JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
IDP (B.Tech + M.Tech)

COURSE STRUCTURE
Applicable From 2021-22 Admitted Batch

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
T O T A L			**11**	**2**	**10**	**18**

I YEAR **II SEMESTER**

S. No.	Course Code	Course Title	L	T	P	CREDITS
1.	BSC	Applied and Multivariable 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-LC	Applied Python Programming Lab	0	1	2	2
T O T A L			**10**	**3**	**10**	**18**

Note : The total Credits in I year are to be 36. Two credits are to be allocated for Applied Python Programming (L-0; T-1;P-2) in the first year

II YEAR **I SEMESTER**

S. No.	Course Code	Course Title	L	T	P	CREDITS
1	ESC	Analog & Digital Electronics	3	0	0	3
2	PCC-1	Data Structures	3	0	0	3
3	PCC-2	Discrete Mathematics	3	0	0	3
4	PCC-3	Computer Organization & Architecture	3	0	0	3
5	PCC-4	Object Oriented Programming	3	0	0	3
6	ESC-LC	Analog & Digital Electronics Lab	0	0	3	1.5
7	PCC-LC	Data Structures Lab	0	0	3	1.5
8	PCC-LC	Object Oriented Programming using C++ Lab	0	0	3	1.5
9	PCC-LC	IT Workshop Lab	0	0	3	1.5
10	*MC	Constitution of India	2	0	0	0
T O T A L			**17**	**0**	**12**	**21**

II YEAR **II SEMESTER**

S. No.	Course Code	Course Title	L	T	P	CREDITS
1	BSC	Applied Statistical Methods	3	1	0	4
2	HSMC	Economics & Financial Analysis	3	0	0	3
3	PCC-5	Operating Systems	3	0	0	3
4	PCC-6	Database Management Systems	3	0	0	3
5	PCC-7	Design and Analysis of Algorithms	3	0	0	3
6	PCC-LC	Operating Systems Lab	0	0	3	1.5
7	PCC-LC	Database Management Systems Lab	0	0	3	1.5
8	PCC-LC	Java programming and Algorithms Lab	0	1	2	2
9	*MC	Environmental Science	2	0	0	0
T O T A L			**17**	**2**	**8**	**21**

Note:* MC- Mandatory Course (Non credit course)

III YEAR **I SEMESTER**

S. No.	Course Code	Course Title	L	T	P	CREDITS
1	PCC-8	Formal Languages & Automata Theory	3	0	0	3
2	PCC-10	Computer Networks	3	1	0	4
3	PCC-11	Machine Learning	3	1	0	4
4	PEC-I	Professional Elective-I	3	0	0	3
5	PEC-II	Professional Elective –II	3	0	0	3
6	PCC-LC	Machine Learning with Python Lab	0	1	2	2
7	PCC-LC	Computer Networks Lab	0	1	2	2
8	HSMC-LC	Advanced English Communication Skills Lab	0	0	2	1
9	*MC	Authentication Techniques	2	0	0	0
T O T A L			**17**	**3**	**8**	**22**

III YEAR **II SEMESTER**

S. No.	Course Code	Course Title	L	T	P	CREDITS
1	PCC-12	Cryptography and Network Security	3	0	0	3
2	PCC-13	Compiler Design	3	1	0	4
3	PCC-14	Software Engineering	3	0	0	3
4	PEC-III	Professional Elective - III	3	0	0	3
5	OEC-I	Open Elective-I	3	0	0	3
6	PCC-LC	Cryptography and Network Security Lab	0	0	3	1.5
7	PCC-LC	Devops Lab	0	2	2	3
8	PCC-LC	Professional Elective-III Lab	0	0	3	1.5
9	*MC	Chatbots	2	0	0	0
T O T A L			**17**	**3**	**8**	**22**

IV YEAR **I SEMESTER**

S.No.	Course Code	Course Title	L	T	P	Credits
1	OE-C	Open Elective - II	3	0	0	3
2	PCC (UG)	Cyber Security	3	0	0	3
4	PC(PG)-1	Advanced Data Structures and Algorithms	3	0	0	3
3	PEC-4 (UG)	Professional Elective – IV	3	0	0	3
5	PEC-5(UG)	Professional Elective – V	3	0	0	3
6	PEC-6(UG)	Professional Elective – VI	3	0	0	3
7	PG (LAB)-1	Advanced Data Structures and Algorithms Lab	0	0	4	2
8	LC-CE-9	Cyber Security Lab	0	0	2	1
9	MINI (UG)	Mini Project / Summer Internship	0	0	4	2
10	PROJ	Project Stage – I	0	0	6	3
Total			**18**	**0**	**16**	**26(21UG+5PG)**

*** To be carried out during the summer vacation between 6th and 7th semesters**

IV YEAR **II SEMESTER**

S.No.	Course Code	Course Title	L	T	P	Credits
1	PC (PG)-2	Big Data Analytics	3	0	0	3
2	PE (PG)-1	Program Elective – I	3	0	0	3
3	PC (PG)-3	Distributed Systems	3	0	0	3
4	PE (PG)-2	Program Elective – II	3	0	0	3
5	PE (PG)-3	Program Elective – III	3	0	0	3
6	PG (LAB)-2	Big Data Analytics Lab	0	0	4	2
7	UG	Project Stage – II	0	0	16	8
8	MC (PG)	Research Methodology & IPR	2	0	0	2
Total			**17**	**0**	**20**	**27(8UG+19PG)**

V YEAR **I SEMESTER**

S.No.	Course Code	Course Title	L	T	P	Credits
1	PE (PG)-4	Program Elective – IV	**3**	**0**	**0**	**3**
2	PC (PG)-4	Social Network Analysis	3	0	0	3
3	OEC (PG)-1	Open Elective	3	0	0	3
4	PG (LAB)-3	Social Network Analysis Lab	0	0	4	2
5	PG	Dissertation Phase– I	0	0	20	10
		Total Credits	**9**	**0**	**24**	**21**

V YEAR **II SEMESTER**

S.No.	Course Code	Course Title	L	T	P	Credits
1	PW (PG)	Dissertation – II	0	0	32	16
		Total Credits				**16**

Total UG Credits: 151
Total PG Credits: 61

Professional Elective Core (PEC) Courses for CSE

Professional Elective-I

1. Information Theory & Coding
2. Advanced Computer Architecture
3. Data Mining & Warehousing
4. Digital Image Processing
5. Graph Databases

Professional Elective -II

1. Internet of Things
2. Speech & Video Processing
3. Informational Retrieval Systems
4. Advanced Databases
5. Software Process and Project Management

Professional Elective -III

1. Deep Learning
2. Network Programming
3. Scripting Languages
4. Mobile Application Development
5. Software Testing Methodologies

Professional Elective -IV

1. Reinforcement Learning
2. Embedded Systems
3. Semantic Web
4. Game Theory
5. Adhoc &Sensor networks

Professional Elective -V

1. Robotic Process Automation
2. Mobile Computing
3. Cloud Computing
4. Software Reliability
5. Natural Language Processing

Professional Elective - VI

1. Computer Vision and Robotics
2. Parallel Computing
3. Blockchain Technologies
4. Software Metrics
5. Cognitive Computing

Open Elective Courses (OEC)

Open Elective - I (Humanities)

1. Entrepreneurship
2. Professional Practice, Law and Ethics
3. Cyber Laws & Ethics

Open Elective – II (CSE)

1. Advanced Python Programming
2. Java Programming
3. Introduction to Data Science

Open Elective (PG)

1. Industrial Safety
2. Operations Research
3. Cost Management of Engineering Projects
4. Composite Materials
5. Energy from Waste
6. Power from Renewable Energy Sources

Program Elective – I

1. Digital Forensics
2. Web Security
3. Introduction to Data Science

Program Elective – II

1. Federated Machine Learning
2. High Performance Computing
3. Optimization Techniques

Program Elective – III

1. Augmented Reality and Virtual Reality
2. Smart Technologies
3. Quantum Computing

Program Elective – IV

1. Fog Computing
2. Web Services & SOA
3. Randomized Algorithms

Matrix Algebra and Calculus

I Year I Semester

L	T	P	C
3	1	0	4

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

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

10 L

UNIT-I: Matrices

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.

8 L

UNIT-II: Diagonalization of a Matrix

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.

10 L

UNIT-III: Mean value theorems and Beta, Gamma functions

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.

10 L

UNIT-IV: First Order ODE

Exact differential equations, converting non-exact equations to exact equations, Linear and Bernoulli's differential equations. Applications: Newton's law of cooling, Law of natural growth

and decay, orthogonal trajectories and electrical circuits. First order equations with higher degree: solvable for the differential coefficient, dependent variable and Independent variable.

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

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

Course outcomes:

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

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

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.

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 Semester

L	T	P	C
3	0	0	3

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.

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.

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

I Year B.Tech. I-Semester **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-1: 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-2: 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 – 3: 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 – 4: 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-5: 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/II-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 Course book 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-Semester

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 LAB

I Year B.Tech. I-Semester

L	T	P	C
0	0	2	1

Objectives

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

1. Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
2. To determine the rate constant of reactions from concentrations as an function of time.
3. The measurement of physical properties like adsorption and viscosity.
4. To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.

Outcomes

1. Determination of parameters like hardness and chloride content in water.
2. Estimation of rate constant of a reaction from concentration – time relationships.
3. Determination of physical properties like adsorption and viscosity.
4. Calculation of R_f values of some organic molecules by TLC technique.

List of Experiments:

1. Determination of total hardness of water by complexometric method using EDTA
2. Estimation of Fe^{+2} by Dichrometry.
3. Estimation of an HCl by Conductometric titrations
4. Estimation of Acetic acid by Conductometric titrations
5. Estimation of HCl by Potentiometric titrations
6. Estimation of Fe^{2+} by Potentiometry using $KMnO_4$
7. Determination of rate constant of acid catalysed hydrolysis of methyl acetate
8. Synthesis of Aspirin and Paracetamol
9. Thin layer chromatography calculation of R_f values. eg ortho and para nitro phenols
10. Determination of acid value of coconut oil
11. Verification of freundlich adsorption isotherm-adsorption of acetic acid on charcoal
12. Determination of viscosity of Coconut oil and ground nut oil by using Ostwald's viscometer.
13. Determination of surface tension of a give liquid using stalagmometer.
14. Determination of partition coefficient of acetic acid between n-butanol and water.

References:

1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand & Co., Delhi)
2. An introduction to practical chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, N. Delhi)
3. Vogel's text book of practical organic chemistry 5^{th} edition
4. Text book on Experiments and calculations in Engineering chemistry – S.S. Dara

ENGLISH LANGUAGE AND COMMUNICATION SKILLS (ELCS) LAB

I Year B.Tech. I-Semester

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

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

Learning Outcomes

Students will be able to:

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

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

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

Listening Skills:

Objectives

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

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

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

Speaking Skills:

Objectives

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

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

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

Exercise – I

CALL Lab:

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

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

ICS Lab:

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

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

Exercise – II

CALL Lab:

Understand: Structure of Syllables – Word Stress– Weak Forms and Strong Forms – 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-Semester

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

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

(Common to all Branches)

I Year II Semester

L	T	P	C
3	1	0	4

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

Objectives: To learn

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

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.

Course outcomes:

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

1. Use the Laplace transforms techniques for solving ODE's.
2. Find the extreme values of functions of two variables with/ without constraints.
3. Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and gravity for cubes, sphere and rectangular parallel piped
4. Evaluate the line, surface and volume integrals and converting them from one to another

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-Semester

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 Junction Transistor (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-Semester

L	T	P	C
3	0	0	3

Pre-requisites: --

Objectives

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

Outcomes

1. To analyze and solve electrical circuits using network laws and theorems.
2. To understand and analyze basic Electric and Magnetic circuits
3. To study the working principles of Electrical Machines
4. 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.

Textbooks:

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.

ENGINEERING GRAPHICS

I Year B.Tech. II-Semester

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

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-Semester

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-Semester

L	T	P	C
0	0	2	1

Pre-requisites: Basic Electrical Engineering

Objectives

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

Outcomes

1. Get an exposure to basic electrical laws.
2. Understand the response of different types of electrical circuits to different excitations.
3. Understand the measurement, calculation and relation between the basic electrical parameters
4. 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

Textbooks:

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-Semester

L	T	P	C
0	1	2	2

Cycle - 1

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

Cycle -2

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

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

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

      Adjust the brightness of an LED (0 to 100, where 100 means maximum brightness) using the in-built PWM wavelength.
9. Collecting Sensor Data
   a) DHT Sensor interface
   - Connect the terminals of DHT GPIO pins of Raspberry Pi.
   - Import the DHT library using ***import Adafruit_DHT***
   - Read sensor data and display it on screen.

ANALOG & DIGITAL ELECTRONICS

II Year B.Tech. I-Semester

L	T	P	C
3	0	0	3

Objectives

1. To introduce components such as diodes, BJTs and FETs.
2. To know the applications of components.
3. To give understanding of various types of amplifier circuits
4. To learn basic techniques for the design of digital circuits and fundamental concepts used in thedesign of digital systems.
5. To understand the concepts of combinational logic circuits and sequential circuits.

Outcomes

1. Know the characteristics of various components.
2. Understand the utilization of components.
3. Design and analyze small signal amplifier circuits.
4. Postulates of Boolean algebra and to minimize combinational functions
5. Design and analyze combinational and sequential circuits
6. Known about the logic families and realization of logic gates.

UNIT - I: Diodes and applications

Junction diode characteristics: Open circuited p-n junction, p-n junction as a rectifier, V-I characteristics, effect of temperature, diode resistance, diffusion capacitance, diode switching times, breakdown diodes, LED.

Diode Applications - clipping circuits, comparators, Half wave rectifier, Full wave rectifier, rectifier with capacitor filter.

UNIT - II: BJTs

Transistor characteristics: The junction transistor, transistor as an amplifier, CB, CE, CC configurations, comparison of transistor configurations, the operating point, self-bias Emitter bias, bias compensation, thermal runaway and stability, transistor at low frequencies, CE amplifier response, gain bandwidth product, Emitter follower, RC coupled amplifier.

Field Effect Transistors: JFET, V-I characteristics, MOSFET, low frequency CS and CD amplifiers.

UNIT - III:

Digital Circuits: Digital (binary) operations of a system, OR gate, AND gate, NOT, EXCLUSIVE OR gate,De Morgan Laws, NAND and NOR DTL gates, modified DTL gates, HTL and TTL gates, output stages,RTL and DCTL, CMOS, Comparison of logic families.

Basic Theorems and Properties of Boolean Algebra, Canonical and Standard Forms, Digital Logic Gates.

UNIT - IV: Combinational logic circuits

The K Map Method, Product-of-Sums Simplification, Don't-Care Conditions, NAND and NOR Implementation, Exclusive-OR Function, Binary Adder-Subtractor,Magnitude Comparator, Decoders, Encoders, Multiplexers, Code converters.

UNIT - V: Sequential logic circuits

Sequential Circuits, Storage Elements: Latches and flip flops, Shift Registers, Ripple Counters, Synchronous Counters, Random-Access Memory, Read-Only Memory.

Text Books

1. Integrated Electronics: Analog and Digital Circuits and Systems, Jaccob Millman, Christos Halkiasand Chethan D. Parikh, 2nd Edition, Tata McGraw-Hill Education, India, 2010.
2. Digital Design, Morris Mano and Michael D. Cilette, 5th Edition, Pearson, 2011.

References

1. Electronic Devices and Circuits, Jimmy J Cathey, Schaum's outline series, 1988.
2. Digital Principles, Roger L. Tokheim, 3rd Edition, Schaum's outline series, McGraw-Hill, 1994.

DATA STRUCTURES

II Year B.Tech. I-Semester

L	T	P	C
3	0	0	3

Prerequisites

1. A course on "Programming for Problem Solving "

Objectives

1. Exploring basic data structures such as stacks and queues.
2. Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.
3. Introduces sorting and pattern matching algorithms

Outcomes

1. Ability to select the data structures that efficiently model the information in a problem.
2. Ability to assess efficiency trade-offs among different data structure implementations or combinations.
3. Implement and know the application of algorithms for sorting and pattern matching.
4. Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and AVL-trees.

UNIT - I

Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

UNIT - II

Dictionaries: linear list representation, skip list representation, operations - insertion, deletion and searching.

Hash table representation: hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

UNIT - III

Search Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching, Red –Black, Splay Trees.

UNIT - IV

Graphs: Graph Implementation Methods. Graph Traversal Methods.
Sortings: Heap Sort, External Sorting- Model for external sorting, Merge Sort.

UNIT - V

Pattern matching and Tries: Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.

Textbooks:

1. Fundamentals of data structures in C, E.Horowitz, S.Sahni and Susan Anderson Freed, 2nd Edition, Universities Press.
2. Data structures using C, A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/pearson education.

References:

1. Data structures: A Pseudocode Approach with C, R.F.Gilberg And B.A.Forouzan, 2nd Edition, Cengage Learning.
2. Introduction to data structures in C, Ashok Kamthane, 1st Edition, PEARSON.

DISCRETE MATHEMATICS

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

Prerequisites
1. An understanding of Mathematics in general is sufficient.

Objectives
1. Introduces the elementary discrete mathematics for computer science and engineering.
2. Topics include formal logic notation, methods of proof, induction, sets, relations, graph theory, permutations and combinations, counting principles; recurrence relations and generating functions.

Outcomes
1. Ability to understand and construct precise mathematical proofs
2. Ability to use logic and set theory to formulate precise statements
3. Ability to analyze and solve counting problems on finite and discrete structures
4. Ability to describe and manipulate sequences
5. Ability to apply graph theory in solving computing problems

UNIT - I

The Foundations: Logic and Proofs

Propositional Logic, Applications of Propositional Logic, Propositional Equivalence, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy.

UNIT - II

Basic Structures, Sets, Functions, Sequences, Sums, Matrices and Relations

Sets, Functions , Sequences & Summations, Cardinality of Sets and Matrices

Relations**,** Relations and Their Properties, n-ary Relations and Their Applications, Representing Relations, Closures of Relations, Equivalence Relations, Partial Orderings.

UNIT - III

Algorithms, Induction and Recursion

Algorithms, The Growth of Functions, Complexity of Algorithms.

Induction and Recursion

Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms, Program Correctness.

UNIT - IV

Discrete Probability and Advanced Counting Techniques

An Introduction to Discrete Probability . Probability Theory, Bayes' Theorem, Expected Value and Variance.

Advanced Counting Techniques

Recurrence Relations, Solving Linear Recurrence Relations, Divide-and-Conquer Algorithms and Recurrence Relations, Generating Functions, Inclusion-Exclusion, Applications of Inclusion-Exclusion.

UNIT - V

Graphs

Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring.

Trees

Introduction to Trees, Applications of Trees, Tree Traversal, Spanning Trees, Minimum Spanning Trees.

Textbook:

1. Discrete Mathematics and Its Applications with Combinatorics and Graph Theory- Kenneth H Rosen, 7th Edition, TMH.

References:

1. Discrete Mathematical Structures with Applications to Computer Science-J.P. Tremblay and R. Manohar, TMH,
2. Discrete Mathematics for Computer Scientists & Mathematicians: Joe L. Mott, Abraham Kandel, Teodore P. Baker, 2nd Edition, Pearson Education.
3. Discrete Mathematics- Richard Johnsonbaugh, 7Th Edition, Pearson Education.
4. Discrete Mathematics with Graph Theory- Edgar G. Goodaire, Michael M. Parmenter.
5. Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimald, 5th Edition , Pearson Education,.

COMPUTER ORGANIZATION & ARCHITECTURE

II Year B.Tech. I-Semester

L	T	P	C
3	0	0	3

Prerequisites: No prerequisites

Co-requisite: A Course on "Digital Logic Design and Microprocessors"

Objectives

1. The purpose of the course is to introduce principles of computer organization and the basic architectural concepts.
2. It begins with basic organization, design, and programming of a simple digital computer and introduces simple register transfer language to specify various computer operations.
3. Topics include computer arithmetic, instruction set design, microprogrammed control unit, pipelining and vector processing, memory organization and I/O systems, and multiprocessors

Outcomes

1. Understand the basics of instructions sets and their impact on processor design.
2. Demonstrate an understanding of the design of the functional units of a digital computer system.
3. Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory.
4. Design a pipeline for consistent execution of instructions with minimum hazards.
5. Recognize and manipulate representations of numbers stored in digital computers

UNIT - I

Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.

Register Transfer Language and Micro operations: Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction codes, Computer Registers Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt.

UNIT - II

Micro Programmed Control: Control memory, Address sequencing, micro program example, design of control unit.

Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

UNIT - III

Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation.

Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT - IV

Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt Direct memory Access.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory.

UNIT - V

Reduced Instruction Set Computer: CISC Characteristics, RISC Characteristics.

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Arrey Processor.

Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, Interprocessor arbitration, Interprocessor communication and synchronization, Cache Coherence.

Textbook:

1. Computer System Architecture, M. Moris Mano, 3rd Edition, Pearson/PHI.

References:

1. Computer Organization, Car Hamacher, Zvonks Vranesic, SafeaZaky, 5th Edition, McGraw Hill.
2. Computer Organization and Architecture, William Stallings 6th Edition, Pearson/PHI.
3. Structured Computer Organization, Andrew S. Tanenbaum, 4th Edition, PHI/Pearson.

OBJECT ORIENTED PROGRAMMING

II Year B.Tech. I-Semester

L	T	P	C
3	0	0	3

Prerequisites

1. A course on "Programming for Problem Solving "

Objectives

1. Introduces object oriented programming concepts using the C++ language.
2. Introduces the principles of data abstraction, inheritance and polymorphism;
3. Introduces the principles of virtual functions and polymorphism
4. Introduces handling formatted I/O and unformatted I/O
5. Introduces exception handling

Outcomes

1. Able to develop programs with reusability
2. Develop programs for file handling
3. Handle exceptions in programming
4. Develop applications for a range of problems using object-oriented programming techniques

UNIT - I

Object Oriented thinking - Different paradigms for problem solving, need for OOP paradigm, differences between OOP and Procedure oriented programming, Overview of OOP concepts- Abstraction, Encapsulation, Inheritance and Polymorphism.

C++ Basics: Structure of a C++ program, Data types, Declaration of variables, Expressions, Operators, Operator Precedence, Evaluation of expressions, Type conversions, Pointers, Arrays, Pointers and Arrays, Strings, Structures, References.

Flow control statement- if, switch, while, for, do, break, continue, goto statements.

Functions - Scope of variables, Parameter passing, Default arguments, inline functions, Recursive functions, Pointers to functions.

Dynamic memory allocation and deallocation operators-new and delete, Preprocessor directives.

UNIT - II

C++ Classes And Data Abstraction: Class definition, Class structure, Class objects, Class scope, this pointer, Friends to a class, Static class members, Constant member functions, Constructors and Destructors, Dynamic creation and destruction of objects, Data abstraction, ADT and information hiding.

UNIT - III

Inheritance: Defining a class hierarchy, Different forms of inheritance, Defining the Base and Derived classes, Access to the base class members, Base and Derived class construction, Destructors, Virtual base class.

Virtual Functions And Polymorphism: Static and Dynamic binding, virtual functions, Dynamic binding through virtual functions, Virtual function call mechanism, Pure virtual functions, Abstract classes, Implications of polymorphic use of classes, Virtual destructors.

UNIT - IV

C++ I/O: I/O using C functions, Stream classes hierarchy, Stream I/O, File streams and String streams, Overloading operators, Error handling during file operations, Formatted I/O.

UNIT-V

Exception Handling: Benefits of exception handling, Throwing an exception, The try block, Catching an exception, Exception objects, Exception specifications, Stack unwinding, Rethrowing an exception, Catching all exceptions.

Textbooks:

1. The Complete Reference C++, 4th Edition, Herbert Schildt, TMH.
2. Problem solving with C++: The Object of Programming, 4th Edition, Walter Savitch, Pearson Education.

References:

1. The C++ Programming Language, B.Stroutstrup, 3rd Edition, Pearson Education.
2. OOP in C++, T.Gaddis, J.Walters and G.Muganda, 3rd Edition, Wiley DreamTech Press.
3. Object Oriented Programming in C++, R.Lafore, 3rd Edition, Galigotia Publications pvt ltd.
4. Computer Science, a Structured Programming Approach Using C++, B.A.Forouzan and R.F.Gilberg, Thomson.

ANALOG & DIGITAL ELECTRONICS LAB

II Year B.Tech. I-Semester

L	T	P	C
0	0	3	1.5

Objectives

1. To introduce components such as diodes, BJTs and FETs.
2. To know the applications of components.
3. To give understanding of various types of amplifier circuits
4. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
5. To understand the concepts of combinational logic circuits and sequential circuits.

Outcomes

1. Know the characteristics of various components.
2. Understand the utilization of components.
3. Design and analyze small signal amplifier circuits.
4. Postulates of Boolean algebra and to minimize combinational functions
5. Design and analyze combinational and sequential circuits
6. Known about the logic families and realization of logic gates.

List of Experiments

1. Obtain Ripple factor,% Regulation of Full Wave Rectifier with & without filter.
2. Plot the input and output Characteristics of given BJT in CE and CB configurations.
3. Plot the Drain and Transfer Characteristics of given JFET in CS configuration.
4. Draw the Frequency response of a CE Amplifier for the given voltage gain.
5. Realization of Boolean Expressions using Gates and Universal gates.
6. Generate clock signal using NAND / NOR gates.
7. Design a 4 – bit Adder / Subtractor after designing a Fulladder circuit using gates.
8. Design an Universal Shift Register using D flip-flops.
9. Design a 4 – bit Ripple Counter using flip-flops and draw the output waveform.
10. Design a Synchronous and Asynchronous binary counter using JK flip-flops.

Textbooks:

1. Integrated Electronics: Analog and Digital Circuits and Systems, Jaccob Millman, Christos Halkias and Chethan D. Parikh, 2nd Edition, Tata McGraw-Hill Education, India, 2010.
2. Digital Design, Morris Mano and Michael D. Cilette, 5th Edition, Pearson, 2011.

References:

1. Electronic Devices and Circuits, Jimmy J Cathey, Schaum's outline series, 1988.
2. Digital Principles, Roger L. Tokheim, 3rd Edition, Schaum's outline series, McGraw-Hill, 1994.

DATA STRUCTURES LAB

II Year B.Tech. I-Semester

L	T	P	C
0	0	3	1.5

Prerequisites:

1. A Course on "Programming for problem solving"

Objectives

1. It covers various concepts of C programming language
2. It introduces searching and sorting algorithms
3. It provides an understanding of data structures such as stacks and queues.

Outcomes

1. Ability to develop C programs for computing and real life applications using basic elements like control statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists.
2. Ability to Implement searching and sorting algorithms

List of Experiments

1. Write a program that uses functions to perform the following operations on singly linked list.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program that uses functions to perform the following operations on doubly linked list.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
3. Write a program that uses functions to perform the following operations on circular linked list.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
4. Write a program that implement stack (its operations) using
   i) Arrays ii) Pointers
5. Write a program that implement Queue (its operations) using
   i) Arrays ii) Pointers
6. Write a 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
7. Write a program 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
8. Write a program to implement the tree traversal methods
9. Write a program to implement the graph traversal methods

Textbooks:

1. Fundamentals of data structures in C, E.Horowitz, S.Sahni and Susan Anderson Freed, 2nd Edition, Universities Press.
2. Data structures using C, A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/pearson education.

References:

1. Data structures: A Pseudocode Approach with C, R.F.Gilberg And B.A.Forouzan, 2nd Edition, Cengage Learning.
2. Introduction to data structures in C, Ashok Kamthane, 1st Edition, PEARSON.

OBJECT ORIENTED PROGRAMMING USING C++ LAB

II Year B.Tech. I-Semester

L	T	P	C
0	0	3	1.5

Prerequisites: A course on "Programming for Problem Solving"

Objectives

1. Introduces object oriented programming concepts using the C++ language.
2. Introduces the principles of data abstraction, inheritance and polymorphism;
3. Introduces the principles of virtual functions and polymorphism
4. Introduces handling formatted I/O and unformatted I/O
5. Introduces exception handling

Outcomes

1. Ability to develop applications for a range of problems using object-oriented programming techniques

List of Experiments

1. Program: Write a C++ Program to display names, roll no's, and grades of 3 students who have appeared in the examination. Declare the class of name, roll no's and grade. Create an array of class objects. Read and display the contents of the array.
2. Program: Write a C++ program to declare *struct*. Initialize and display contents of member variables.
3. Program: Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.
4. Program: Given that an EMPLOYEE class contains following members: data members: Employee number, Employee name, Basic, DA, IT, Net Salary and print data members. Write a C++ program to read the data of N employee and compute Net salary of each employee (DA=52% of Basic and Income Tax (IT) =30% of the gross salary)**.**
5. Program: Write a C++ to illustrate the concepts of console I/O operations.
6. Write a C++ program to use scope resolution operator. Display the various values of the same variables declared at different scope levels.
7. Program: Write a C++ program to allocate memory using *new* operator.
8. Write a C++ program to create multilevel inheritance. (Hint:classes A1,A2, A3)
9. Write a C++ program to create an array of pointers. Invoke functions using array objects.
10. Write a C++ program to use pointer for both base and derived classes and call the member function. Use Virtual keyword.

Textbooks:

1. The Complete Reference C++, 4th Edition, Herbert Schildt, TMH.
2. Problem solving with C++: The Object of Programming, 4th Edition, Walter Savitch, Pearson Education.

References:

1. The C++ Programming Language, B.Stroutstrup, 3rd Edition, Pearson Education.
2. OOP in C++, T.Gaddis, J.Walters and G.Muganda, 3rd Edition, Wiley DreamTech Press.
3. Object Oriented Programming in C++, R.Lafore, 3rd Edition, Galigotia Publications pvt ltd.
4. Computer Science, a Structured Programming Approach Using C++, B.A.Forouzan and R.F.Gilberg, Thomson.

IT WORKSHOP LAB

II Year B.Tech. I-Semester

L	T	P	C
0	0	3	1.5

Objectives:

The IT Workshop for engineers is a training lab course spread over 60 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, Power Point and Publisher.

PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered. **The students should work on working PC to disassemble and assemble to working condition and install Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible. Internet & World Wide Web** module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced. **Productivity tools** module would enable the students in crafting professional word documents, excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools and LaTeX. (**Recommended to use Microsoft office 2007 in place of MS Office 2003)**

PC Hardware

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

Task 6: Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

Internet & World Wide Web

Task1: **Orientation & Connectivity Boot Camp:** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: **Search Engines & Netiquette:** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install an antivirus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and Word

Task 1 – Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using LaTeX and Word to create project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4 : Creating a Newsletter : Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

Excel

Excel Orientation: The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2 : Calculating GPA - .Features to be covered:- Cell Referencing, Formulae in excel – average, std.deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

Task 3: Performance Analysis - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

Task 4: Charts and Pivot Tables – Charts, Pivot Tables

Task 5: Conditionals and Lookup Tables - Conditional functions, IF functions, Lookup functions

Task 6: Conditional Formatting and Lists - Conditional formatting, Sorting lists, Filtering lists

LaTeX and MS/equivalent (FOSS) tool Power Point

Task1: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and Powerpoint. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

Task 2: Second week helps students in making their presentations interactive. Topic covered during this week includes: Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Concentrating on the in and out of Microsoft power point and presentations in LaTeX. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

References:

1. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dreamtech
2. The Complete Computer upgrade and repair book, 3rd Edition, Cheryl A Schmidt, WILEY Dreamtech
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. PC Hardware and A+Handbook, Kate J. Chase, PHI (Microsoft)
5. LaTeX Companion, Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan – CISCO Press , Pearson Education. Microsoft Office 2007: The Missing Manual - Chris Grover, Mathew MacDonald, E.A.Vander Veer O'reilly Media

CONSTITUTION OF INDIA

Mandatory Course

II Year B.Tech. I-Semester **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.

Syllabus

Unit1 History of Making of the Indian Constitution- History of Drafting Committee - Philosophy of the Indian Constitution- Preamble Salient Features

Unit2 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 3 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 4 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 5 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.

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.

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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APPLIED STATISTICAL METHODS

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

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

Objectives: To learn

1. The theory of Probability, and probability distributions of single and multiple random variables
2. The sampling theory and testing of hypothesis and making inferences
3. Stochastic process and Markov chains.

8 L

UNIT-I: : Probability

Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence, and the Product Rule, Bayes' Rule,

Random Variables and Probability Distributions: Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions, Joint probability distributions

10 L

UNIT-II: Expectation and discrete distributions

Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev's Theorem.

Discrete Probability Distributions: Introduction and Motivation, Binomial Distribution, Poisson distribution and the poison process.

10 L

UNIT-III: Continuous Distributions and sampling

Continuous Uniform Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the BinomialDistributions.

Fundamental Sampling Distributions: Random Sampling, Some Important Statistics, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, t – Distribution, F-Distribution.

10 L

UNIT-IV: One- and Two- samples Estimation & Tests of Hypotheses

Introduction, Statistical Inference, Classical Methods of Estimation,Single Sample: Estimating the mean, standard error of a point estimate, prediction interval. Two sample: Estimating the difference between two means, Single sample: Estimating a proportion, Two samples: Estimating the difference between two proportions, Single sample: Two samples: Estimating the ratio of two variances.

Statistical Hypotheses: General Concepts, Testing a Statistical Hypothesis,Single sample: Tests concerning a single mean, Two samples: tests on two means, One sample: test on a single proportion. Two samples: tests on two proportions, Two- sample tests concerning variances.

10 L

UNIT-V: Stochastic Processes And Markov Chains

Introduction to Stochastic processes- Markov process. Transition Probability, Transition Probability Matrix, First order and Higher order Markov process, n-step transition probabilities, Markov chain, Steady state condition, Markov analysis.

Course outcomes:

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

1. Apply the concepts of probability and distributions to some case studies.
2. Formulate and solve problems involving random variables and apply statistical methods for analysing experimental data.
3. Apply concept of estimation and testing of hypothesis to some case studies.
4. Correlate the material of one unit to the material in other units.

Text Books

1. Ronald E. Walpole,Raymond H. Myers,Sharon L. Myers,Keying Ye, Probability & Statistics For Engineers & Scientists, 9th Ed. Pearson Publishers.
2. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications.
3. S.D.Sharma, Operations Research, Kedarnath and Ramnath Publishers, Meerut, Delhi

References

1. T.T. Soong, Fundamentals of Probability And Statistics For Engineers, John Wiley & Sons, Ltd, 2004. .
2. Sheldon M Ross, Probability and statistics for Engineers and scientists, academic press.

ECONOMICS AND FINANCIAL ANALYSIS

II Year B.Tech. II-Semester

L	T	P	C
3	0	0	3

Course Objective:
To prepare engineering students to analyze cost/ revenue/ financial data and to make economic and financial analysis in decision making process and to examine the performance of companies engaged in engineering.

Course Outcome:
To perform and evaluate present and future worth of the alternate projects and to appraise projects by using traditional and DCF Methods. To carry out cost benefit analysis of projects and to calculate BEP of different alternative projects.

Unit- I: Macro Economic Concepts : Economics- Micro & Macroeconomics-National Income Accounting - Methods of Estimation- Various Concepts of National Income - Inflation – Causes of Inflation and Measures to Control Inflation - New Economic Policy -Industrial policy, Trade policy, and Fiscal policy and its Impact on Industry-Types of companies-Features.

Unit- II: Introduction to Business Economics- Basic Principles of Economics– Fundamental Concepts- Demand – Demand Determinants - Law of Demand- Demand Forecasting and Methods- Elasticity of Demand– Supply- Elasticity of Supply- Theory of Firm.

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UNIT- III: Production, Cost, Market Structures & Pricing:

Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions. Cost analysis: Types of Costs, Short run and Long run Cost Functions. Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, and Monopolistic Competition. Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, Cost Volume Profit Analysis (simple problems).

Unit- IV: Introduction to Accounting: Accounting Principles (GAPP), concepts, conventions- - Double entry system of Book keeping–Accounting rules- Journal- ledger- Trial balance- Trading and Profit and Loss account- Balance Sheet. (Simple Problems).

Unit- V: Capital Budgeting Techniques: Significance of Capital Budgeting - cash flows-Time Value of Money- Choosing between alternative investment proposals- Methods of Appraisal Techniques- Pay Back Period - Average Rate of Return – Net Present Value- Internal Rate of Return – Profitability Index(simple problems).

Suggested Readings:

1. Henry Malcom Steinar-Engineering Economics, Principles, McGraw Hill Pub.
2. D.D.Chaturvedi, S.L.Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.
3. Jain and Narang" Accounting, Kalyani Publishers.
4. Arora, M.N." Cost Accounting, Vikas Publication.
5. S.N.Maheshwari, Financial Management, Vikas Publishing House.

OPERATING SYSTEMS

II Year B.Tech. II-Semester

L	T	P	C
3	0	0	3

Prerequisites

1. A course on "Computer Programming and Data Structures"
2. A course on "Computer Organization and Architecture"

Objectives

1. Provide an introduction to operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection)
2. Introduce the issues to be considered in the design and development of operating system
3. Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix

Outcomes

1. Will be able to control access to a computer and the files that may be shared
2. Demonstrate the knowledge of the components of computer and their respective roles in computing.
3. Ability to recognize and resolve user problems with standard operating environments.
4. Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.

UNIT - I

Introduction to Operating System**, Structures - Simple Batch, Multiprogrammed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls.**

UNIT - II

Process and CPU Scheduling **- Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads, and Inter process Communication, Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling.**

System call interface for process management-fork, exit, wait, waitpid, exec

UNIT - III

Deadlocks **- System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.**

Process Management and Synchronization **- The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors.**

Interprocess Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT - IV

Memory Management and Virtual Memory **- Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.**

UNIT - V

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

Textbooks:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the Unix environment, W.R.Stevens, Pearson education.

References:

1. Operating Systems – Internals and Design Principles, Stallings, 5th Edition, Pearson Education/PHI, 2005.
2. Operating System A Design Approach-Crowley,TMH.
3. Modern Operating Systems, Andrew S Tanenbaum 2nd edition, Pearson/PHI
4. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education
5. Unix Internals The New Frontiers, U.Vahalia, Pearson Education.

DATABASE MANAGEMENT SYSTEMS

II Year B.Tech. II-Semester **L T P C**
3 0 0 3

Prerequisites

1. A course on "Data Structures"

Objectives

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

Outcomes

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

UNIT - I

Database System Applications: A Historical Perspective, File Systems versus DBMS**,** the Data Model, Levels of Abstraction in DBMS, Data Independence, Structure of DBMS

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

UNIT - II

Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, deleting/altering tables and views.

Relational Algebra**,** Tuple relational Calculus, Domain relational calculus.

UNIT - III

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

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

UNIT - IV

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

UNIT - V

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

Textbooks:

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

References:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel, 7th Edition.
2. SQL The Complete Reference, James R. Groff, Paul N. Weinberg, 3rd Edition,
3. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.
4. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah,PHI.

DESIGN AND ANALYSIS OF ALGORITHMS

II Year B.Tech. II-Semester

L	T	P	C
3	0	0	3

Prerequisites

1. A course on "Computer Programming and Data Structures"
2. A course on "Advanced Data Structures"

Objectives

1. Introduces the notations for analysis of the performance of algorithms.
2. Introduces the data structure disjoint sets.
3. Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic programming, greedy, branch and bound methods) and mention problems for which each technique is appropriate;
4. Describes how to evaluate and compare different algorithms using worst-, average-, and best-case analysis.
5. Explains the difference between tractable and intractable problems, and introduces the problems that are P, NP and NP complete.

Outcomes

1. Ability to analyze the performance of algorithms
2. Ability to choose appropriate data structures and algorithm design methods for a specified application
3. Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs

UNIT - I

Introduction: Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations-Big oh notation, Omega notation, Theta notation and Little oh notation.

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

UNIT - II

Disjoint Sets: Disjoint set operations, union and find algorithms

Backtracking: General method, applications, n-queen's problem, sum of subsets problem, graph coloring

UNIT - III

Dynamic Programming: General method, applications- Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design.

UNIT - IV

Greedy method: General method, applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

UNIT - V

Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem - LC Branch and Bound solution, FIFO Branch and Bound solution.

NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NP-Complete classes, Cook's theorem.

Textbook:

1. Fundamentals of Computer Algorithms, Ellis Horowitz,Satraj Sahni and Rajasekharan,University Press.

References:

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft,Pearson education.
2. Introduction to Algorithms, second edition,T.H.Cormen, C.E.Leiserson, R.L.Rivest, and C.Stein, PHI Pvt. Ltd./ Pearson Education.
3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R. Tamassia, John Wiley and sons.

OPERATING SYSTEMS LAB
(Using UNIX/LINUX)

II Year B.Tech. II-Semester

L	T	P	C
0	0	3	1.5

Prerequisites

1. A course on "Programming for Problem Solving"
2. A course on "Computer Organization and Architecture"

Co-requisite

1. A course on "Operating Systems"

Objectives

1. To provide an understanding of the design aspects of operating system concepts through simulation
2. Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix

Outcomes

1. Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management.
2. Able to implement C programs using Unix system calls

List of Experiments

1. Write C programs to simulate the following CPU Scheduling algorithms
   a) FCFS b) SJF c) Round Robin d) priority
2. Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, fcntl, seek, stat, opendir, readdir)
3. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.
4. Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.
5. Write C programs to illustrate the following IPC mechanisms
   a) Pipes b) FIFOs c) Message Queues d) Shared Memory
6. Write C programs to simulate the following memory management techniques
   a) Paging b) Segmentation

Textbooks:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the Unix environment, W.R.Stevens, Pearson education.

References:

1. Operating Systems – Internals and Design Principles Stallings, Fifth Edition–2005, Pearson Education/PHI
2. Operating System A Design Approach-Crowley,TMH.
3. Modern Operating Systems, Andrew S Tanenbaum 2nd edition, Pearson/PHI
4. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education
5. Unix Internals The New Frontiers, U.Vahalia, Pearson Education

DATABASE MANAGEMENT SYSTEMS LAB

II Year B.Tech. II-Semester

L	T	P	C
0	0	3	1.5

Co-requisites

1. Co-requisite of course "Database Management Systems"

Objectives

1. Introduce ER data model, database design and normalization
2. Learn SQL basics for data definition and data manipulation

Outcomes

1. Design database schema for a given application and apply normalization
2. Acquire skills in using SQL commands for data definition and data manipulation.
3. Develop solutions for database applications using procedures, cursors and triggers

List of Experiments

1) Concept design with E-R Model
2) Relational Model
3) Normalization
4) Practicing DDL commands
5) Practicing DML commands
6) Querying (using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.)
7) Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
8) Triggers (Creation of insert trigger, delete trigger, update trigger)
9) Procedures
10) Usage of Cursors

Textbooks:

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

References:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel, 7th Edition.
2. SQL The Complete Reference, James R. Groff, Paul N. Weinberg, 3rd Edition,
3. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.
4. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah,PHI.

JAVA PROGRAMMING AND ALGORITHMS LAB

II Year B.Tech. II-Semester **L T P C**

0 1 2 2

Prerequisites

1. A Course on "Data Structures"
2. A Course on "Objected Oriented Programming through Java"

Objectives

1. It covers various concepts of java programming language
2. It introduces searching and sorting algorithms
3. It introduces the feasible and optimal solutions by using the different design methods

Outcomes

1. Develop the feasible and optimal solutions by using Greedy and dynamic programming.
2. Able to design the searching algorithms

Java programming:

1. Write a program to implement Abstraction
2. Write a program to implement Inheritance
3. Write a program to implement Polymorphism
4. Write a program to implement Encapsulation
5. Write a program to implement Methods in Java
   - Static, Abstract and Final
6. Write a program to implement Multi threading
7. Write a program to implement String Reverse

Algorithms:

1. Write a program to implement n-Queen's problem
2. Write a program to implement Optimal Binary Search Tree
3. Write a program to implement 0/1 Knapsack problem by using Dynamic Programming
4. Write a program to implement Greedy Knapsack problem
5. Write a program to implement Prim's minimum cost spanning tree by using Greedy Method
6. Write a program to implement Kruskal's minimum cost spanning tree by using Greedy Method
7. Write a program to implement Job sequencing with deadlines by using Greedy Method
8. Write a program to implement Single source shortest path problem by using Greedy Method

Textbooks:

1. Fundamentals of Computer Algorithms, Ellis Horowitz,Satraj Sahni and Rajasekharan,University Press.

References:

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft,Pearson education.
2. Introduction to Algorithms, second edition,T.H.Cormen, C.E.Leiserson, R.L.Rivest, and C.Stein, PHI Pvt. Ltd./ Pearson Education.
3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R. Tamassia, John Wiley and sons
4. Java The Complete Reference, Herbert Schildt's, 9th Edition, TATA McGRAW – HILL.

ENVIRONMENTAL SCIENCE

II Year B.Tech. II-Semester **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, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:

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

REFERENCE BOOKS:

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