Bharati Vidyapeeth

(Deemed to be University) Pune, India

College of Engineering, Pune

Department of Computer Science Engineering

B.Tech. CSE (2023 Course)

Program Curriculum

As Per NEP Guidelines

VISION OF UNIVERSITY:

Social Transformation through Dynamic Education

MISSION OF UNIVERSITY:

- To make available quality education in different areas of knowledge to the students as per their choice and inclination.
- To offer education to the students in a conducive ambiance created by enriched infrastructure! and academic facilities in its campuses.
- To bring education within the reach of rural, tribal and girl students by providing them substantive fee concessions and subsidized hostel and mess facilities.
- To make available quality education to the students of rural, tribal and other deprived sections of the population

VISION OF THE INSTITUTE:

To be World Class Institute for Social Transformation Through Dynamic Education.

MISSION OF THE INSTITUTE:

- To provide quality technical education with advanced equipment, qualified faculty members, and infrastructure to meet needs of the profession and society.
- To provide an environment conducive to innovation, creativity, research, and entrepreneurial leadership.
- To practice and promote professional ethics, transparency and accountability for social community, economic and environmental conditions.

VISION OF THE DEPARTMENT

To be focused on innovative and quality education in computer science and engineering that prepares professionals for development of society.

MISSION OF THE DEPARTMENT

- To provide academic environment for the development of skilled professionals
- To cultivate research culture that contributes to the sustainable development of the society.
- To enhance academic and industry collaborations for global exposure.

PROGRAM EDUCATIONAL OBJECTIVES

The students of B.TECH. (Computer Science and Engineering), after graduating will able to,

1. Demonstrate technical and professional competencies by applying Engineering Fundamentals, knowledge of computing and technologies.
2. Exhibit effective personality, good communication and team building skills
3. Adopt to the latest trends in the field of computer science and engineering.

PROGRAM SPECIFIC OUTCOMES

1. To design, develop and implement computer programs on hardware towards solving problems.
2. To employ expertise and ethical practice through continuing intellectual growth and adapting to the working environment.

PROGRAM OUTCOMES

1 Apply the knowledge of mathematics, science, engineering, and computing to provide a solution of complex engineering problems.

2 Identify, analyse complex engineering problems to derive conclusions using computer science and engineering knowledge.

3 Outline resolutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration, societal, and environmental considerations.

4 Use existing research knowledge and research techniques including design of experiments, data analysis, and synthesis to provide valid inferences.

5 Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools.

6 Apply inferences obtained by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the subsequent responsibilities relevant to the professional engineering practice.

7 Recognize the impact of the professional engineering solutions in societal and environmental contexts to demonstrate the knowledge for sustainable development.

8 Apply ethical principles and execute professional ethics and responsibilities and norms of the engineering practice.

9 Work effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary surroundings.

10 Talk effectively on complex engineering activities with the engineering community such as being able to comprehend and write effective reports and design documentation, make effective presentations.

11 Prove knowledge and understanding of the engineering and management principles and apply these to one’s work, as a member and leader in a team.

12 Recognise the need for and have the preparation and ability to engage in independent and life-long learning in context of technological change.

A. DEFINITION OF CREDITS:

1 Hour Lecture (L) per week	1 credit
1 Hour Tutorial (T) per week	1 credit
1 Hour Practical (P) per week	0.5 credits
2 Hours Practical (Lab)/week	1 credit

B. STRUCTURE OF UNDERGRADUATE ENGINEERING PROGRAMME:

Sr.No.	Category	Breakup of Credits
1	Basic Science Courses	16
2	Engineering Science Course	13
2	Core Courses and Lab	99
4	Professional Elective Courses	17
5	Project	09
6	Internship	06
7	Skill based Courses	16
**8	Value based Courses	08(Optional Credit)
9	Humanity/Social	06
TOTAL		180

- **** Indicates optional credits**

C. COURSE CODE AND DEFINITION

Course Code	Definitions
L	Lecture
T	Tutorial
P	Practical
TW	Term Work
O	Oral
SEE	Semester End Examination
ESC	Engineering Science Courses
BSC	Basic Science Courses
CC	Core Courses
PEC	Professional Elective courses
VAC	Value added Courses
SBC	Skill Based Courses
HSMC	Humanities/Social and management Courses
PROJ	Project
MAC	Mandatory Credit Course

Semester wise Credits

Sr. No.	Semester	Credits
1	I	25
2	II	25
3	III	23
4	IV	22
5	V	23
6	VI	22
7	VII	23
8	VIII	22

BHARATI VIDYAPEETH (DEEMED TO BE UNIVERSITY)
COLLEGE OF ENGINEERING, PUNE
B. Tech. (CSE): Semester –I (NEP 2020 COURSE)

Sr. No	Category	Subject Code	Subject	Teaching Scheme			Examination Scheme-Marks						Credits			
				L	P	T	ESE	Internal Assessment	TW	OR	PR	Total	Th	Pr/Or	Tut	Total
1.	BSC		Engineering Mathematics- I	3	-	1	60	40	-	-	-	100	3	0	1	4
2.	BSC		Engineering Chemistry	3	2	-	60	40	50	-	-	150	3	1	0	4
3.	ESC		Digital Electronics	4	2	-	60	40	25		-	150	4	1	0	5
4.	ESC		Probability and Statistics	4	2	-	60	40	25	-	-	125	4	1	0	5
5.	PCC		Programming and Problem Solving	4	2	-	60	40	25	-	25	150	4	1	0	5
6.	HSMC		Communication Skills	-	2	-	-	-	50	-	-	50	0	1	0	1
7.	SBC		Skill Base Course -I (Computer-Aided Drawing & Design)	-	2	-	-	-	25	25	-	50	0	1	0	1
			Total	**18**	**12**	**1**	**300**	**200**	**200**	**25**	**25**	**750**	**18**	**6**	**1**	**25**

**** indicate this is mandatory but the credits will not be considered in SGPA/CGPA**

BHARATI VIDYAPEETH (DEEMED TO BE UNIVERSITY)
COLLEGE OF ENGINEERING, PUNE
B. Tech. (CSE): Semester – II (NEP 2020 COURSE)

Sr. No	Category	Subject Code	Subject	Teaching Scheme			Examination Scheme-Marks						Credits			
				L	P	T	ESE	Internal Assessment	TW	OR	PR	Total	Th	Pr/Or	Tut	Total
1.	BSC		Engineering Mathematics- II	3	-	1	60	40	-	-	-	100	3	0	1	4
2.	BSC		Engineering Physics	3	2	-	60	40	50	-	-	150	3	1	0	4
3.	ESC		Electrical Technology	4	2	-	60	40	25	-	-	125	4	1	0	5
4.	ESC		Discrete Mathematical Structures	4	-	1	60	40	25	-	-	125	4	0	1	5
5.	PCC		Linear Data Structures	4	2	-	60	40	25	-	25	150	4	1	0	5
6.	HSMC		Universal Human Values	-	2	-	-	-	50	-	-	50	0	1	0	1
7.	SBC		Skill Base Course-II (Computer Workshop Technology)	-	2	-	-	-	25	25	-	50	0	1	0	1
			Total	**18**	**10**	**2**	**300**	**200**	**175**	**25**	**25**	**750**	**18**	**5**	**2**	**25**

**** indicate this is mandatory but the credits will not be considered in SGPA/CGPA**

B. Tech
(Computer Science Engineering)
Semester- I

Programme: B. Tech. (Common for All) Sem – I

COURSE: Engineering Mathematics -I		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS:**
Theory: 03 Hours / Week Tutorial: 01 Hours / Week	End Semester Examination:60 Marks Internal Assessment: 40 Marks	Theory: 04
		Total: 04

Course Pre-requisites: The students should have knowledge of	
1	Algebra of matrices and its Determinants, Maxima and Minima of single variable functions.
Course Objective: On completion of the course -	
1. Fundamental theorems, concepts in Matrices, Demoivr's theorem and its applicationsin engineering. 2. Various techniques in Calculus, Explanation of functions and Infinite series. 3. Partial differentiation, maxima, minima and its applications in engineering.	
Course Outcomes: On completion of the course, the students will be able to:	
1	Understand rank of matrix and apply it to solve system of linear equations
2	Understand the DeMoiver's theorem, hyperbolic functions and apply it in engineering problems.
3	Understand the Leibnitz's rule and apply it to find nth derivative of a function.
4	Understand fundamental concepts of convergence, divergence of infinite series and its tests.

5	Understand the concept of partial differentiation and apply it to find total derivative.	
6	Evaluate the maxima and minima of any two variables functions.	
Course Content:		
Unit-I	**Matrices** Rank, Normal form, System of Linear Equations, Linear Dependence and Independence,Linear and Orthogonal Transformations. Eigen values, Eigen Vectors.	**(06 Hrs)**
Unit-II	**Complex Numbers and Applications:** Definition, Cartesian, Polar and Exponential Forms ,Argand‟s Diagram, De'Moivre's theorem and its application to find roots of algebraicequations., Hyperbolic Functions, Logarithm of Complex Numbers, Separation into Real and Imaginary parts, Application to problems in Engineering.	**(06 Hrs)**
Unit-III	**Differential Calculus :** Differential Calculus, Successive Differentiation, nth Derivatives of Standard Functions, Leibnitz's Theorem. **Expansion of Functions:** Taylor's Series and Maclaurin's Series	**(06 Hrs)**
Unit-IV	**Differential Calculus:** Indeterminate Forms, L' Hospital's Rule, Evaluation of Limits. **Infinite Series** : Infinite Sequences, Infinite Series, Alternating Series, Tests for Convergence, Absolute and Conditional Convergence, Power series, Range of Convergence	**(06 Hrs)**
Unit-V	**Partial Differentiation and Applications:** Partial Derivatives, Euler's Theorem on Homogeneous Functions, Implicit functions, TotalDerivatives, Change of Independent Variables. Errors and Approximations.	**(06 Hrs)**
Unit-VI	**Jacobian:** Jacobians and their applications, Chain Rule, Functional Dependence. **Maxima and Minima:** Maxima and Minima of Functions of two variables, Lagrange's method ofundetermined multipliers.	**(06 Hrs)**

Internal Assessment :Consist of Unit test 20 marks, PBL-20 marks	
Unit Test -1	Unit No: I, II, III
Unit Test -2	Unit No: IV, V, VI

Reference Books:

1	Applied Mathematics (Volumes I and II) by P. N. Wartikar & J. N. Wartikar(Pune Vidyarthi Griha Prakashan, Pune), 7th Edition, 1988,Reprint 2010.
2	Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi),42th Edition ,2012.
3	Higher Engineering Mathematics by B.V. Ramana (Tata McGraw-Hill),Edition ,2008.
4	Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.), 8th Edition,1999,Reprint 2010.
5	Advanced Engineering Mathematics, 7e, by Peter V. O'Neil (Thomson Learning),Edition 2007.
	Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education), 2nd ,Edition, 2002.

Programme – Engineering Chemistry for all branches (First year)

Designation of Course	**Engineering Chemistry**		
Teaching Scheme	**Examination Scheme**	**Marks**	**Credits Allotted**
Theory:- 03 Hours/ Week	University Examination	60	Theory: 03
Practical: 02 Hours/ Week	Internal Examination	40	Tutorial : 00
Tutorial :- 00 Hours/Week	TW	50	O/P/TW: 01
	Total	150	04

Course Prerequisites:-	The student should have • Basic knowledge of chemistry. • Basic knowledge of electrochemistry and chemistry of materials • Introductory knowledge of polymers.
Course Objectives:-	The student should acquire the knowledge of 1. To develop the interest among the students regarding chemistry and their applications in engineering. 2. To develop confidence among students about chemistry, how the knowledge of chemistry is applied in technological field. 3. The student should understand the concepts of chemistry to lay the groundwork for subsequent studies in the Engineering field
Course Outcomes:-	After completion of the course students will be able to

	1. **Understand** the different methods of analysis of water, different environmental pollutants and importance of green chemistry 2. **Understand** and **apply** the importance of fuels for various engineering applications. 3. **Explain** the drawbacks of corrosion and different methods of elimination of corrosion 4. **Apply** the knowledge of polymer to study advanced materials**.** 5. **Apply** the basic concept of chemistry to explain the chemical properties and processes of materials of nanoscale 6. **Understand** the instrumental analysis helpful for various engineering applications

Course Contents

Unit 1	**Water Technology & Green Chemistry**	(6 Hrs.)
Introduction, sources and impurities in water, Hardness of water, types, determination of hardness using EDTA titration, softening of hard water by ion-exchange process. Numerical problems on hardness of water. Major environmental pollutants, Basic principles of green chemistry. Atom economy, Synthesis of adipic acid, Industrial applications of green chemistry, Numerical problems on Atom economy.		
Unit 2	**Electrochemical energy and solar energy**	(6 Hrs.)
Fuels: Introduction, Definition, importance of fuels, calorific value, types, fluidized bed catalytic cracking, knocking (Petrol engine), mechanism and its ill effects, biodiesel, power alcohol, octane and cetane number.Solar Energy: Introduction, construction, working and applications of photovoltaic cell.		

Unit 3	**Corrosion technology and it's control**	(6 Hrs.)
Introduction, Electrochemical theory of corrosion, Types of corrosion, Differential metal and differential aeration (pitting and water line) caustic embritlement. Factors affecting the rate of corrosion, Corrosion control: Cathodic protection, sacrificial anode and impressed current methods, Metal coatings, Galvanization and tinning, Anodizing, Anodizing of aluminum, Organic coatings: Paint and varnishes.Metal finishing: Introduction, Technological importance. Principles of electroplating. Electroplating of chromium. Electro less plating: Introduction, electro less plating of nickel & copper on PCB with applications.j		
Unit 4	**Engineering Materials and Technology**	(6 Hrs.)
Polymers: Introduction, classification, Synthesis and applications of Polyurethane, polycarbonates, Conducting Polymers: Synthesis & Mechanism of conduction in poly aniline.Composites: Introduction, constitution, classification. Types: fiber glass, hybrid and reinforced Composites with applications.		
Unit 5	**Nano materials**	(6 Hrs.)
Introduction, size dependent properties (Surface area, Electrical, Optical, Catalytic and Thermal properties). Synthesis of nano materials: Top down and bottom up approaches, Synthesis by Sol-gel, precipitation and chemical vapour deposition, Nano scale materials: Fullerenes, Carbon nano tubes and graphenes – properties and applications.		
Unit 6	**Instrumental methods of analysis**	(6 Hrs.)
Introduction, Theory, Instrumentation and applications of colorimetry, pHmetry, conductometry. Introduction to spectroscopy, principles and applications of UV/Vis. Spectroscopy		

Experiments:

Experiments No	**Name of Experiment**
1	Determination of Hardness of water sample by EDTA method.
2	To determine strength of acid by pH – metric Titration.
3	To measure the strength of acid by conductometric titration

4	Measurement of Surface tension of a given liquid by Stalgmometer.
5	To determine alkalinity water sample.
6	Estimation of the given amount of copper in the given solution by colorimetry
7	Synthesis of conducting polyaniline from aniline by oxidative polymerization
8	Determination of iron content in the given solution by Mohr's method
9	To determine the strength of given acid solution by titrating it against base solution using indicator
10	Determination of reaction rate, order and molecularity of hydrolysis of ethyl acetate
11	Verification of Beer-Lambert's Law.
12	Determination Of Viscosity Of Liquids By Ostwald's Viscometer
13	Determination Of Chloride Content Of Water By Argentometry
14	Estimation of copper from brass by iodometry
15	To study set up of Daniel cell.

Text Books/ References::

1	Engineering Chemistry, Dhanpat Rai & Sons, Delhi, 1992. Jain P.C & Jain Monica.
2	Engineering Chemistry, Tata McGraw-Hill Publication, New Delhi. O. G. Palanna.
3	A textbook of Engineering Chemistry, McGraw-Hill Publication, New Delhi. S. S. Dara.
4	Polymer Science and technology (2nd Edition), P. Ghosh, Tata McGRAW Hill, 2008.

5	Polymers: Chemistry & Physics of Modern Materials (2nd edition) J.M.G.Cowie, Blackie Academic & Professional, 1994.
6	Engineering Chemistry- Fundamentals and applications, Cambridge Publishers - 2015. Shikha Agarwal.
7	Polymers: Chemistry & Physics of Modern Materials (2nd edition) J.M.G.Cowie, Blackie.

Unit Test –

Unit Test -1	Unit No: I, II, III
Unit Test -2	Unit No: IV, V, VI

Digital Electronics					
Teaching Scheme		**Examination Scheme**		**Credit Scheme**	
	Hours/Week		**Marks**		**Credits**
Theory:	**04 Hours/Week**	**End Semester Examination**	**60 Marks**	**Theory**	**04**
Practical:	**02 Hours/Week**	**Internal Assessment**	**40 Marks**		
		Term work	**25 Marks**	**Practical**	**01**
		Total	**125 Marks**	**Total**	**05**

Course Objective:

- To present the Digital fundamentals, Boolean algebra and its applications in digital systems
- To familiarize with the design of various combinational digital circuits using logic gates
- To introduce the analysis and design procedures for synchronous and asynchronous sequential circuits
- To understand the various semiconductor memories and related technology

Prerequisite:

Mathematics and Elementary Physics

Course Outcomes: On completion of the course, students will have the ability to:

1. Comprehend different number systems and Boolean algebraic principles.
2. Apply logic design minimization techniques to simplify Boolean expressions
3. Analyse and design combinational logic circuits.
4. Demonstrate the operations of systems with sequential circuit elements.
5. Comprehend characteristics and structure of Programmable Logic Devices and Memory.
6. Draw ASM charts for sequential circuit design.

Unit I	**08 Hours**

Digital systems: Number Systems: Introduction to Number Systems-Decimal, Binary, Octal, Hexadecimal, Conversion of number system, Representation of Negative Numbers, 1's complement and 2's complement. Binary Arithmetic: Binary addition, Binary subtraction, Subtraction using 1's complement and 2's complement, Binary multiplication, and division. Digital Codes: BCD code, Excess-3 code, Gray code and ASCII code. Logic Gates: Logical Operators, Logic Gates-Basic Gates, Universal Gates, realization of other gates using universal gates.	
Unit II	**08 Hours**
Logic Design Minimization: Boolean algebra, De Morgan's Theorems, Standard representation of logic functions, Sum of Product (SOP) form, Product of Sum (POS) form, Simplification of logical functions, Minimization of SOP and POS forms using Karnaugh-Maps up to 4 variables Don't care condition, Quine-McCluskey Method.	
Unit III	**08 Hours**
Combinational Circuits: Binary and BCD arithmetic, Half Adder, Full Adder, Half Subtractor, Full Subtractor, Binary Adder (IC 7483), BCD adder, Code converters Multiplexers, De multiplexer, Decoder (IC 74138) and their use in combinational logic design, Priority Encoder, Digital Comparators, Parity generators and Checker(IC 74180), ALU	
Unit IV	**08 Hours**
Sequential Circuits: Flip- flop: SR, JK, D, T flip flops, Truth Tables and Excitation tables, Conversion from one type to another type of Flip Flop. Registers: Buffer register, Shift register. Counters: Asynchronous counters, Synchronous counters, Modulus counters	
Unit V	**08 Hours**

FSM and ASM charts: Introduction to FSM, Moore and Mealy State machine, state machine as a sequential controller. Design of state machines: state table, state assignment, transition/excitation table, excitation maps and equations, logic realization, ASM chart notations, ASM block, State diagram, ASM chart for sequential circuits, Multiplexer Controller.	
Unit VI	**08 Hours**
Memory and PLD: Semiconductor memories: memory organization, memory expansion, Classification and characteristics of memories, RAM, ROM, EPROM, EEPROM, NVRAM, SRAM, DRAM. Programmable logic devices: Study of PROM, PAL, PLAs. Architecture of PLA, Designing combinational circuits using PLDs.	

Textbooks:

1. M. Morris Mano and M. D. Ciletti, Digital Design, Pearson Education.
2. RP Jain, Modern Digital Electronics, Tata McGraw Hill Publication.
3. F.J. Hill and G.L. Peterson, Switching Theory and Logic Design, John Wiley
4. J.F.Wakerly "Digital Design: Principles and Practices", 3rd edition, 4th reprint, Pearson Education, 2

Reference Books:

1. David J. Comer, Digital Logic & State Machine Design, Oxford University Press.
2. Digital Integrated Electronics- H. Taub&D.Shilling, McGraw Hill.

List of Assignments:

Six assignments to be given by the course coordinator (Theory)-one from each unit

Project Based Learning

1. Survey report of basic gates ICs 7432, 4011, 4050, 4070,4071,4010
2. Implement combinational logic Circuit of given Boolean Equation.
3. Implement Half Adder and Half Subtractor.
4. Implement Full Adder using two Half Adders

5. Build 4-bit parallel Adder / Subtractor using IC.
6. Build Code Converters: Binary to Gray
7. Build Code Converters: Excess 3 to Binary)
8. Implement Two Bit Magnitude Comparator using IC 7485
9. Implement given combinational logic using MUX
10. Implement 7 segment decoder driver using IC 7447.
11. Build a Decade counter and Up-Down Counter.
12. Build a Shift Registers: SISO and SIPO
13. Implement the Johnson Counter and Ring Counter.
14. Survey Report on Static I/O and transfer Characteristic of TTL and CMOS.
15. Implement given Boolean Function using PLA.(Function and Equation will be given by Subject Teacher)

(Note:- *Students in a group of 3 to 4 shall complete any one project from the above list)

List of Laboratory Exercises:

1. Verify truth tables of logic gates. (AND, OR, XOR, NOT, NAND, NOR). Simplify the given Boolean expression using K-map and implement using gates
2. State De-Morgan's theorem and write Boolean laws. Implement NAND and NOR as Universal gates.
3. Design (truth table, K-map) and implement half and full adder/ subtractor.
4. Design (truth table, K-map) and implement 4-bit BCD to Excess-3 Code converters.
5. Study of magnitude Comparator using IC 7485
6. Implement of logic functions using multiplexer IC 74151 (Verification, cascading & logic function implementation)
7. Implement logic functions using 3:8 decoder IC 74138.
8. Verify truth tables of different types of flip flops.
9. Design (State diagram, state table & K map) and implement 3 bit Up and Down Asynchronous and Synchronous Counter using JK flip-flop
10. Design and implement modulo 'n' counter with IC 7490.

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

Probability and Statistics					
Teaching scheme		**Examination scheme**		**Credit scheme**	
Hours/Week			**Marks**	**Credits**	
Lecture:	**4 Hours/Week**	**End Semester Examination:**	**60 Marks**	**Theory:**	**4**
Practical:	**2 Hours/Week**	**Internal Assessment:**	**40 Marks**		
		Term Work:	**25 Marks**	**Practical:**	**1**
		Total:	**125 Marks**	**Total:**	**5**

Course Objectives:

- Probability theory and expected value.
- Probability distribution and its applications.
- Multiple regression and ANOVA.

Course Outcomes: On completion of the course, students will have the ability to:

1. Apply Bayes theorem to find probability.
2. Compute mathematical expectations.
3. Identify various theoretical distributions.
4. Use correlation coefficient to interpret numerical data.
5. Use regression to estimate the dependent variable.
6. Apply concept of graph in optimization.

Unit I	**08 Hours**

Probability Theory: Definition of probability: classical, empirical, and axiomatic approach of probability, Addition theorem of probability, Multiplication theorem of probability, Bayes' theorem of inverse probability, Properties of probabilities	
Unit II	**08 Hours**
Random Variable and Mathematical Expectation. Definition of random variables, Probability distributions, Probability mass function, Probability density function, Mathematical expectation, Join and marginal probability distributions, Properties of expectation and variance with proofs, Examples	
Unit III	**08 Hours**
Theoretical Probability Distributions: Binomial distribution, Poisson distribution, Normal distribution, Fitting of binomial distributions, Properties of binomial, Poisson and normal distributions, Relation between binomial and normal distributions, Relation between Poisson and normal distributions, Importance of normal distribution	
Unit IV	**08 Hours**
Correlation: Introduction, Types of correlation, Correlation and causation, Methods of studying correlation, Karl Pearson's correlation coefficient, Spearman's rank correlation, Coefficient, Properties of Karl Pearson's correlation coefficient, Properties of Spearman's rank correlation coefficient, Probable errors, Examples...	

Unit V	**08 Hours**
Linear Regression Analysis: Introduction, Linear and non-linear regression, Lines of regression, Derivation of regression lines of y on x and x on y, Angle between the regression lines, Coefficients of regression, Theorems on regression coefficient, Properties of regression coefficient	
Unit VI	**08 Hours**
Multiple Regression and AVOVA: Multiple regression & multiple correlation, Analysis of variance (one way, two way with as well as without interaction)	
Textbooks	
1.S. C. Gupta, "Fundamentals of Statistics", 46th Edition, Himalaya Publishing House.	
2.G. V. Kumbhojkar, "Probability and Random Processes", 14th Edition, C. Jamnadas and company.	
3.Murray Spiegel, John Schiller, R. ALU Srinivasan, Probability and Statistics, Schaum's Outlines	
Kishor S. Trivedi, "Probability, Statistics with Reliability, Queuing and Computer Science Applications", 2nd Edition, Wiley India Pvt. Ltd.	
5.Vijay K. Rohatgi, A. K. Md. Ehsanes Saleh, An Introduction to Probability And Statistics, 3rd Edition, Wiley Publication	
6.I.R. Miller, J.E. Freund and R. Johnson. Fun “Probability and Statistics for Engineers” (4th Edition)	

Project Based Learning

Students are expected prepare report on any one topic, write its definition, applications and analyse the hypothetical data. Also, write pseudo code for it, wherever applicable.

1. Bayes theorem
2. Additive and multiplicative law of probability
3. Mathematical expectation
4. Joint and marginal probability distribution
5. Theoretical probability distribution
6. Coefficient of correlation
7. Regression estimates
8. Simple regression model
9. Multiple regression model
10. One way ANOVA
11. Two way ANOVA
12. Correlation
13. Multiple correlation

Note: - *Students in a group of 3 to 4 shall complete any one project from the above list.

List of Laboratory Experiments (The course co-ordinator may frame 8-10 experiments)

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

Programming and Problem Solving					
Teaching Scheme		**Examination Scheme**		**Credit Scheme**	
	Hours/Week		**Marks**		**Credits**
Theory:	**04 Hours/Week**	**End Semester Examination**	**60 Marks**	**Theory**	**04**
Practical:	**02 Hours/Week**	**Internal Assessment**	**40 Marks**		
		Term Work	**25 Marks**	**Practical**	**01**
		Practical	**25 Marks**		
		Total	**150 Marks**	**Total**	**05**

Course Objective:

The course is designed to provide complete knowledge of C language. Students will be able to develop logics which will help them to create programs, applications in C. Also by learning the basic programming constructs they can easily switch over to any other language in future.

Prerequisite:

Basic knowledge of mathematics.

Course Outcomes: On completion of the course, students will have the ability to:

1. Describe the steps in problem-solvingand write a pseudocode for a given problem.
2. Identify the suitable control structure and write a C code for the same.
3. Write the C code for a given algorithm.
4. Illustrate use of pointers and functions
5. Write programs that perform operations using derived data types.
6. Validate the logic building and code formulation by designing code capable of passing various test cases

Unit I	**08 Hours**
Introduction to Computer Problem Solving: The problem solving Aspect, Top Down Design, Implementation of Algorithms, Program Verification, The Efficiency of Algorithms, The Analysis of Algorithms, Fundamental Algorithms: General problem solving strategies: Introduction to program Planning tools- algorithm, flowcharts, and pseudo codes. Introduction to Programming Logic.	
Unit II **Control structures:** Features of C, basic concepts, structure of C program, program, declarations, variables, data types, expressions, operators assignment, arithmetic, relational, logical, increment and decrement, precedence of operators, type conversions, scanf and printf functions if-else, nested if-else, ladder if-else and switch statement. C Conditional control structures: for, while do-while Unconditional control structures: break, continue, goto statement.	**08 Hours**
Unit III	**08 Hours**
Arrays and strings: Declaration initialization of one dimensional Array, two dimensional array, accessing array elements, Character Array/String, Character - Handling Library Functions, Standard Input/Output Library Functions for string.	
Unit IV	**08 Hours**
Functions and structures: What is a Function , Benefits of a Function , Function Terminology , Array of Structures, How does Function Works , Scope and Lifetime of Variables in function ,Storage Classes of Variables , Call by value and call by reference ,Recursion ,Overview of Structures , Defining and Using a Structure , Structures within a Structure.	

Unit V	**08 Hours**
Pointers: Declaring and Initializing Pointers, Function and Pointer Parameters, Pointer Arithmetic, Pointer and Arrays, Two Dimensional Arrays and Pointers.	
Unit VI	**08 Hours**
Files : FILE , Opening and Closing of Files , Writing and Reading in Text Format, Writing and Reading in Binary Format, Command Line Arguments	

Textbooks:

1. Let Us C by YashavantKanetkar, 13e, BPB Publication.
2. BrainW. Kernighan& Dennis Ritchie, C Programming Language, 2nd edition, PHI.
3. E.Balaguruswamy, Programming in ANSI C 5th Edition McGraw-Hill.
4. How to Solve it by Computer by R. G. Dromey, 1e, Pearson Education.

Reference Books:

1. C: The Complete Reference by Herbert Schildt.

List of Assignments:

1. Write a pseudocode and draw a flowchart for a given problem.
2. Justify the selection of appropriate control structure
3. Write a function to check whether the string is palindrome.
4. List and explain the working of standard string I/O functions.

5. Define a dynamic array to store the student record.
6. List and explain the different modes of opening file.

Project Based Learning

1. Calendar using C
2. Snake Game
3. Cricket score display
4. Quiz game
5. Phone-book application
6. Election System
7. Simple Result system
8. Typing Tutor
9. Bill Calculator
10. Grade Calculator
11. CGPA Calculator
12. Digital Clock
13. Contact Management System
14. IP finder
15. Bank Management System.
16. Departmental Store Management.
17. Hangman Game Project.
18. Library Management System

(Note:- *Students in a group of 3 to 4 shall complete any one project from the above list)

List of Laboratory Exercises:

1. Describe the problem-solving steps.
2. Write a pseudocode and draw a flowchart.

3. Use mathematical operators and basic data types.	
4. Demonstrate use of control structures.	
5. Demonstrate use of logical operators.	
6. Solve the real time problem using single and two dimensional array.	
7. Perform the operations on string.	
8. Solve the problems using recursive and non-recursive functions.	
9. Solve the problems using dynamic memory allocations.	
10. Perform the operations on files.	
Syllabus for Unit Tests:	
Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

	Communication Skills **(Common for all Branches)**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 00 Hours/ Week	End Semester Examination	00	Theory: 00 Tutorial: 00 Practical: 01
Practical :- 02 Hours/ Week	Internal Assessment	00	
Tutorial :- 00 Hours/ Week	Term Work	50 Marks	
	Total	50 Marks	01

Course Prerequisites:-	Students should have knowledge of Basic English grammar Students should have basic information of sound system of English language.
Course Objective	The course objective of Communication Skills puts the following class teaching objectives, considering English Language skills as a wheel rolling aspects in today's world, the focus is on honing the skills such as LSRW and presentation skills. It also puts emphasis on technical and professional writing skills. Honing the presentation skills among students through appropriate activities, this will help them in their business ventures.
Course Outcomes:-	After completion of the course students will be able to 1. Understand and construct the error free sentences of English language and do implementation of it in the spoken and written business communication

	2. Understand and apply the sounds of English language for correct pronunciation 3. Understand and develop the ability to enhance sound vocabulary for effective communication 4. Understand communication process and principles to do applications in business communication 5. Understand the techniques of writing skills and apply them in appropriate context and domain 6. Create effective business presentation and do effective implementation of it through activities

Unit I:English grammar (4 Hrs)
Application of Basic Grammar: Articles, Prepositions, Tenses, Subject-verb agreement, Use of phrases & Clauses in sentences, Common errors
Unit II. Phonetics/study of sounds in English (4 Hrs)
Introduction to phonetics, study of speech organs, study of phonetic script, transcriptions of words, articulation of different sound in English, reducing MTI, stress and intonation
Unit III: Vocabulary Enrichment (4 Hrs)
Ways of word formation, Foreign phrases, One word substitutions, Synonyms & antonyms, Words often confused, Indian English words, Usage of idioms &phrases.GRAS-PT formula
Unit IV: Communication Skills (4 Hrs)
Introduction, forms and function of communication process, non-verbal codes in communication, Importance of listening skills, Listening V/s hearing, Types of listening, Barriers to communication and listening, Importance of LSRW skills in communication
Unit V: Technical Writing Skills (4 Hrs)
The mechanics and principles of written communication, Technical Communication, Need and Importance, technical report writing;, email writing, , notice, agenda, minutes of meeting writing. Use of technology in technical writing

Unit VI.Presentation skills **(4Hrs)**
Designing effective presentation, understanding theme, developing content and layout of presentation, use of tone and language, technological tools for effective presentation.
Reference Books:
1. Business Communication by Meenakshi Raman, Prakash Singh published by Oxford University press, second edition,
2. Spoken English- A manual of Speech and Phonetics by R. K. Bansal, J. B. Harrison published by Orient Blackswan.
3. Technical Communication by Meenakshi Raman, Sangeeta Sharma published by Oxford University press.
4. Developing Communication Skills by Krishna Mohan, Meera Banerji published by Macmillan India Pvt Ltd.
Recommended web-links for enhancing English language and business communication http://www.bbc.co.uk/worldservice/learningenglish http://www.englishlearner.com/tests/test.html http://www.hodu.com/default.html http://www.communicationskills.co.in/index.html

COMPUTER AIDED DRAWING & DESIGN

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT CHEME	
Practical:	**2 Hours/Week**	**Term Work:**	**25 Marks**	**Practical:**	**1**
		Oral:	**-**		
Total	**2 Hours/Week**		**25 Marks**	**Total:**	**1**

Prerequisite:
Basics of programming skill

Course Objective:

1. To have the knowledge of Orthographic and Isometric projections
2. To understand the basic principles of Engineering drawing
3. To have the knowledge of different AutoCAD commands
4. To understand the algorithm for generating different entities on the screen

Course Outcomes: On completion of the course, students will have the ability to:

1. Prepare and understand drawings
2. Use the principles of orthographic projections
3. Use the principles of Isometric projections
4. Able to draw simple drawing using AutoCAD
5. Generate the line by highlighting the pixels
6. Fill the polygon

Unit I **04 Hours**

Orthographic Projection

Dimensioning and conventions strictly as per SP 46:2003 (Revised). Orthographic projection of right regular solids such as cube and prism. Orthographic projection of simple machine blocks

Unit II **04 Hours**

Isometric Projections

Introduction, Isometric axes, Lines & planes, Isometric scale, Isometric projection and Isometric view, Conversion of Isometric to Orthographic Projections

Unit III **04 Hours**

Introduction to AutoCAD

Getting Started with AutoCAD. Line, polyline, Circle, arc Rectangle, polygon Ellipse, Elliptical arc, spline, Xline, Ray, Points Measure, Divide, Region Wipeout, Helix, Donut

Unit IV **04 Hours**

AutoCAD Modify Tools and Dimensioning

Move, copy, Rotate, scale Stretch, fillet, chamfer Erase, offset, explode Array, polar Array, path array Trim, extend, mirror. Annotations Dimensions, dimension setting Linear dimension, Aligned dimension Angular dimensions, arc length, Radius Diameter

Unit V **04 Hours**

Line Drawing Algorithm

The Digital Difference Analyser (DDA) algorithm to draw lines on a screen. Interpolation points based on the difference between the start and end points. Bresenham Line Drawing Algorithm. Numerical examples.

Unit VI **04 Hours**

Flood Fill Algorithm

Concept of seed point, four connected approaches and eight connected. Boundary colour and fill colour. Filling of different polygon.

Textbooks:

1. **"**Elementary Engineering Drawing" by Bhatt, N.D., Charotar publishing Co.
2. "Engineering Graphics" by K.L. Narayana and P.Kannaiah, SCITECH PUBLICATIONS (INDIA) PVT.LTD. October 2008

3. “Engineering Graphics with AutoCAD”, D. M. Kulkarni, A. P. Rastogi, and A. K. Sarkar (2009), PHI Learning Private Limited, New Delhi.
4. “Engineering Drawing: With an Introduction to CAD,” Jolhe, Dhananjay (2006), Tata Mc Graw Hill, India

List of Laboratory Exercise:

1. Drawing to half imperial size sheet with instruments. Drawing illustrating basic concepts of Orthographic projections and dimensioning.
2. From the given three views draw isometric
3. Introduction to AutoCAD. Student should get familiarise with the GUI of the software.
4. Commands for drawing basic entities
5. AutoCAD Modify Tools and Dimensioning
6. Digital Difference Analyser (DDA) algorithm
7. Bresenham Line Drawing Algorithm
8. Flood Fill Algorithm

B. Tech
(Computer Science Engineering)
Semester- II

Programme: B. Tech. (Common for All) Sem – II

<table>
<tr><td colspan="3">COURSE: ENGINEERING MATHEMATICS -II</td></tr>
<tr><td>TEACHING SCHEME:</td><td>EXAMINATION SCHEME:</td><td>CREDITS:</td></tr>
<tr><td>Theory: 03 Hours / Week
Tutorial: 01 Hours / Week</td><td>End Semester Examination:60 Marks
Internal Assessment: 40 Marks</td><td>Theory: 04</td></tr>
<tr><td></td><td></td><td>Total: 04</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td colspan="3">Course Pre-requisites:The students should have knowledge of</td></tr>
<tr><td>1</td><td colspan="2">Student should have Basic Knowledge of differential calculus</td></tr>
<tr><td colspan="3">Course Objective: On completion of the course -</td></tr>
<tr><td colspan="3">This course help student to develop an ability for differential equations to model the complex physical systems.</td></tr>
<tr><td colspan="3">Course Outcomes: On completion of the course, the students will be able to:</td></tr>
<tr><td>1</td><td colspan="2">To solve differential equations by different methods</td></tr>
<tr><td>2</td><td colspan="2">Apply different laws to solve Simple Harmonic Motion, One– Dimensional Conduction of Heat, Chemical engineering problems.</td></tr>
</table>

3	To solve integral calculus and Fourier series	
4	To solve integral calculus with error functions	
5	Determine position in solid geometry	
6	Solve multiple integration problems	
Course Content:		
Unit-I	**Differential Equation** Definition, Order and Degree of DE, Formation of DE. Partial Differential Equations, Classification of higher order PDEs. Solutions of Variable Separable DE, Exact DE, Linear DE and reducible to these types.	**(06 Hrs)**
Unit-II	**Applications of Differential Equations** Applications of DE to Orthogonal Trajectories, Newton's Law of Cooling, Kirchoff‟s Law of Electrical Circuits, Motion under Gravity,Rectilinear Motion, Simple Harmonic Motion, One–Dimensional Conduction of Heat, Chemical engineering problems. Solution of Higher order ODE with constant and variable coefficients and its applications to boundary and initial value problems.	**(06 Hrs)**
Unit-III	**Fourier Series and Integral Calculus** Definition, Dirichlet's conditions, Fourier Series and Half Range Fourier Series, Harmonic Analysis. duction formulae, Beta and Gamma functions	**(06 Hrs)**
Unit-IV	**Integral Calculus and Curve Tracing** Differentiation Under the Integral Sign, Error functions. Tracing of Curves, Cartesian, Pola and Parametric Curves. Rectification of Curves.	**(06 Hrs)**
Unit-V	**Solid Geometry** Cartesian, Spherical Polar and Cylindrical Coordinate Systems. Sphere, Cone and Cylinder.	**(06 Hrs)**
Unit-VI	**Multiple Integrals and their Application**	**(06 Hrs)**

	Double and Triple integrations, Applications to Area, Volume, Mean and Root Mean Square Values	

Internal Assessment :Consist of Unit test 20 marks, PBL-20 marks

Unit Test -1	Unit No: I, II, III
Unit Test -2	Unit No: IV, V, VI

Reference Books:

1	Applied Mathematics (Volumes I and II) by P. N. Wartikar & J. N. Wartikar (Pune Vidyarthi Griha Prakashan, Pune), 7th Edition, 1988,Reprint 2010.
2	Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi),42th Edition ,2012.
3	Higher Engineering Mathematics by B.V. Ramana (Tata McGraw-Hill),Edition ,2008.
4	Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.), 8th Edition, 1999,Reprint 2010.
5	Advanced Engineering Mathematics, 7e, by Peter V. O'Neil (Thomson Learning),Edition 2007.
	Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education), 2nd ,Edition, 2002.

Designation of Course	**Engineering Physics (Common for all Branches)**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 3 Hours/ Week	End Semester Examination	60 Marks	Theory: 03 Tutorial: 00 Practical: 01
Practical :- 02 Hours/ Week	Internal Assessment	40 Marks	
Tutorial :- 00 Hours/ Week	Term Work	50 Marks	
	Oral/Practical Examination	-- Marks	
	Total	150 Marks	04

Course Prerequisites:-	Students are expected to have a basic understanding of physics and calculus.
Course Objective	To impart knowledge of basic concepts in physics relevant to engineering applications in a broader sense with a view to lay foundation for the engineers.
Course Outcomes :-	1. Interpret the properties of charged particles to develop modern instruments such as electron microscopy. 2. Relate the problems associated with architectural acoustics and give their remedies and use ultrasonic as a tool in industry for non destructive testing. 3. Solve quantum physics problems to micro level phenomena and solid state physics. 4. Appraise the wave nature of light and apply it to measure stress, pressure and dimension etc. 5. Develop competency and understanding of the principles and applications of lasers and fiber optics. 6. Explain properties of solid matter and connect to applications in the field of engineering.

Course Contents

Unit 1	**Modern Physics**	**(6Hrs.)**
Motion of a charged particle in electric and magnetic fields, Electrostatic and Magnetostatic focussing, Electron microscopy, interaction of electron beam with the material, Wavelength and resolution, TEM, SEM and EDS, Separation of isotopes by Bainbridge mass spectrograph, CRT, CRT in CRO.		
Unit 2	**Architectural Acoustics**	**(6Hrs.)**
Elementary acoustics, Reverberation and reverberation time, Sabine's formula (without Derivation), Intensity level, Sound intensity level, Loudness, Sound absorption, Sound absorption coefficient, different types of noise and their remedies, basic requirement for acoustically good hall, factors affecting the architectural acoustics and their remedies, introduction to ultrasonics, Production of ultrasonics by magnetostriction and piezoelectric methods, applications (thickness measurement, flaw detection).		
Unit 3	**Quantum mechanics**	**(6Hrs.)**
Dual nature of matter, concept of wave packet, group and phase velocity and relation between them, physical significance of wave function, Schrodinger's time dependant and time independent wave equation, Application of Schrodinger's time independent wave equation to the problems of Particle in a rigid box, concept of tunnelling at potential barrier (no derivation-only conceptual discussion).		
Unit 4	**Optics – I (Interference and Diffraction)**	**(6 Hrs.)**
INTERFERENCE: Interference due to thin film of uniform thickness and nonuniform thickness, Newton's rings, Engineering applications of interference (optical flatness, non-reflecting coatings). DIFFRACTION: Diffraction at a single slit (Geometrical method), Conditions for maximum and minimum, Diffraction at a circular aperture (Result only), Plane diffraction grating, Conditions for principal maxima and minima.		
Unit 5	**Optics – II (Polarisation and Lasers)**	**(6Hrs.)**
POLARISATION: Introduction, Double refraction and Huygen's theory, Positive and negative crystals, Nicol prism. LASERS: Lasers introduction, Characteristics of Lasers, Working principle and components of He-Ne Laser, Nd -YAG Laser, Semiconductor diode Laser, Applications in the field optical fiber (Principle, Acceptance angle and acceptance cone, Numerical aperture, Types of optical fibers, Fiber optic communication).		

Unit 6	Solid State Physics	(6Hrs.)
Origin of band gap, Energy bands in solids, Fermi-Dirac probability function and position of Fermi level in intrinsic semi-conductors (with derivation) and in extrinsic semi-conductors, Formation and band structure of p-n junction, Hall effect and Hall coefficient, Photovoltaic effect, Solar cell and its characteristics. Introductions of nanoparticles, properties of nanoparticles (Optical, electrical, Magnetic, structural, mechanical), synthesis of nanoparticles (Physical and chemical), quantum dots – wide band semiconductors, direct/indirect band gap semiconductors.		

Practical (Any Eight of the Following)

1. Determination of radius of planoconvex lens/wavelength of light/Flatness testing by Newton's rings
2. Determination of wavelength of light using diffraction grating
3. Determination of frequency of ac voltage by CRO.
4. Determination of refractive index for O-ray and E-ray
5. Determination of divergence of a laser beam
6. Particle size by semiconductor laser
7. Determination of wavelength of laser by diffraction grating
8. To study Hall effect and determine the Hall voltage
9. Calculation of conductivity by four probe method
10. Study of solar cell characteristics and calculation of fill factor
11. Determination of band gap of semiconductor
12. Synthesis of metal oxide nanoparticles (ZnO/ZnS/Gold)
13. Measurement of average SPL across spherical wavefront and behaviour with the distance
14. Determination of velocity of sound in liquid by ultrasonic interferometer
15. Study of B-H curve of a sample.

Text Books

1. A Textbook of Engineering Physics, M N Avadhanulu, P G Kshirsagar and TVS Arun Murthy, S. Chand Publishing (2018)
2. Engineering Physics, R K Gaur and S L Gupta, Dhanpat Rai Publishing Co Pvt Ltd (2015)
3. Concepts of Modern Physics, Arthur Beiser, Shobhit Mahajan and S. Rai Choudhury, McGraw Hill Education (2017)

Reference Books

1. Fundamentals of Physics, Jearl Walker, David Halliday and Robert Resnick, John Wiley and Sons (2013)

2. Optics, Francis Jenkins and Harvey White, Tata Mcgraw Hill (2017)
3. Principles of Physics, John W. Jewett, Cengage publishing (2013)
4. Introduction to Solid State Physics, C. Kittel, Wiley and Sons (2004)
5. Principles of Solid State Physics, H. V. Keer, New Age International (1993)
6. Laser and Non-Linear Optics, B. B. Laud, New Age International Private Limited (2011)
7. Nanotechnology: Principles and Practices, Dr. S. K. Kulkarni, Capital Publishing Company (2014)
8. Science of Engineering Materials- C.M. Srivastava and C. Srinivasan, New Age International Pvt. Ltd. (1997)

Electrical Technology		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03 Hrs / Week	**End Semester Examination:** 60 Marks	**Theory:**03 Credits
Practical: 02 Hrs / Week	**Internal Assessment:** 40 Marks	**Practical:**01 credit
	TW: 25Marks	
	Total :125	**Total:**04 Credits

Course Pre-requisites:	
The students should have basic knowledge of: Mathematics, Physics and Chemistry.	
Course Objectives:	
1.	The course introduces fundamental concepts of DC and AC circuits, electromagnetism, transformer, electrical wiring,illumination, and Tariff system.
Course Outcomes: After learning this course the students will be able to	
1.	Apply knowledge of basic concepts of work, power, energy for energy conversion and calculate current in electrical network using Kirchoff's laws.
2.	Analysed response of electrical DC circuit using network theorems.

3.	Define and understand basic terms of single phase A.C. circuit and supply systems.
4.	Define and understand basic terms of three phase A.C. circuit and measurement of three phase power.
5.	Discuss and apply fundamental concepts of magnetic circuit and electro-mechanics for operation of single-phase transformer.
6.	Explain layout of distribution system, illumination, types of wiring, earthing system, and Tariff system.

UNIT – IIntroduction	**(08 Hrs)**
Concept of EMF, Potential difference, voltage, current, resistance. Fundamental linear, passive, and active elements, voltage sources and current sources, ideal and practical sources, concept of dependent and independent sources, Kirchhoff-s laws and applications to network solutions using mesh and nodal analysis, Batteries: Principle, types, construction and working.	
UNIT – IIDC Circuits	**(08 Hrs)**
Current-voltage relations of the electric network by mathematical equations to analyze the network (Superposition theorem, Thevenin's theorem, Norton's Theorem, Maximum Power Transfer theorem), Simplifications of networks using series-parallel, Star/Delta transformation.	
UNIT – III Single phase AC Circuit	**(08Hrs)**
Sinusoidal AC waveform definitions, form factor, peak factor, study of R-L, R-C, RLC series circuit, R-L-C parallel circuit, resonance, phasor representation in polar and rectangular form, concept of impedance, admittance, active, reactive, and apparent power, power factor. (Simple numerical problems).	
UNIT – IVThree phase AC circuit	**(08 Hrs)**

Three phase system-its necessity and advantages, meaning of phase sequence, line and phase voltage/current relations, star and delta connections, balanced supply and balanced load, three phase power and its measurement (simple numerical problems).	
UNIT – VElectro-Mechanics	**(08 Hrs)**
Electricity and Magnetism, magnetic field and Faraday's law, self and mutual inductance, Magnetic circuit, Magnetic material and B-H Curve, Single phase transformer, principle of operation, EMF equation, voltage ratio, current ratio, kVA rating, losses in transformer, efficiency and regulation, Determination of efficiency & regulation by direct load test.	
UNIT – VI Electrical Wiring and Components	**(08 Hrs)**
Basic layout of the distribution system, Types of wiring system & wiring accessories, Types of lamps (Incandescent, Fluorescent, Sodium Vapour, LED),Necessity of earthing, Types of earthing, Tariff –introduction and types.	
Term Work:	
The term work shall consist of record of minimum eight experiments.	
1. Familiarization of electrical Elements, sources, measuring devices related to electrical circuits. 2. Study of residential electricity bill. 3. Verification of Superposition theorem 4. Verification of Thevenin's theorem 5. Verification of Norton's theorem 6. Verification of Kirchoff's laws 7. Verification of Maximum power transfer theorem 8. Study of R-L, R-C series, and parallel circuit. 9. Study of R-L-C series circuits for $X_L > X_C$, $X_L < X_C$ & $X_L = X_C$ 10. Verification of relation in between voltage and current in three phase balanced star and delta connected loads. 11. Demonstration of measurement of electrical quantities in DC and AC systems.	

12. Determination of efficiency & regulation of single-phase transformer by direct load test.

Project based learning: Student shall demonstrate minimum one concept based on syllabus topic.

1. Demonstration of conversion of energy.
2. Study and understand practical specifications of transformer.
3. Study and understand practical specifications of battery and demonstrate its application.
4. Demonstration of phenomenon of electromagnetic induction.
5. Demonstration of electromagnetism, electro mechanics and their applications by using professional software tool.
6. Development of practical kits for understanding different theorems related to electrical circuits. (Thevenin's theorem, Norton's Theorem, Maximum Power Transfer theorem, Superposition theorem etc.)
7. Demonstration of illumination system.
8. Demonstration of distribution system.
9. Study and understand safety practices in electrical system.
10. Study and understand electrical earthing system.
11. Study and understand electrical wiring.

Textbooks:

1. Electric Machinery, (Sixth Edition) A.E. Fitzgerald, KingselyJr Charles, D. Umans Stephen, Tata McGraw Hill.
2. A Textbook of Electrical Technology, (vol. I& II),B. L. Theraja, Chand and Company Ltd., New Delhi.
3. Basic Electrical Engineering, V. K. Mehta, S. Chand and Company Ltd., New Delhi.
4. Theory and problems of Basic Electrical Engineering, (SecondEdition), J. Nagrath and Kothari, Prentice Hall of India Pvt. Ltd.

Reference Books:

1. Basic of Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press.
2. Introduction to Electrodynamics, D. J. Griffiths, (Fourth Edition), Cambridge University Press.

3. Engineering Circuit Analysis, William H. Hayt& Jack E. Kemmerly, McGraw-Hill Book Company Inc.	
4. Fundamentals of Electrical and Electronics Engineering,Smarjith Ghosh, Prentice Hall (India) Pvt. Ltd.	
5. Edward Hughes – "Electrical Technology"- Seventh Edition, Pearson Education Publication	
6. H. Cotton – "Elements of Electrical Technology", C.B.S. Publications 7. John Omalley Shawn – "Basic circuits analysis" McGraw Hill Publications	
8. Vincent Del Toro – "Principles of Electrical Engineering", PHI Publications	
Syllabus for Unit Test:	
Unit Test -1	**UNIT – I, UNIT – II, UNIT - III**
Unit Test -2	**UNIT – IV, UNIT – V, UNIT - VI**

Discrete Mathematical Structures

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Theory:	04 Hours/Week	End Semester Examination	60 Marks	Theory	04
Practical:	02 Hours/Week				
		Internal Assessment	40 Marks	Tutorial	00
		Term Work	25 Marks	Practical	01
		Oral	25 Marks		
		Total	150 Marks	Total	05

Course Objective:

The objective is to provide a mathematical foundation and skills those are required in further study of Computer Science and Engineering. The course Discrete Mathematical Structures deals with discrete objects, countable sets. It helps to develop logical thinking and a wide variety of real-world applications to computer science. It is a very good tool for improving reasoning and problem-solving capabilities.

Prerequisite:

Basic knowledge of Elementary Linear Algebra, Numerical Mathematical Computation, Programming basics.

Course Outcomes: On completion of the course, students will have the ability to:

1. Demonstrate the ability to write the sentences in the symbolic logic and evaluate a proof technique.

2. Apply the basic principles of set theory to analyse the data relationship and prove basic properties of set.
3. Analyse the properties of relations and functions to determine their properties.
4. Apply the knowledge of Boolean algebra for building basic electronic and digital circuits.
5. Solve problems of combinatorics and recurrence relations.
6. Model problems in Computer Science using graphs and trees.

Unit I **06 Hours**

Mathematical Logic: Propositional Logic, Predicate logic, First order logic, Rules of inference, Introduction to proof techniques, resolution, Mathematical induction, Methods of proofs.

Unit II **06 Hours**

Set Theory: Types of sets, Sets operations and laws, Algebra of Sets, Multisets, Application of the principle of inclusion and exclusion.

Number Theory: Modular arithmetic, prime numbers, and properties, GCD, Chinese remainder theorem, Extended Euclidean algorithm.

Unit III **06 Hours**

Relations: Basic definition, properties and types of relations, relations and digraphs, paths in relations and digraphs, equivalence and partially ordered relations, Transitive closure and Warshall's algorithm.

Functions: Types of functions, Identity functions, Composition of functions, Mathematical functions, Pigeonhole principle.

Unit IV **06 Hours**

Algebraic Structures: Isomorphism and Homomorphism, Groups, Algebraic Structures with Binary Operations, rings, Cyclicgroups, codes.

Lattice: Posets andHasse Diagrams, Lattice as an algebraic system, Properties of lattices. Group Codes: The Communication Model and Basic notion of Error Correction, Generation of Group codes, Parity Check, Error Recovery

Unit V

Combinatorics and Recurrence Relations: **06 Hours**

Combinatorics: Permutations, Sumrule, Product rule, Combinatorial proofs.

Recurrence Relations: Linear Recurrence relation, Second order RR with constant coefficients, Applications of Recurrence Relation.

Unit VI

Concepts of Graphs and Trees: Definition, Degree, Types, Operations on graphs, Paths, Circuits, Connectedness, Planar graphs and their properties, Eulerian and Hamiltonian graphs. **06 Hours**

Trees: Basic properties of trees, Binary trees, Application: Minimum Spanning Tree, Shortest Path.

Textbooks:

1. J.P. Tremblay and Manohar: Discrete mathematical structures with application to Computer Science, McGraw hill- New Delhi.
2. Kolman and R.C. Busby: Discrete mathematical structures for computer science Prentice Hall, New-Delhi.
3. Malik and M. K. Sen: Discrete Mathematics, Cengage Learning India Pvt. Ltd.
4. R.M. Somasundaram: Discrete Mathematical Structures, Prentice Hall India Learning Private Limited.
5. C.L.Liu, Elements of Discrete Mathematics, second edition, McGraw-Hill Book Company.

Reference Books:

1. Kenneth H. Rosen: Discrete Mathematics and its applications Eighth Edition McGraw Hill Education.
2. Stanat and McAlister: Discrete Mathematics for Computer Science, PHI.

List of Assignments:

The following are some sample assignments. The course co-ordinator will frame one assignment on each unit for internal assessment.

1. Given a fact or a statement prove or disprove using suitable technique.
2. Write the given English language sentences represent in the Symbolic logic.
3. Given the statement forms Infer the validity of the statement form.
4. Draw a Hasse diagram and find chains and antichains.
5. Find the number of ways for any event or given sample space.
6. Given a problem represent in a graph and compute the optimal solution.
7. Given a communication network find the path between the given nodes.

Project Based Learning

1. Discrete Mathematics in Railway Planning using graph theory and linear algebra.
2. Object transformations using linear algebra.
3. Discrete mathematics in cryptography.
4. In Google maps to determine fastest driving routes and times.
5. In image processing
6. In relation database using sets.
7. In cyber security using graph theory.
8. Shortest path between two cities using a transportation system.
9. Data compression system with the help of Huffman coding.
10. Find the shortest tour that visits each of a group of cities only once and then ends in the starting city using graphs.

List of laboratory Exercise:

1. Perform set Operations.
2. Compute a power set of a given set.
3. List various properties of Relation and construct a program to evaluate it with a program.
4. Apply Warshall's algorithm to compute a Transitive Closure of a given relation entered by the user.(Use any suitable programming language).
5. Solve a programming problem based on application of Eulerian and Hamiltonian Graph.
6. Develop a program using RSA algorithm

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

Linear Data Structures

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Theory:	04 Hours/Week	End Semester Examination	60 Marks	Theory	04
Practical:	02 Hours/Week	Internal Assessment	40 Marks		
		Term Work	25 Marks	Practical	01
		Practical	25 Marks		
		Total	150 Marks	Total	05

Course Objective:

The objective of the course is to provide the students in-depth knowledge of different Linear Data structures and their use to solve the programming problems.

Prerequisite: Basic knowledge of computer

Course Outcomes: On completion of the course, students will have the ability to:

1. Use appropriate data structure to solve a particular problem
2. Demonstrate the use of linked list and compare it with array.
3. Demonstrate the use of stack as an ADT.
4. Perform the operations on queue.
5. Apply the searching and sorting algorithms
6. Demonstrate the use of Files and different File Organizations

Unit I **08 Hours**

Introduction to Data structures: Introduction to algorithm, Algorithm analysis, Big O Notations, Need of Data structure, Classification of Data Structures, Operations on Data Structures. **Arrays:** Introduction, Array Operations, representation of Arrays in Memory, One- & Two-dimensional array in function, Implementation of One- & Two-Dimensional Arrays in Memory, Abstract Data Types.

Unit II **08 Hours**

Linear Lists: Introduction, Singly linked list, Circularly Linked List, Doubly Linked lists, Basic operations, - Insertion, Deletion, retrieval, traversal, create List, insert node, delete node, List Search, Empty list, Destroy list, Applications of Linked List

Unit III **08 Hours**

Stacks: Stack Structure, Operations on Stacks – create stack, Push stack, Pop stack, Array and Linked Representation, operations (For both array and Linked representation),Types of Notations, Applications of Stack: Reversing Data, Converts Decimal to Binary, Parsing, Postponement.

Unit IV **08 Hours**

Queue: Introduction, Definition, Storage Methods Queue Operations- Enqueue, Dequeue, Queue front, Queue rear, Queue Example, Create Queue, priority Queue, Circular Queue, Application of Queue: Categorising Data, Queue. Simulation, Array and Linked representation of queue (operations on array and Linked representation.

Unit V **08 Hours**

Implementation &Application: Searching: Linear Search, Binary Search, Hashing: Introduction. Hash Tables, Hash Functions, Collision, Applications

Sorting – Selection Sort, Bubble Sort, Insertion Sort, Merge Quick Sort, Shell Sort

Unit VI **08 Hours**

Files and Organization: Introduction, Data Hierarch, FileAttributes, Text and Binary Files, Basic File Operations, File Organization, Sequential Organization, Relative File Organization, Indexed Sequential File `Organization.

Textbooks:

1. Richard F Gilberg&Behrouz A Forouzan, Data Structures (A PseudocodeApproach with C), second edition, Cengage Learning, 2004.
2. PAI, Data Structures, Tata McGraw-Hill Education, 2008
3. Data Structures Using C, ReemaThareja, OXFORD University Press

Reference Books:

1. Mayank Patel, Data Structure and Algorithm With C, Educreation Publishing, 2018
2. Thomas H. Cormen, Charles E Leiserson, Ronald L Rivest, Clifford Stein, Introduction to Algorithms, MIT Press, 2001.

List of Assignments:

1. Write an algorithm for a given problem and analyse it's complexity
2. Describe representation of a linked list in the memory and Write a pseudocode to perform deletion operation on list.
3. Illustrate the use of stack to solve the Tower of Hanoi problem.
4. Write a pseudocode to perform operations on priority queue.
5. Compare bubble sort and selection sort
6. Describe the sequential file organization.

Project Based Learning

1. Expression Evaluation
2. Traffic Management System
3. Library Management System for a small library in a department
4. Employee Record System
5. Dictionary
6. Calendar Application
7. Medical Store Management System
8. Cricket Score Sheet
9. Bank Management System that handles only savings account
10. Ticket booking system for bus

(Note:- *Students in a group of 3 to 4 shall complete any one project from the above list)

List of Laboratory Exercises:

1. Use of array and operations on Array.
2. Operations on singly and doubly linked list.
3. Polynomial operations using linked list.
4. Create stack and demonstrate it's use.
5. Develop a priority queue and perform the operations.
6. Demonstrate the use of different file organizations.

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

Designation of Course	**Universal Human Values (Common for all Branches)**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 00 Hours/ Week	End Semester Examination	00	Theory: 00 Tutorial: 00 Practical: 01
Practical :- 02 Hours/ Week	Internal Assessment	00	
Tutorial :- 00 Hours/ Week	Term Work	50 Marks	
	Oral/Practical Examination	00 Marks	
	Total	50 Marks	01

Course Prerequisites:-	During the Induction Program, students would get an initial exposure to human values through Universal Human Values. This exposure is to be augmented by this compulsory full semester foundation course.
Course Objective	Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence Strengthening of self-reflection. Development of commitment and courage to act
Course Outcomes:-	After completion of the course students will be able to 1. Create more awareness of themselves, and their surroundings (family, society, nature); 2. Understand the Human being is coexisting with self and body and able to recognize its different needs and fulfilment. 3. Develop more responsible life with human relationships, while keeping in mind the human nature 4. Understand to imbibe sensitive approach towards society and understand the dimensions of harmony in the society 5. Understand the recycle structure of the nature and able to recognize the participation. 6. Apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

Unit I: Introductions, Aspirations and Concerns (4Hrs)

Getting to know each other, Self-exploration, Individual academic, career Expectations of family, peers, society, and nation fixing one's goals Basic human aspirations Need for a holistic perspective, Role of UHV
Unit II. Self-Management, Health (4Hrs)
Self-confidence, peer pressure, time management, anger, stress Personality development, Self-improvement Harmony in the human being. Health issues, healthy diet, healthy lifestyle Hostel life Harmony of the self and Body Mental and physical health.
Unit III: Relationships (4Hrs)
Home sickness, gratitude towards parents, teachers and others Ragging and interaction Competition and cooperation Peer pressure. Harmony in relationship Feelings of trust, respect, gratitude, glory, love
Unit IV: Society (4 Hrs)
Participation in society. Harmony in the society Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals .Visualizing a universal harmonious order in society- Undivided Society, Universal Order-from family to world family
Unit V: Natural Environment (4 Hrs)
Participation in nature Harmony in nature/existence Understanding the harmony in the Nature
Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self regulation in nature
Unit VI. Self-evaluation Strategy (4 Hrs)
Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers. At the level of society: as mutually enriching institutions and organizations review role of education Need for a holistic perspective
Text Book
1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010
Reference Books
1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004. 3. The Story of Stuff (Book).
3. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi 5. Small is Beautiful - E. F Schumacher.
4. Slow is Beautiful - Cecile Andrews
5. Economy of Permanence - J C Kumarappa 8. Bharat Mein Angreji Raj - PanditSunderlal 9. Rediscovering India - by Dharampal
6. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi 11. India Wins Freedom - Maulana Abdul Kalam Azad
7. Vivekananda - Romain Rolland (English)

Computer Workshop Technology					
TEACHING SCHEME		**EXAMINATION SCHEME**		**CREDIT SCHEME**	
Practical:	**2 Hours/Week**	**Term Work:**	**25 Marks**	**Practical:**	**1**
		Oral:	**-**		
Total	**2 Hours/Week**		**25 Marks**	**Total:**	**1**

Course Objective:

To acquire the knowledge of basic manufacturing processes used in computer engineering technology

Prerequisite:

Basics of Engineering materials. Basics of computer and laptop.

Course Outcomes: On completion of the course, students will have the ability to:

1. Understand the basics parts used in the computer and laptop.
2. Understand fundamental concepts of assembly of electronics components (PCB).
3. Understand the various joining processes
4. Develop plastic moulding component used in computer engineering.
5. Developing the component used in computer engineering by use of 3D printing technology.
6. Understand the knowledge of making fasteners used for computer and laptop.

Unit I	**04 Hours**
Assembly of Computer: Introduction to hardware peripherals like RAM, ROM, keyboard, Mouse, processors, etc. Generation of processors. Working of SMPS. Study of various ports. Steps and precautions to assemble computer, Tools used in computer hardware	
Unit II **Printed Circuit Boards Assembly (PCB):** Study of joining processes, Resistance welding and Soldering processes, why and how flux, tip tinner, solder wick, and post-	**06 Hours**

soldering cleaners are used in the hand soldering process. Laser welding, orbital welding. Advantages and disadvantages of welding processes.	
Unit III **CPU Cabinet Manufacturing Process:** Introduction to machines in sheet metal Industry: shearing machine, bending machine, circular profile cutting machines. Different types of sheet metal folds. Rivets and its different parts, selection of rivet heads, types of rivets and its uses. Punching, blanking, shearing, bending, and piercing.	**06 Hours**
Unit IV	**02 Hours**
Plastic Molding Process: Introduction to plastic molding. Types of plastics. Types of plastic molding. Exercise on plastic molding machine ,manufacturing of plastic moulded job.	
Unit V **3D Printing Technology:** Introduction to Additive Manufacturing, Need for Additive Manufacturing, Generic AM process, Classification of AM Processes, 3D Printing process. Steps in AM process, Advantages of AM, Major Applications	**02 Hours**
Unit VI	**04 Hours**
Study of Machining Processes: Introduction to machining processes, Different types of turning and grinding operations, by using turning operations making of simple fastener used in computer engineering.	
Textbooks:	
1. Khanna O.P. and Lal. M., " Production Technology", Dhanpatrai Publications (P) Ltd., New Delhi. 2. Jain R.K., "Production Technology", Khanna Publishers, Delhi	

3. The Complete Reference PC Hardware, Craig Zacker, John Rourke

Reference Books:

1. Choudhary Hajra S. k., Choudhary Hajra A. k. "Elements of Workshop Technology Vol 2 Machine Tools, Publisher: Media Publishers & Promoters, India.
2. Rajput R. K ., "Manufacturing Technology", Laxmi Publications (P)Ltd, New Delhi..

List of Laboratory Exercise:

1. Practical on introduction to hardware and different tools used in workshop technology for computer engineering.
2. Experiment and demonstration of soldering processes on electronics components such as PCB assembly.
3. Practical on resistance welding processes.
4. Practical demonstration on shearing machine, bending machine, circular profile cutting machines used in sheet metal operations for manufacturing of cabinet used in computer.
5. Practical demonstration on Punching, blanking, shearing, bending, and piercing.
6. Practical demonstration on plastic molding machine.
7. Practical demonstration on 3 D printing machine
8. Practical demonstration on making fastener for computer by machining processes .
9. Industrial visit to the manufacturing industry.