of BJT. Calculate h-parameters from the Characteristics.
5. Obtain the Drain and Transfer characteristics of CD,CS configuration of JFET. Calculate gm, rd from the Characteristics.
6. Determine the VI Characteristics of SCR. Calculate Breakover voltage from the Characteristics.
7. Obtain the VI Characteristics of UJT and identify the negative resistance region.
8. Perform an experiment to choose Q-point for a Transistor that operate in active region and Observe the affect of external Load resistance on Q-point.
9. Design a Self bias Circuit and determine the Q-point of the Transistor and its Stability factor by both simulation and realization with hardware components.
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

II Year B.Tech. I Sem

L	T	P	C
0	0	2	1

Course Outcomes

Upon completing this course, the student will be able to

1. Acquire the knowledge on numerical information in different forms and Boolean Algebra theorems.
2. Define Postulates of Boolean algebra and to minimize combinational functions,and design the combinational circuits.
3. Design and analyze sequential circuits for various cyclic functions.
4. Characterize logic families and analyze 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

List of Experiments

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

1. Realization of Logic circuit to generate r's Compliment using Logic Gates.
2. Realization of given Boolean function using universal gates and minimizing the same.Compare the gate count before and after minimization.
3. Design and realize Full Adder circuit using gates/universal gates. Implement Full Subtractor using full adder.
4. Designing a 2 – bit Comparator using AND, OR and NOT gates. Realize 4 – bit Comparator using 2 – bit Comparators.
5. Realize 2:1 MUX using the given gates and Design 8:1 using 2:1 MUX.
6. Implement the given Boolean function using the given MUX(ex: code converters).
7. Realize a 2x4 Decoder using logic gates and implement 3x8 Decoder using 2x4 Decoder.
8. Implement the given Boolean function using given Decoders.
9. Convert Demultiplexer to Decoder and vise versa.
10. Verification of truth tables 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 JK flipflops.
15. Designing of sequence detecting State Machine with minimal states using the given flipflops.
16. Designing of Parity Bit(even/odd) generator using the given flipflops.
17. Realize all logic gates with TTL logic.
18. Realize all logic gates with DTL logic.

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MODELLING & SIMULATION LAB

II Year B.Tech. I Sem

L	T	P	C
0	0	2	1

Note:

- All the experiments are to be simulated using MATLAB or equivalent software
- Minimum of 12 experiment are to be completed/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

List of Experiments:

1. Design and App for generating various standard viz: Periodic and Aperiodic, Unit Impulse, Unit Step, Square, Saw tooth, 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,Computation of Energy and Average Power on them.
2. Design an App for finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts of Signal.
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 obtaining Sinusoidal 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 plot pole-zero diagram in S-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 plot pole-zero diagram in Z-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 Gaussian noise and for finding its mean, Skewness, Kurtosis, PDF and PSD.
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 Removal of noise from the signal using Cross correlation.
16. Design an App for Extraction of Periodic Signal masked by noise using 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

II Year B.Tech. 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

II Year B.Tech. 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.

ELECTROMAGNETIC FIELDS AND WAVES

II Year B.Tech. II Sem

L	T	P	C
3	0	0	3

Pre-requisite: Mathematics

Course Objectives

1. To learn the Basic Laws, Concepts and proofs related to Electrostatic Fields and Magnetostatic Fields, and apply them to solve physics and engineering problems.
2. To distinguish between static and time-varying fields, and understand the significance and utility of Maxwell's Equations and Boundary Conditions, and gain ability to provide solutions to communication engineering problems.
3. To analyze the characteristics of Uniform Plane Waves (UPW), determine their propagation parameters and estimate the same for dielectric and dissipative media.
4. To conceptually understand the waveguides and to determine the characteristics of rectangular waveguides, microstrip lines .

Course Outcomes

Upon completing this course, the student will be able to

1. Acquire the knowledge of Basic Laws, Concepts and proofs related to Electrostatic Fields and Magnetostatic Fields.
2. Characterize the static and time-varying fields, establish the corresponding sets ofMaxwell's Equations and Boundary Conditions.
3. Analyze the Wave Equations and classify conductors, dielectrics and evaluate the UPW Characteristics for several practical media of interest.
4. Determine the analysis of rectangular waveguides, their mode characteristics, and design waveguides for solving practical problems.

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 Flux Density, Gauss Law and Applications, Electric Potential, Relation between E and V, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitors – Parallel Plate, Coaxial, Spherical.

UNIT II

Magnetostatics

Biot-Savart's Law, Ampere's Circuit Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law.

UNIT III

Maxwell's Equations (Time Varying Fields)

Faraday's Law, Transformer and Motional EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Forms, Conditions at a Boundary Surface - Dielectric-Dielectric and Dielectric-Conductor Interfaces.

UNIT IV

EM Wave Characteristics

Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definitions, Relation between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media,Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Polarization.

Reflection and Refraction of Plane Waves – Normal and Oblique Incidences for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector and Poynting Theorem.

UNIT V

Waveguides

Electromagnetic Spectrum and Bands. Rectangular Waveguides – Solution of Wave Equations in Rectangular 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, Phase and Group Velocities, Wavelengths and Impedance Relations, Equation of Power Transmission, Impossibility of TEM Mode. Microstrip Lines – Z_o Relations, Effective Dielectric Constant.

TEXT BOOKS

1. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, 8th Ed., McGrawHill,2014
2. Principles of Electromagnetics – Matthew N.O. sadiku and S.V. Kulkarni, 6th Ed., Oxford University Press, Aisan Edition, 2015.

REFERENCES

1. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, 2nd Ed., PHI, 2000.
2. Engineering Electromagnetics – Nathan Ida, 2nd Ed., Springer (India) Pvt. Ltd., New Delhi, 2005.
3. Electromagnetic Field Theory Fundamentals – Bhag Singh Guru and Huseyin R. Hiziroglu, Cambridge University Press, 2nd Ed., 2006.

ANALOG AND DIGITAL COMMUNICATIONS

II Year B.Tech. II Sem

L	T	P	C
3	1	0	4

Pre-requisite: Signals and Systems

Course Objectives

1. To develop ability to analyze system requirements of analog and digital communication systems.
2. To understand the generation, detection of various analog and digital modulation techniques.
3. To acquire theoretical knowledge of each block in AM, FM transmitters and receivers.
4. To understand the concepts of baseband transmissions.

Course Outcomes

Upon completing this course, the student will be able to

1. Design and analyze various Analog Modulation and Demodulation techniques.
2. Understand the effect of noise present in continuous wave Modulation techniques.
3. Understand the concept of Superhetrodyne Receiver and Pulse Modulation Techniques
4. Analyze and design the various Digital Modulation Techniques and Base 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

Amplitude Modulation

Need for modulation, Amplitude Modulation - Time and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves - Switching modulator, Detection of AM Waves - Envelope detector, DSBSC modulation - time and frequency domain description, Generation of DSBSC Waves - Balanced Modulators, Coherent detection of DSB-SC Modulated waves, COSTAS Loop, SSB modulation - time and frequency domain description, frequency discrimination and Phase discrimination methods for generating SSB, Demodulation of SSB Waves, Vestigial side band modulation – Time and Frequency domain description. Noise in AM, DSB and SSB Systems.

UNIT II

Angle Modulation

Basic concepts of Phase Modulation, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave using Bessel functions, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Waves- Armstrong Method, Detection of FM Waves: Balanced slope detector, Phase locked loop, Comparison of FM and AM. , Noise in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis and de-emphasis.

UNIT III

Transmitters &Receivers

Radio Transmitter Block diagram, **Radio Receiver -** Receiver Types - Tuned radio frequency receiver, Superhetrodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, Image frequency, AGC, Amplitude limiting, FM Receiver, Comparison with AM Receiver.

Pulse Modulation
Types of Pulse modulation- PAM, PWM and PPM. Comparison of FDM and TDM.
Pulse Code Modulation
PCM Generation and Reconstruction, TDM PCM hierarchy, Quantization Noise, Non Uniform Quantization and Companding,DPCM, Adaptive DPCM, DM and Adaptive DM, Noise in PCM and DM.

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. Electronics Communication Systems-Fundamentals through Advanced-Wayne Tomasi, 5th Edition, PHI, 2009.
2. Principles of Communication Systems - Herbert Taub, Donald L Schiling, Goutam Saha, 3rd Edition, Mcgraw-Hill, 2008.
3. Digital Communications – Simon Haykin, John Wiley, 2005.

REFERENCES

1. Electronic Communications – Dennis Roddy and John Coolean , 4th Edition , PEA, 2004
2. Electronics & Communication System – George Kennedy and Bernard Davis , TMH, 2004
3. Analog and Digital Communication – K. Sam Shanmugam, Willey ,2005

LINEAR AND DIGITAL INTEGRATED CIRCUITS

II Year B.Tech. II Sem

L	T	P	C
3	0	0	3

Pre-requisite: Switching Theory and Logic Design.

Course Objectives

The main objectives of the course are:

1. To introduce the basic building blocks of linear integrated circuits.
2. To introduce the theory and applications of analog multipliers and PLL.
3. To introduce the concepts of waveform generation and introduce some special function ICs.
4. To understand and implement the working of basic digital circuits.

Course Outcomes

Upon completing this course, the student will be able to

1. A thorough understanding of operational amplifiers with linear integrated circuits.
2. Attain the knowledge of functional diagrams and design applications of IC 555 and IC 565.
3. Acquire the knowledge and design the Data converters.
4. Understanding of the different families of digital integrated circuits and their characteristics.

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

Operational Amplifier

Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation - Inverting, Non-Inverting, Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.

UNIT II

Op-Amp, IC-555 & IC 565 Applications

Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Sawtooth, Square Wave, IC555 Timer - Functional Diagram, Monostable and Astable Operations, Applications, IC565 PLL - Block Schematic, principle and Applications.

UNIT III

Data Converters

Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

UNIT IV

Combinational Logic ICs

Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs - Code Converters, Decoders, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators.

UNIT V

Sequential Logic IC's and Memories

Familiarity with commonly available 74XX & CMOS 40XX Series ICs – All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers.

Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

TEXT BOOKS

1. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 2003.
2. Digital Fundamentals – Floyd and Jain, Pearson Education, 8th Ed., 2005.

REFERENCES

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2nd Ed., 2003.
2. Digital Design Principles and Practices – John. F. Wakerly, Pearson 3rd Ed., 2009.
3. Linear Integrated Circuits and Applications – Salivahana, TMH, 2008.
4. Operational Amplifiers with Linear Integrated Circuits, 4th Ed., William D.Stanley, Pearson Education India, 2009.

ANALOG AND PULSE CIRCUITS

II Year B.Tech. II Sem

L	T	P	C
3	1	0	4

Pre-requisite: Electronic Devices and Circuits

Course Objectives

1. Learn the concepts of high frequency analysis of transistors.
2. To give understanding of various types of amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
3. To familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback.
4. To construct various multivibrators using transistors and sweep circuits.

Course Outcomes

Upon completing this course, the student will be able to

1. Design the multistage amplifiers and understand the concepts of High Frequency Analysis of Transistors.
2. Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to generate sustained oscillations.
3. Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications.
4. Design multivibrators and sweep circuits for various applications.

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

Multistage Amplifiers

Classification of Amplifiers, Distortion in amplifiers, Different coupling schemes used in amplifiers, Frequency response and Analysis of multistage amplifiers, Cascode amplifier, Darlington pair.

Transistor at High Frequency

Hybrid -π model of Common Emitter transistor model, f_α, $_\beta$ and unity gain bandwidth, Gain-bandwidth product.

UNIT II

Feedback Amplifiers

Concepts of feedback – Classification of feedback amplifiers – General characteristics of Negative feedback amplifiers – Effect of Feedback on Amplifier characteristics – Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations.

UNIT III

Oscillators

Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge Oscillators, LC type Oscillators –Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators, Frequency and amplitude stability of Oscillators, Crystal Oscillator.

UNIT IV

Large Signal Amplifiers

Class A Power Amplifier- Series fed and Transformer coupled, Conversion Efficiency, Class B Power Amplifier- Push Pull and Complimentary Symmetry configurations, Conversion Efficiency, Principle of operation of Class AB and Class C Amplifiers.

Tuned Amplifiers

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

UNIT V

Multivibrators

Types of Triggering, Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using Transistors.

Time Base Generators

General features of a Time base Signal, Methods of Generating Time Base Waveform, concepts of Transistor Miller and Bootstrap Time Base Generator, Methods of Linearity improvement.

TEXT BOOKS

1. Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw Hill Education, 2nd Ed., 2010
2. Electronic Devices Conventional and current version -Thomas L. Floyd, Pearson, 2015.

REFERENCES

1. Electronic Devices and Circuits, David A. Bell – 5th Ed., Oxford, 1986.
2. Electronic Devices and Circuits theory– Robert L. Boylestead, Louis Nashelsky, 11th Ed., Pearson, 2009.
3. Millman's Pulse, Digital and Switching Waveforms –J. Millman, H. Taub and Mothiki S. Prakash Rao, 2 Ed., TMH, 2008.
4. Pulse, Switching and Digital Circuits –David A. Bell, 5th Ed, Oxford, 2015.

ANALOG AND DIGITAL COMMUNICATIONS LAB

II Year B.Tech. 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:

- Minimum 12 experiments should be conducted.
- All these experiments are to be simulated first either using MATLAB, Commsim or any other simulation package and then to be realized in hardware

1. Practically generate Amplitude modulated Signal and demodulate it by designing and implementing the corresponding Demodulator for different modulation indices. Plot the corresponding waveforms and their spectrum. 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 Frequency modulated Signal for different modulation indices. Plot the corresponding waveforms and their spectrum. 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-SC modulated Signal for different modulation indices and plot the corresponding waveforms and their spectrum. Also calculate theoretically and practically the modulation index in each case
4. Practically generate and demodulate SSB-SC modulated Signal (Phase Shift Method) for different modulation indices and plot the corresponding waveforms and their spectrum. Also calculate theoretically and practically the modulation index in each case
5. Demonstrate the Frequency Division Multiplexing & De multiplexing 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 Pulse Amplitude Modulator & Demodulator Circuit using 555 timer and plot the corresponding waveforms from the practical observations
8. Design and implement a Pulse Width Modulator & Demodulator Circuit using 555 timer and plot the corresponding waveforms from the practical observations
9. Design and implement a Pulse Position Modulator & Demodulator Circuit using 555 timer and plot the corresponding waveforms from the practical observations
10. Generate practically PCM Modulated Signal and demodulate it by designing and implementing the

corresponding Demodulator. Plot the corresponding waveforms from practical observations

11. Generate practically Delta Modulated 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

II Year B.Tech. 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:

- Minimum 12 experiments should be conducted.
- Verify the functionality of the IC in the given application.

Design and Implementation of:

1. Design an Inverting and Non-inverting Amplifier using Op Amp and calculate gain.
2. Design Adder and Subtractor using Op Amp and verify addition and subtraction process.
3. Design a Comparator using Op Amp and draw the comparision results of A=B, A<B, A>B.
4. Design a Integrator and Differentiator Circuits using IC 741 and derive the required condition practically..
5. Design a Active LPF, HPF cutoff frequency of 2KHZ and find the roll off of it.
6. Design a Circuit using IC 741 to generate sine/square/triangular wave with period of 1KHZ and draw the output waveform.
7. Construct Mono-stable Multivibrator using IC 555 and draw its output waveform.
8. Construct Astable Multivibrator using IC 555 and draw its output waveform and also find its duty cycle.
9. Design a Schmitt Trigger Circuit and find its LTP and UTP.
10. Design Frequency modulator and demodulator circuit and draw the respective waveforms.
11. Design Voltage Regulator using IC 723, IC 7805/7809/ 7912 and find its load regulation factor.
12. Design R-2R ladder DAC and find its resolution and write a truth table with respective voltages.
13. Design Parallel comparator type/counter type/successive approximation ADC and find its efficiency.
14. Design a Gray code converter and verify its truth table.
15. Design an even priority encoder using IC 74xx and verify its truth table.
16. Design a 8x1 multiplexer using digital ICs.
17. Design a 4-bit Adder/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. Design a Up/down counter using IC 74163 and draw read/write waveforms.
20. Design a Universal shift register using IC 74194/195 and verify its shifting operation.
21. Design a 16x4 RAM using 74189 and draw its read/write operation.
22. Design a 8x3 encoder/3x8 decoder and verify its truth table.

ANALOG AND PULSE CIRCUITS LAB

II Year B.Tech. 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

List of Experiments:

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. Design a single tuned amplifier and determine the Q of its tuned circuit practically.
11. Design a Bistable Multivibrator and analyze the effect of commutating capacitors and draw the wave forms at base and collector of transistors.
12. Design a Astable Multivibrator and draw the wave forms at base and collector of transistors.
13. Draw the response of Schmitt trigger for gain of greater than and less than one.
14. Design a Bootstrap sweep circuit using BJT and draw its output time base waveform.
15. Design a Miller sweep circuit using BJT and draw its output time base waveform.

ENVIROMENTAL SCIENCE

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

Course Objectives:

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

Course Outcomes:

- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

UNIT-I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity. Structural features, Biotic structure, Abiotic structure, Ecological succession, Types of Ecosystems, Field visits.

UNIT-II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies. **Food recourses**: Desertification, Equitable use of resource for sustainable use style.

UNIT-III

Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex- situ conservation. National Biodiversity act.

UNIT-IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. Landslides, floods, cyclones. **Noise Pollution:** Sources and Health hazards, standards, **Thermal pollution:** Introduction, causes and consequences. **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT-V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biologicaland Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:

1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha forUniversity Grants Commission.
2 Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

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