

BACHELOR OF TECHNOLOGY
INFORMATION TECHNOLOGY

SYLLABI BOOK
(2021 - 2022)



Department of Information Technology
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DHARMSINH DESAI UNIVERSITY
FACULTY OF TECHNOLOGY
COURSE STRUCTURE FOR B.TECH. (INFORMATION TECHNOLOGY) W.E.F. 2021-22

B.Tech Semester –I

Subject	Teaching Scheme			Total	Credit	Exam Scheme (Marks)				
	L	T	P			Th.	Int.	TW	Prac.	Total
Mathematics – I	3	1	0	4	4	60	40	-	-	100
Basic Electrical Engineering	3	1	2	6	5	60	40	50	-	150
Programming for Problem Solving - I	4	0	3	7	5.5	60	40	50	-	150
Engineering Graphics & Design	1	0	4	5	3	-	-	100	-	100
Software Workshop	0	0	2	2	1	-	-	50	-	50
	11	2	11	24	18.5	180	120	250	0	550

B.Tech Semester –II

Subject	Teaching Scheme			Total	Credit	Exam Scheme (Marks)				
	L	T	P			Th.	Int.	TW	Prac.	Total
Mathematics – II	3	1	0	4	4	60	40	-	-	100
Programming for Problem Solving - II	4	0	3	7	5.5	60	40	50	-	150
Physics	3	1	2	6	5	60	40	50	-	150
Hardware Workshop	0	0	4	4	2	-	-	100	-	100
English	2	0	2	4	3	40	-	50	-	90
Environmental Studies	2	0	0	2	0	40	-	-	-	40
	14	2	11	27	19.5	260	120	250	0	630

B.Tech Semester –III

Subject	Teaching Scheme			Total	Credit	Exam Scheme (Marks)				
	L	T	P			Th.	Int.	TW	Prac.	Total
Probability Theory and Statistics	3	1	0	4	4	60	40	-	-	100
Communication Systems	4	0	2	6	5	60	40	25	25	150
Design of Digital Circuits	4	0	2	6	5	60	40	25	25	150
Effective Technical Communication	3	0	0	3	3	50	-	50	-	100
Object Oriented Programming using Java	4	0	2	6	5	60	40	25	25	150
Data Structures and Algorithms	4	0	2	6	5	60	40	25	25	150
	22	1	8	31	27	350	200	150	100	800

B.Tech Semester –IV

Subject	Teaching Scheme			Total	Credit	Exam Scheme (Marks)				
	L	T	P			Th.	Int.	TW	Prac.	Total
Universal Human Values – II	3	0	0	3	3	60	-	-	-	60
Discrete Mathematics	3	1	0	4	4	60	40	-	-	100
Computer and Communication Networks	4	0	2	6	5	60	40	25	25	150
Database Management System	4	0	2	6	5	60	40	25	25	150
Design & Analysis of Algorithm	4	0	2	6	5	60	40	25	25	150
Microprocessor Architecture and Programming	4	0	2	6	5	60	40	25	25	150
	22	1	8	31	27	360	200	100	100	760

B.Tech Semester –V

Subject	Teaching Scheme			Total	Credit	Exam Scheme (Marks)				
	L	T	P			Th.	Int.	TW	Prac.	Total
Computer Organisation	3	0	0	3	3	60	-	-	-	60
Theory of Automata & Formal Language	4	0	0	4	4	60	40	-	-	100
App Development	4	0	2	6	5	60	40	25	25	150
Professional Elective Course - 1	4	0	2	6	5	60	40	25	25	150
Professional Elective Course - 2	4	0	2	6	5	60	40	25	25	150
Open Elective - 1 (E-Commerce And E-Security)	3	0	0	3	3	60	-	-	-	60
	22	0	6	28	25	360	160	75	75	670

B.Tech Semester –VI

Subject	Teaching Scheme			Total	Credit	Exam Scheme (Marks)				
	L	T	P			Th.	Int.	TW	Prac.	Total
Open Elective - 2 (Data Analysis & Information Extraction)	3	0	0	3	3	60	-	-	-	60
Language Translator	4	0	2	6	5	60	40	25	25	150
Applied Operating System	4	0	2	6	5	60	40	25	25	150
Data Analytics using Python	0	0	2	2	1	-	-	25	25	50
Professional Elective Course - 3	4	0	2	6	5	60	40	25	25	150
Project – I	0	0	2	2	1	-	-	25	25	50
	15	0	10	25	20	240	120	125	125	610

B.Tech Semester –VII

Subject	Teaching Scheme			Total	Credit	Exam Scheme (Marks)				
	L	T	P			Th.	Int.	TW	Prac.	Total
Constitution of India	1	0	0	1	0	-	-	-	-	-
Professional Elective Course - 4	4	0	2	6	5	60	40	25	25	150
Development Operations	0	0	2	2	1	-	-	25	25	50
Open Elective - 3 (Artificial Intelligence)	3	0	0	3	3	60	-	-	-	60
Professional Elective Course - 5	4	0	2	6	5	60	40	25	25	150
Professional Elective Course - 6	4	0	2	6	5	60	40	25	25	150
Project – II	0	0	2	2	1	-	-	25	25	50
	16	0	10	26	20	240	120	125	125	610

B.Tech Semester –VIII

Subject	Teaching Scheme			Total	Credit	Exam Scheme (Marks)				
	L	T	P			Th.	Int.	TW	Prac.	Total
Industrial Internship	0	6	24	30	18	0	0	150	350	500
	0	6	24	30	18	0	0	150	350	500

List of Professional Elective Courses (PEC)

1	Advanced Java Technology	Professional Elective Course - 1
	Internet of Things	
2	Software Engineering	Professional Elective Course - 2
	Advanced Algorithms	
3	Design Patterns and Application Frameworks	Professional Elective Course - 3
	Cloud Computing	
4	Machine Learning	Professional Elective Course - 4
	Digital Image Processing	
5	Distributed Computing	Professional Elective Course - 5
	Advanced Operating System	
6	Web Technology	Professional Elective Course - 6
	Speech & Natural Language Processing	

B. TECH. SEMESTER – I (EC/CE/IT)
SUBJECT: MATHEMATICS – I

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	1	-	4	4	60	40	-	-	100

Reference Code:BSC102

A. COURSE OBJECTIVES

The objective of this course is to familiarize the prospective engineers with techniques in calculus, matrices, vector spaces and multivariable calculus

B. DETAILED SYLLABUS

Unit	Topic(s)
[1]	CALCULUS Evolutes and involutes, Evaluation of definite and improper integrals; Beta and Gamma functions and their properties, Applications of definite integrals to evaluate surface areas and volumes of revolutions. Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin's theorems with remainders; Indeterminate forms and L'Hospital's rule, Maxima and minima.
[2]	MATRICES Matrices, Vectors: addition and scalar multiplication, matrix multiplication; Rank of a matrix, Linear systems of equations, Determinants, Cramer's Rule, Inverse of a matrix, Gauss Elimination and Gauss Jordan method.
[3]	VECTOR SPACES Eigenvalues, Eigenvectors, Symmetric, Skew-symmetric, and Orthogonal Matrices, Linear Independence of vectors, Diagonalization.
[4]	MULTIVARIABLE CALCULUS (Differentiation) Limit, Continuity and Partial derivatives, Directional derivatives, Total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Vector Differential Calculus; Gradient, curl and divergence.

C. RECOMMENDED TEXT/ REFERENCE BOOK

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 40th Edition, 2007.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
4. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005

5. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
6. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
7. N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxi Publications, Reprint, 2010.
8. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.

B. TECH. SEMESTER – I (EC/CE/IT)

SUBJECT: BASIC ELECTRICAL ENGINEERING

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	1	2	6	5	60	40	50*	-	150

Reference Code ESC104

*TW Marks include Viva based on TW

A. COURSE OBJECTIVES

The course imparts an in-depth understanding of the fundamental concepts with an objective to expose the students to the various types of electrical, electronic and magnetic circuits and their applications. This course is designed to provide knowledge of fundamentals and various laws in electromagnetic and magnetic circuits, and electrostatics.

B. DETAILED SYLLABUS

- | Unit | Topic(s) |
|------|--|
| [1] | DC CIRCUITS
Electrical circuit elements (R, L, and C), the impact of temperature, voltage, and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems; Time-domain analysis of first-order RL and RC circuits. |
| [2] | AC 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; Three-phase balanced circuits, voltage and current relations in star and delta connections. |
| [3] | ELECTRO-MAGNETIC INDUCTION
Introduction, Magnetic effect of electric current, Current carrying conductor in the magnetic field, Law of electromagnetic induction, Induced emf, Self-Inductance (L), Mutual Inductance (M), and Coupling coefficient between two magnetically coupled circuits (K), Inductances in series and parallel. |
| [4] | MAGNETIC CIRCUITS
Introduction, Definition of Magnetic quantities, Magnetic circuit, Leakage flux, Fringing effect, Comparison between magnetic and electric circuits. |
| [5] | TRANSFORMERS
Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation, and efficiency; Auto-transformer and three-phase transformer connections. |

[6] 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, Construction, Principles, and working theory and Types of DC Motors & Generators, 1-Ph & 3-Ph Induction Motor, AC Generator.

C. RECOMMENDED TEXT / REFERENCE BOOKS

1. Basic Electrical, Electronics, and Computer Engineering, R. Muthu Subramanian, S. Salvahanan, K. A. Muraleedharan, 2nd Edition, Tata McGraw Hill.
2. Electronics Principles, Albert Paul Malvino, 6th Edition, Tata McGraw Hill
3. Electrical Technology (Vol: II), B. L. Theraja, A. K. Theraja, 23rd Edition, R. Chand & Company
4. Basic Electrical Engineering, D.P. Kothari, I. J. Nagrath, 3rd Edition, Tata McGraw Hill
5. Introduction to VLSI Circuit & Systems, John P. Uyemura, 1st Edition, John Willey & Sons Inc.
6. Basic Electrical Engineering, D.C. Kulshreshtha, 1st Edition, Tata McGraw Hill
7. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson
8. Electrical Engineering Fundamentals, V.D. Toro, 2nd Edition, Prentice Hall India
9. Fundamentals of Electrical Engineering, L.S. Bobrow, , Oxford University Press

B. TECH. SEMESTER – I (EC/CE/IT)

SUBJECT: PROGRAMMING FOR PROBLEM SOLVING - I

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
4	-	3	7	5.5	60	40	50*	-	150

Reference Code ESC105

*TW Marks include Viva based on TW

A. COURSE OBJECTIVES

The objectives of teaching this course are:

- To impart an in-depth understanding of fundamental programming concepts to build C programs.
- To explain conditional branching, iteration/looping, code reusability, and pointers using C Programming Language.
- To demonstrate and teach how to code, document, test, and implement a well-structured C program.

B. DETAILED SYLLABUS

Unit	Topic(s)
[1]	OVERVIEW OF C Basic structure of C program; Compiling and running C program
[2]	CONSTANTS, VARIABLES, AND DATA TYPES Types of constants; Basic data types, Identifier, Variable, Enum, Symbolic constant, Typedef; Keywords, Overflow and Underflow
[3]	OPERATORS AND EXPRESSIONS Arithmetic, relational, logical, Assignment, bitwise, and sizeof operator; Operator precedence and associativity; Expression evaluation
[4]	MANAGING INPUT AND OUTPUT OPERATIONS getchar and putchar functions; Formatted I/O using printf and scanf.
[5]	DECISION MAKING AND BRANCHING if and if...else statement, Nested and ladder if...else, Conditional operator, switch statement, goto statement with a warning.
[6]	DECISION MAKING AND LOOPING while, do...while, for loops, nested loops, break and continue statements.
[7]	ARRAYS AND STRINGS Introduction to arrays; Declaration, initialization, and access of one-dimensional and two-dimensional arrays; Introduction to multi-dimensional and variable length arrays; Declaration and initialization of strings; Printing and scanning strings to/from standard I/O; String handling functions, list of strings
[8]	USER-DEFINED FUNCTIONS Function prototype and function declaration, function definition, function call, actual and formal parameters/arguments; Return type and return statement; Nested function call,

- recursion; Scope, visibility, and lifetime of variables
- [9] **STRUCTURES AND UNIONS**
Defining structure, declaring, and initializing structure variables, typedef; Accessing structure members; Copying and comparing structure variables; Nested structures, arrays, and structures; Structures and functions, unions
- [10] **POINTERS**
Introduction, accessing address of a variable; Declaration and initialization of pointer variables; Accessing variable using pointer, chain of pointers; Scale factor and pointer expressions; Pointers and arrays, Pointer to array Vs array of pointers; Passing arrays and strings to the function; Array of pointers, pointers and functions, pointers and structures, const pointer vs pointer to const.

C. RECOMMENDED TEXT/REFERENCE BOOK

1. Programming in ANSI C by Balagurusamy, 8th Ed., Tata McGraw Hil
2. Programming with C by Byron Gottfried, 3rd Ed., McGraw Hill Education
3. The C Programming Language by Kernighan and Ritchie, 2nd Ed., PHI Learning
4. Expert C Programming: Deep C Secrets by Peter Van Der Linden, Pearson Education
5. Let Us C by Yashvant Kanetkar, 12th Ed., BPB Publication
6. Programming in C by Ashok N. Kamthane, 2nd Ed., Pearson Education

B. TECH. SEMESTER – I (EC/CE/IT)

SUBJECT: ENGINEERING GRAPHICS & DESIGN

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
1	-	4	5	3	-	-	100*	-	100

Reference Code ESC106

*TW Marks includes Viva based on TW

A. COURSE OBJECTIVES

The objectives of this course are:

- To Understand the drawing importance in Engineering.
- To Describe the 3-Dimensional object in a different 2-Dimensional view.
- To Develop skills in Reading and Interpretation of Engineering Drawings.
- To enhance drawing skills through hands-on training in a CAD lab using engineering software.

B. DETAILED SYLLABUS

Unit	Topic(s)
[1]	INTRODUCTION TO ENGINEERING DRAWING Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloids, Hypocycloid and Involute; Scales –Plain, Diagonal and Venire Scales;
[2]	ORTHOGRAPHIC PROJECTIONS Principles of Orthographic Projections-Conventions -Projections of Points and lines inclined to both planes; Projections of planes inclined Planes-Auxiliary Planes;
[3]	PROJECTIONS OF REGULAR SOLIDS Planes-Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.
[4]	SECTIONS AND SECTIONAL VIEWS OF RIGHT ANGULAR SOLIDS Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solid s, objects from industry and dwellings (foundation to slab only)
[5]	ISOMETRIC PROJECTIONS Principles of Isometric projection –Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice versa, Conventions;
[6]	OVERVIEW OF COMPUTER GRAPHICS

Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software

[7] **CUSTOMIZATION AND CAD DRAWING**

Set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerance; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles;

[8] **ANNOTATIONS, LAYERING, AND OTHER FUNCTIONS**

Applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modelling of parts and assemblies. Parametric and non -parametric solid, surface, and wireframe models. Part editing and two-dimensional documentation of models. Planar projection theory includes sketching of perspective, isometric, multi-view, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerance techniques; dimensioning and scale multi-views of dwelling;

C. RECOMMENDED TEXT/REFERENCE BOOKS

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Narayana, K.L. & P Kanniah (2008), Textbook on Engineering Drawing, Scitech Publishers) (Corresponding set of) CAD Software Theory and User Manuals

B. TECH. SEMESTER – I (EC/CE/IT)

SUBJECT: SOFTWARE WORKSHOP

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
-	-	2	2	1	-	-	50*	-	50

Reference Code ESC107

*TW Marks include Viva based on TW

A. COURSE OBJECTIVES

The objective of the course is to familiarize students with various software tools and technology. The course aims at providing hands-on experience related to basic software installation, usage of Operating systems, and various essential software utilities.

B. DETAILED SYLLABUS

Unit	Topic(s)
[1]	OPERATING SYSTEM Introduction to Operating System and Linux Architecture.
[2]	SOFTWARE Installation of open source/freeware software using the package manager for programming/simulation.
[3]	SHELL COMMANDS Linux usage, commands & shell scripting; Command structure, and general-purpose utility.
[4]	FILE HANDLING Basic file handling; The file system, Handling ordinary files, File attributes, and permission, file system details.
[5]	SHELL SCRIPTING Basic Shell commands, Looping and Branching; Various programs using Shell Scripting
[6]	SHELL UTILITIES Find command and shell, simple filters, advance filters.
[7]	EDITORS VI editor for basic text editing, LATEX for scientific documents, and report writing

**NOTE: Topics will be covered in experiments

C. RECOMMENDED TEXT/REFERENCE BOOKS

1. Unix: Concepts and Applications, Sumitabha Das, 4th Edition, Tata McGraw Hill

B. TECH. SEMESTER – II (EC/CE/IT)

SUBJECT: MATHEMATICS-II

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	1	-	4	4	60	50	-	-	100

Reference Code BSC301

A. COURSE OBJECTIVES

The objective of this course is to familiarize the prospective engineers with techniques in Differential Equations, and numerical methods and Laplace transform.

B. DETAILED SYLLABUS

Unit	Topic(s)
[1]	FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS AND INTRODUCTION TO HIGHER ORDER DIFFERENTIAL EQUATIONS Exact, linear and Bernoulli's equations; Euler's equations; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type, second-order linear differential equations with variable coefficients. Method of variation of parameters, Cauchy-Euler equation.
[2]	NUMERICAL METHODS Ordinary differential equations: Taylor's series, Euler and modified Euler's methods, Runge- Kutta method of fourth-order for solving first-order equations; Solution of algebraic and transcendental equations: Newton Raphson's Method, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules.
[3]	MULTIVARIABLE CALCULUS (INTEGRATION) Multiple Integration: Double integrals (Cartesian), Change of the order of integration in double integrals, Change of variables (Cartesian to polar); Applications: areas and volumes; Triple integrals (Cartesian), Scalar line integrals, Vector line integrals, Scalar surface integrals, Vector surface integrals, theorems of Green, Gauss and Stoke's.
[4]	LAPLACE TRANSFORM Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions, Finding inverse Laplace transform by different methods, Convolution theorem; Evaluation of integrals by Laplace transform, Solving ODE by Laplace Transform method.

C. RECOMMENDED TEXT/REFERENCE BOOKS

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 40th Edition, 2007.

2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
4. W. E. Boyce and R. C. Di Prima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.
5. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
6. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
7. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
8. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc- Graw Hill, 2004.
9. N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2008

B. TECH. SEMESTER – II (EC/CE/IT)

SUBJECT: PROGRAMMING FOR PROBLEM SOLVING - II

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
4	-	3	7	5.5	60	40	50*	-	150

Reference Code ESC201

*TW Marks include Viva based on TW

A. COURSE OBJECTIVES

The objectives of teaching this course are:

- To provide fundamental concepts of object-oriented programming like abstraction, inheritance, polymorphism, etc. and explain differences between object-oriented programming and procedural programming
- To teach programmatic implementation of these concepts using C++ language.
- To explain the significance of these concepts to learn subjects like software engineering and object-oriented design and analysis.

B. DETAILED SYLLABUS

Unit	Topic(s)
[1]	BASICS OF C++ Overview, Program structure, keywords, identifiers, constants, data types; Symbolic constants, declaration of variables, operators, namespaces, control structures. Dynamic memory – C style - malloc, calloc, realloc, and free Vs C++ style; New and delete keywords, reference, and pointer.
[2]	FUNCTIONS IN C++ Main function (variations in signature), function prototype, inline functions; Call and return by reference, default parameters, function overloading.
[3]	INTRODUCTION TO OBJECT-ORIENTED PROGRAMMING Procedural Vs Object-Oriented Programming; Principles of OOP, Benefits and applications of OOP.
[4]	CLASSES AND OBJECTS – ENCAPSULATION AND ABSTRACTION Introduction, private and public members, defining member functions, static members; Objects as function arguments and return type; Friend functions, const member functions, Constructors and their types, Destructor, Operator overloading, type conversion
[5]	INTRODUCTION TO C++ STRING CLASS
[6]	INHERITANCE Introduction, types of inheritance – single, multiple, multilevel, hierarchical, and hybrid inheritance; Protected members, overriding, virtual base class.
[7]	POLYMORPHISM Introduction, Pointers, and Objects, this pointer, pointer to derived classes; virtual and pure virtual functions, dynamic binding.
[8]	INPUT/OUTPUT

- Introduction to streams, standard I/O stream objects; Stream classes, unformatted and formatted I/O, manipulators.
- [9] **EXCEPTION HANDLING**
Basics of exception handling; Try-catch-throw, re-throwing exceptions, user-defined exceptions.
- [10] **TEMPLATES**
Basics of class templates and function templates.

C. RECOMMENDED TEXT/REFERENCE BOOKS

1. Object-Oriented programming with C++, Seventh Edition, by E Balagurusamy, TMH publication
2. The C++ Programming Language, Fourth Edition, by Bjarne Stroustrup, Addison -Wesley publication
3. Object-Oriented Programming in C++, Fourth Edition, by Robert Lafore, SAMS publication
4. Accelerated C++: Practical Programming by Example, First Edition, by Andrew Koenig and Barbara E. Moo, Addison-Wesley publication
5. C++ Black Book, First edition, by Steven Holzner, Paraglyph Press
6. C++: The Complete Reference, Fourth Edition, by Herbert Schildt, McGraw Hill Education

B. TECH. SEMESTER – II (EC/CE/IT)

SUBJECT: PHYSICS

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	1	2	6	5	60	40	50*	-	150

Reference Code BSC101

*TW Marks include Viva based on TW

A. COURSE OBJECTIVES

The course provides an in-depth understanding of the concepts associated with Semiconductor, Optoelectronics, Communication, Oscillators, and Basic Switching devices. It also serves the basic design ideas around rectification and amplification. The course focuses on modulation techniques and their components. The overall aspects of basic physics application in electronics with a practical approach are covered in this subject. This course also includes analog modulation & demodulation techniques (AM, FM, and PM) and digital modulation (ASK, FSK and PSK).

B. DETAILED SYLLABUS

Unit Topic(s)

[1] SEMICONDUCTORS

Intrinsic and extrinsic semiconductors, Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Metal-semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for optoelectronic & other devices.

[2] DIODE

Introduction to P-N junction Diode and V-I characteristics, Half wave and Full-wave rectifiers, capacitor filter; Zener diode and its characteristics, Zener diode as a voltage regulator, Special purpose diodes.

[3] LIGHT-SEMICONDUCTOR INTERACTION

Radiative transitions and optical absorption, LED and LASER, Photo detectors.

[4] ACTIVE COMPONENTS AND APPLICATIONS

BJT: Structure and input-output characteristics of a BJT, The Unbiased Transistor, Transistor Currents, Biased Transistor, a single stage voltage divider biasing, Emitter Bias, The CE Connections, The Base Curve, Collector curve, Transistor approximation Variation in current Gain, The Load Line, The Operating point, Recognizing Saturation, BJT as a switch & Amplifiers, LED Drivers.

[5] OSCILLATORS

General form of the oscillator, Sinusoidal oscillator, phase shift oscillator, and Crystal Oscillator.

[6] MOSFET

MOS physics and mode of operations, nFET current-voltage relationship, MOS pass characteristics, and CMOS inverter, Dynamic RAM (DRAM) 1T bit-cell.

[7] FIBER OPTICS

Fiber Optics and Optoelectronics, Historical Developments, A Fiber-Optic Communication System, Advantages of Fiber-Optic Systems, Ray Propagation in Optical Fibers, Fundamental Laws of Optics, Ray Propagation in Step-Index Fibers, Ray Propagation in Graded-Index Fibers.

[8] COMMUNICATION SYSTEMS

Communication system components, Analog modulation- AM, FM, PM; Digital modulation- ASK, FSK, PSK.

C. RECOMMENDED TEXT / REFERENCE BOOKS

1. Electronics Principles, Albert Paul Malvino, 6th Edition, Tata McGraw Hill
2. David Griffiths, Introduction to Electrodynamics
3. S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley (2008).
4. R.P Khare, Fiber Optics and Optoelectronics, Oxford University Press
5. Sanjay Sharma, Communication Systems: Analog and Digital
6. Halliday and Resnick, Physics
7. W. Saslow, Electricity, magnetism and light
8. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc. (1995).
9. B. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc., (2007).
10. Yariv and P. Yeh, Photonics: Optical Electronics in Modern Communications, Oxford University Press, New York (2007).
11. P. Bhattacharya, Semiconductor Optoelectronic Devices, Prentice Hall of India (1997)
12. Behrouz A. Forouzan, Data communication, and Networking.
13. B. P lathi, Modern Digital and Analog Communication Systems, 3rd edition.

B. TECH. SEMESTER – II (EC/CE/IT)

SUBJECT: HARDWARE WORKSHOP

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
-	-	4	4	2	-	-	100*	-	100

Reference Code ESC201

*TW Marks includes Viva based on TW

A. COURSE OBJECTIVES

The objective of the course is to familiarize students with various hardware tools and techniques. The course aims at imparting practical knowledge of various electronic components, computer hardware, and internet technology.

B. DETAILED SYLLABUS

Unit Topic(s)

[1] ELECTRONIC COMPONENTS

Study of Digital Multimeter, Power Supply, Function Generator, Cathode Ray Oscilloscope, Digital Oscilloscope, and their use; Study the Measurement of Phase Difference in single-phase circuit, Study of Various Electrical and Electronics component like LED, LDR, Photo-diode, MOSFET, MCB, and Relay.

[2] COMPUTER HARDWARE

Introduction to a personal computer and its basic peripherals, installation of Operating System, Software, and the required device drivers; Students are suggested to perform similar tasks on the laptop scenario wherever possible.

[3] PERIPHERALS

Programming of Computer Ports & Interfacing of Electronic Components, Cables, and Connectors like RJ45, RS232, and CRO probe.

[4] INTERNET

Introduction to Internet & World Wide Web modules, making a PC Internet ready; Introduction to Internet and TCP/IP, Ethernet Connection, WiFi connection, configure TCP/IP (IP, Gateway, DNS, and Proxy), and use of ping command; Information sharing and data transfer over Local Area Network and Internet.

[5] WEB INFRASTRUCTURE

Basic Components of Web Sites, Front end & back-end tools and technology; HTML & CSS, Developing, Configuring, and deploying a website.

[6] IOT BOARDS AND CIRCUIT SIMULATION

Introduction to IOT boards like Arduino, Raspberry Pie, etc.; Interfacing, Circuit designing, and PCB designing.

[7] MINI PROJECT

Student will develop a mini project related to the topics listed above.

**NOTE: Topics will be covered in experiments

C. RECOMMENDED TEXT/REFERENCE BOOKS

1. Electronic Components and Materials Principles, Dr. Madhuri A Joshi, 2nd Edition, Shroff Publishers & Distributors PVT. LTD.
2. A Textbook of Computer Hardware and Networking, Jyotika Deshmukh, D J Publications
3. Learning Web Design, Jennifer Robbins, 4th edition, O'Reilly Media

B. TECH. SEMESTER – II (EC/CE/IT)

SUBJECT: ENGLISH

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
2	-	2	4	3	40	-	50*	-	90

Reference Code HSMC201

*TW Marks include Viva based on TW

A. COURSE OBJECTIVES

The objective of the course is to provide basic knowledge of the English language to students coming from different backgrounds. The course aims to teach English Grammar and Communications skills which will be useful to engineers.

B. DETAILED SYLLABUS

Unit Topic(s)

[1] VOCABULARY BUILDING

The concept of Word Formation, Root words from foreign languages and their use in English, Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives, Synonyms, antonyms, and standard abbreviations.

[2] BASIC WRITING SKILLS

Sentence Structures, use of phrases and clauses in sentences, Importance of proper punctuation, creating coherence, organizing principles of paragraphs in documents, Techniques for writing precisely.

[3] IDENTIFYING COMMON ERRORS IN WRITING

Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Articles, Prepositions, Redundancies, Clichés.

[4] NATURE AND STYLE OF SENSIBLE WRITING

Describing, Defining, Classifying, providing examples or evidence, Writing introduction and conclusion.

[5] WRITING PRACTICES

Comprehension, Précis Writing, Essay Writing

[6] ORAL COMMUNICATION

Listening Comprehension, Pronunciation, Intonation, Stress and Rhythm, Common, Everyday Situations: Conversations and Dialogues, Communication at Workplace, Interviews, Formal Presentations (This unit involves interactive practice sessions in Language Lab).

C. RECOMMENDED TEXT/REFERENCE BOOK

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001

4. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.
5. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

B. TECH. SEMESTER – II (EC/CE/IT)
SUBJECT: ENVIRONMENTAL STUDIES

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
2	-	-	2	0	40	-	-	-	40

Reference Code MC-II

A. COURSE OBJECTIVES

The objective of this course is to bring awareness about sustainable development is a key to the future of mankind. Understanding, analyzing, and proposing solutions to the contemporary environmental issues and problems of pollution, population explosion, solid waste disposal, environmental degradation, economic productivity, global warming, ozone layer depletion, and loss of biodiversity.

B. DETAILED SYLLABUS

Unit Topic(s)

[1] THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, scope, and importance & need for public awareness.

[2] NATURAL RESOURCES

Renewable and non-renewable resource: Natural resources and associated problems; Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction, mining, dams, and their effects on forests and tribal people; Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts, over water, dams benefit and problems; Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies; Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies; Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies; Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification; Role of an individual in conservation of natural resources; Equitable use of resources of sustainable lifestyles

[3] ECOSYSTEMS

Concept of an ecosystem, Structure and function of an ecosystem, producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem and Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries)

[4] BIODIVERSITY AND ITS CONSERVATION

Introduction definition: Genetic, species and ecosystem diversity; Bio-geographical classification of India; Value of biodiversity: Consumptive use, productive use, social, ethical, aesthetic and option values; Biodiversity at global, national and local levels. India as a mega-diversity nation, Hot-spots of biodiversity, threats to biodiversity, habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India; Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity

[5] ENVIRONMENTAL POLLUTION

Definition, Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear hazards; Solid waste management, causes, effects and control measures of urban and industrial wastes;

Role of an individual in prevention of pollution, Pollution case studies; Disaster management: floods, earthquake, cyclone, and landslides.

[6] SOCIAL ISSUES AND THE ENVIRONMENT

From unsustainable to sustainable development, urban problems related to energy Water conservation, rainwater harvesting, watershed management; Resettlement and rehabilitation of people: its problems and concerns, Case studies; Environmental ethics: Issues and possible solutions; Climate change: Global warming, acid rain, ozone layer depletion, nuclear accidents, and the holocaust. Case studies, Wasteland reclamation, Consumerism and waste products; Environment Protection Act: Air (Prevention and Control of Pollution) Act, Water (Prevention & Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act; Issues involved in the enforcement of environmental legislation Public awareness

[7] HUMAN POPULATION AND THE ENVIRONMENT

Population growth, variation among nations, population explosion, Family Welfare Program, Environment, and human health, human rights, Value education HIV/AIDS, Women and Child Welfare; Role of Information Technology in Environmental and human health Case studies.

[8] FIELD WORK

Visit to a local area to document environmental assets (river/forest/grassland/hill/mountain); Visit a local polluted site – Urban/Rural/Industrial/Agricultural; Study common plants, insects, birds. Study of simple ecosystems – pond, river, hill, slopes, etc.

C. RECOMMENDED TEXT/ REFERENCE BOOK

1. Erach Bharucha Textbook of Environmental Studies; Second Edition, Universities Press: Hyderabad, 2013
2. Poonia, M. P.; Sharma, S. C. Environmental studies; Khanna Publishing House: New Delhi, 2017
3. Rajagopalan, R. Environmental Studies; Oxford University Press: India, 2015
4. Varandani, N. S. Basics of Environmental studies; Lambert Academic Publishing: Germany, 2013.
5. Basak, A. Environmental Studies; Dorling Kindersley: India, 2009.
6. Dhameja, S. K. Environmental studies; S. K. Kataria and Sons: New Delhi, 2007.
7. Rao, C. S. Environmental Pollution Control Engineering; Wiley publishers: New Delhi, 2006.
8. Brunner, R. C. Hazardous Waste Incineration; McGraw Hill: Michigan, 1989.
9. Clark, R. S. Marine Pollution; Clanderson Press Oxford: Bath, 2001.
10. Trivedy, R. K. Handbook of Environmental Laws, Acts, Guidelines, Compliances & standards; B. S. publications: Hyderabad, 2005.
11. Jadhav, H.; Bhosale, V. M. Environmental Protection and Laws; Himalaya Pub. House: Delhi, 1995.
12. Agarwal, K. C. Environmental Biology; Nidi Publ.: Bikaner, 2001.
13. Bharucha, E. The Biodiversity of India; Mapin Publishing: Ahmedabad, India, 2002.
14. Cunningham, W.P.; Cooper; Gorhani, T. H. E.; Hepworth, M.T., Environmental Encyclopedia; Jaico Publ. House: Mumbai, 2001.
15. De, A. K. Environmental Chemistry; Wiley Eastern: New Delhi, 2006.
16. Gleick, H. P. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security; Stockholm Env. Institute Oxford Univ. Press: New York, 1993.
17. Hawkins, R.E., Encyclopedia of Indian Natural History; Bombay Natural History Society: Bombay, 1987.

18. Heywood, V. H.; Waston, R. T. Global Biodiversity Assessment; Cambridge Univ. Press: Cambridge, 1995.
19. Mckinney, M.L.; School, R.M. Environmental Science systems & Solutions; Web enhanced edition: USA, 1996.
20. Miller, T.G. Jr.; Spoolman, S. E. Environmental Science; Cengage learning: Wadsworth, 2014.
21. Odum, E.P. Fundamentals of Ecology; W.B. Saunders: USA, 1971.
22. Rao, M. N.; Datta, A.K. Waste Water treatment; Oxford & IBH Publ.: New Delhi, 1987.
23. Sharma, B. K., Environmental Chemistry; Goel Publ. House: Meerut, 2001.
24. Townsend, C., Harper, J.; Michael, B. Essentials of Ecology; Blackwell: Oxford, 2008.
25. Trivedi, R. K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II; B. S. Publications, Hyderabad, 2010.
26. Trivedi, R. K.; Goel, P. K. Introduction to air pollution; ABD Publishers: Jaipur, 2003.
27. Wanger, K. D., Environmental Management; W.B. Saunders Co. Philadelphia, USA, 1998.

B. TECH. SEMESTER – III (IT)
SUBJECT: PROBABILITY THEORY AND STATISTICS

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	1	-	4	4	60	40	-	-	100

Reference Code BSC3XX

A. COURSE OBJECTIVES

The objectives of teaching this course are:

- To provide an understanding of the basic concepts of probability, conditional probability, and independent events.
- To focus on the random variable, mathematical expectation and different types of distributions, sampling theory, and estimation theory.
- To demonstrate and teach the design of statistical hypothesis about the real-world problem and conduct appropriate tests for drawing valid inferences about the population characteristics
- To explain the significance of hypothesis testing for any research work

B. DETAILED SYLLABUS

Unit	Topic(s)
[1]	BASIC PROBABILITY Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality.
[2]	CONTINUOUS PROBABILITY DISTRIBUTIONS Continuous random variables and their properties, distribution functions and densities, normal, exponential, and gamma densities.
[3]	BIVARIATE DISTRIBUTIONS Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule.
[4]	BASIC STATISTICS Measures of Central tendency: Moments, skewness, and Kurtosis - Probability distributions: Binomial, Poisson, and Normal - evaluation of statistical parameters for these three distributions, Correlation, and regression – Rank correlation.
[5]	APPLIED STATISTICS Curve fitting by the method of least squares- fitting of straight lines, second-degree parabolas, and more general curves; Test of significance: Large sample test for a single proportion, a difference of proportions, a single mean, difference of means, and difference of standard deviations.
[6]	SMALL SAMPLES Test for a single mean, a difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

C. RECOMMENDED TEXT/REFERENCE BOOK

1. Introduction to Probability and Statistics for Engineers and Scientists, Sheldon M. Ross, 4th edition1.
2. Head First Statistics, Dawn Griffiths, O'Reilly
3. Introduction to Probability Theory, P. G. Hoel, S. C. Port, and C. J. Stone, Universal Book Stall, 2003 (Reprint).
4. A First Course in Probability, S. Ross, 6th Ed., Pearson Education India, 2002.
5. An Introduction to Probability Theory and its Applications, W. Feller, Vol. 1, 3rd Ed., Wiley, 1968.

B. TECH. SEMESTER – III (IT)
SUBJECT: COMMUNICATION SYSTEMS

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
4	-	2	6	5	60	40	25	25	150

Reference Code ESC3XX

A. COURSE OBJECTIVES

To impart an in-depth understanding of the major concepts, techniques, and performance criteria used in the analysis of various signal operations (time domain and frequency domain), this course covers the Fourier analysis of the signals, provides knowledge of various blocks that constitute an analog and digital communication system and their interrelation and correlates the concepts of Information Theory with reference to analog & digital communication systems. This course also includes the analog modulation & demodulation techniques (AM, FM, and PM) and digital modulation & demodulation techniques (PCM, DPCM, and DM).

B. DETAILED SYLLABUS

Unit	Topic(s)
[1]	WAVEFORM SPECTRA Introduction, Sinusoidal Waveform, General Periodic Waveforms Trigonometric Fourier Series for a Periodic Waveforms, Fourier Coefficients, Spectrum for the Trigonometric Fourier Series, Rectangular Waves, Sawtooth Waveform, Pulse Train, Some General Properties of Periodic Waveforms, Exponential Fourier Series, Approximate Formulas for the Fourier Coefficient, Energy Signals for Fourier Transform, Filtering of Signals, Power Signals, Bandwidth Requirements for Analog Information Signals.
[2]	DIGITAL LINE WAVEFORMS Symbols, Bits, Bits and Bauds, Functional notations for Pulses, Line codes and Waveforms, M-ary Encoding, Inter Symbol Interference.
[3]	AMPLITUDE MODULATION Introduction, Amplitude Modulation, Amplitude Modulated Transmitters, AM Receivers.
[4]	SINGLE SIDEBAND MODULATION Introduction, Single Sideband Principles, The Balanced Modulator SSB Generation, SSB Reception, Modified SSB Systems.
[5]	ANGLE MODULATION Introduction, Frequency Modulation, Phase Modulation, Equivalence between FM and PM, Angle Modulator Circuits, Angle Modulation Detectors.
[6]	PULSE MODULATION Pulse Amplitude Modulation, Pulse Code Modulation, Pulse Frequency Modulation, Pulse Time Modulation, Pulse Position Modulation, Pulse Width Modulation.
[7]	DIGITAL COMMUNICATION Synchronization, Asynchronous Transmission, Probability of Bit Error in Baseband Transmission, Matched Filters, Optimum Terminal Filters, Bit Timing Recovery, Eye Diagram, Digital Carrier System, Carrier Recovery Circuit, DPSK, Hard and Soft Decision, Error Control Coding.
[8]	INTRODUCTION TO INFORMATION THEORY Measure of Information, Source Encoding.

C. RECOMMENDED TEXT/REFERENCE BOOK

1. Modern Digital and Analog Communication System, B. P. Lathi, 2nd Edition, Oxford Publication
2. Communication Systems, Simon Haykin, 3rd Edition, John Wiley & sons.
3. Electronic Communication System-Fundamental through Advance, Tomas W., 3rd Edition, Wisley.
4. Communication System Analog & Digital, R. P. Singh, Tata McGraw-Hill.

B. TECH. SEMESTER – III (IT)
SUBJECT: DESIGN OF DIGITAL CIRCUITS

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
4	-	2	6	5	60	40	25	25	150

Reference Code ESC3XX

A. COURSE OBJECTIVES

The objectives of teaching this course are:

- The subject design of digital circuits aims to explain to the students about the basic knowledge of digital logic and circuit design.
- To familiarize the student with digital representations of information, Number systems, Logic gates, Boolean algebra, designing the circuits and their applications.
- To teach the student about fundamental principles of digital design using combinational and sequential logic to analyze and design digital circuits.

B. DETAILED SYLLABUS

Unit	Topic(s)
[1]	BINARY SYSTEMS Introduction to Digital Computers and Digital Systems; Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers; Complements, binary Codes; Binary Storage and Registers, Binary Logic; Integrated Circuits.
[2]	BOOLEAN ALGEBRA AND LOGIC GATES Basic Definitions, Axiomatic Definition of Boolean algebra; Basic Theorems and Properties of Boolean algebra; Boolean Functions; Canonical and Standard Forms, Other Logic Operations; Digital Logic Gates, IC Digital Logic Families.
[3]	SIMPLIFICATION OF BOOLEAN FUNCTIONS The Map Method; Two and Three Variable Maps, Four-Variable Map, Five and Six Variable Maps; Product of Sum simplification; NAND and NOR Implementations. Don't-Care Conditions; The Tabulation Method; Determination of Prime- Implicants, selection of Prime implicants.
[4]	COMBINATIONAL LOGIC Introduction, Design Procedure, Adders and Subtractors, Code Conversion, Analysis Procedure, Multilevel NAND Circuits, Multilevel NOR Circuits, Exclusive OR, and Equivalence Functions.
[5]	COMBINATIONAL LOGIC WITH MSI AND LSI Introduction, Binary Parallel Adder, Decimal Adder, Magnitude Comparator, Decoders, Multiplexers, Read-Only Memory (ROM), Programmable Logic Array (PLA).
[6]	SEQUENTIAL LOGIC Introduction, Flip-Flops, Triggering of Flip-Flops, Analysis of Clocked Sequential Circuits, State Reduction, and Assignment; Flip-Flop excitation Tables Design Procedure, Design of Counters, Design with State Equations.
[7]	REGISTERS, COUNTERS AND THE MEMORY UNIT Introduction, Registers, Shift Registers, Ripple Counters, Synchronous Counters, Timing Sequences, The Memory Unit, Examples of Random-Access Memories.

[8] DIGITAL INTEGRATED CIRCUITS

Introduction, Bipolar Transistor Characteristics, RTL and DTL Circuits, Integrated-Injection Logic, Transistor-Transistor Logic, Emitter Coupled logic, Metal-Oxide Semiconductor, Complementary MOS.

C. RECOMMENDED TEXT/ REFERENCE BOOKS

1. Digital Logic and Computer Design by: M. Morris Mano
2. Microelectronics by: Jacob Millman & Arvin Grabel, Second Edition McGraw Hill International Edition

B. TECH. SEMESTER – III (IT)

SUBJECT: EFFECTIVE TECHNICAL COMMUNICATION

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	-	-	3	3	50	-	50	-	100

Reference Code HSMC3XX

A. COURSE OBJECTIVES

The objectives of teaching this course are:

- To discuss and explain technical writing and professional communication along with the importance of Ethics, etiquette, and Values.
- To prepare students for effective public speaking, group discussion, and interviews.
- To explain how to study and validate various information sources such as websites, business documents, and professional journals.
- To teach how to carry out self development and self assessment.
- To prepare students to produce effective technical documents.

B. DETAILED SYLLABUS

Unit	Topic(s)
[1]	INFORMATION DESIGN AND DEVELOPMENT Different kinds of technical documents, Information development life cycle, Organization structures, factors affecting information and document design, Strategies for organization, Information design and writing for print and for online media.
[2]	TECHNICAL WRITING, GRAMMAR, AND EDITING Technical writing process, forms of discourse, Writing drafts and revising Collaborative writing, creating indexes, technical writing style, and language; Basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style; Introduction to advanced technical communication, Usability, Human factors, Managing technical communication projects, time estimation, Single sourcing, Localization
[3]	SELF-DEVELOPMENT AND SELF-ASSESSMENT Self-assessment, Awareness, Perception, and Attitudes, Values and belief, Personal goal setting, career planning, Self-esteem. Managing Time; Personal memory, Rapid reading, Taking notes; Complex problem solving; Creativity
[4]	COMMUNICATION AND TECHNICAL WRITING Public speaking, Group discussion, Oral; presentation, Interviews, Graphic presentation, Presentation aids, Personality Development. Writing reports, project proposals, brochures, newsletters, technical articles, manuals, official notes, business letters, memos, progress reports, minutes of meetings, and event report.
[5]	ETHICS Business ethics, Etiquettes in social and office settings, Email etiquettes, Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Work culture in jobs, Personal memory, Rapid reading, Taking notes, Complex problem solving, Creativity.

C. RECOMMENDED TEXT/REFERENCE BOOK

1. David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. New York, 2004
2. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)
3. Shiv Khera, You Can Win, Macmillan Books, New York, 2003.

B. TECH. SEMESTER – III (IT)

SUBJECT: OBJECT ORIENTED PROGRAMMING USING JAVA

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
4	-	2	6	5	60	40	25	25	150

Reference Code PCC3XX

A. COURSE OBJECTIVES

The objectives of teaching this course are:

- To teach fundamental knowledge of object-oriented programming principles including defining classes, polymorphism, inheritance, encapsulation, abstraction, and interface, and explain with examples how to represent the solution of a given problem in object oriented representation.
- To explain how to use library API such as String, Arrays, StringBuffer, StringTokenizer, and Math in framing solutions to problems.
- To impart knowledge of package, exception, and multithreading and show their usage in practical problems.
- To discuss concepts of making user interactive programs using GUI programming, Stream API, and Network Programming and demonstrate their use in solving problems.
- To demonstrate skills to write, debug, and execute java programs and enable them to create Java solutions for given problem statements.

B. DETAILED SYLLABUS

Unit	Topic(s)
[1]	INTRODUCTION TO PROGRAMMING LANGUAGE – JAVA Java programming: History of Java Primitive data types, variables, constants, scope and lifetime of variables, Comments; Operators, operator hierarchy, expressions; Type conversion and casting.
[2]	CONTROL STRUCTURE AND METHODS Control flow statements and loops, Loops – for, while, do-while; Console input and output, formatting output; Constructors and methods, Overloading of methods and constructors, recursion, Parameter passing, static fields and methods, access control, this reference; Garbage collection.
[3]	OBJECT ORIENTED PROGRAMMING PRINCIPLES OOP Concepts, Classes, and objects, Data abstraction, encapsulation, inheritance, Polymorphism. Procedural and object-oriented programming paradigm; Object-Oriented Programming Using Java, Inheritance: Inheritance types, super and subclasses, member access rules, super keyword, preventing inheritance: final classes and methods, the object class and its methods; Polymorphism: dynamic binding, method overriding, abstract classes and methods; Interface: Interfaces vs Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface.

- [4] **ARRAYS, STRING, AND PACKAGES**
Arrays: 1,2, N-dimension array, jagged array, arrays of objects; String: Exploring concepts of String, StringBuffer, and StringTokenizer classes; Packages: Defining, creating, and accessing a package, understanding CLASSPATH, importing packages, Exploring “Java.Util”.
- [5] **EXCEPTION HANDLING**
Exception Handling: Benefits of exception handling, the classification of exceptions; Exception hierarchy: Throwable, checked exceptions, and unchecked exceptions; Usage of try, catch, throw, throws, and finally; Re-throwing exceptions, exception specification, built in exceptions; Creating and using own/user-defined exception sub classes.
- [6] **MULTITHREADING**
Multithreading: Multi-Threading and Multitasking; Thread Life Cycle, thread states, creating threads: Thread Priorities, Thread Groups, Daemon Threads, interrupting threads, thread priorities; Synchronizing threads, inter-thread communication.
- [7] **GETTING STARTED WITH GRAPHIC PROGRAMMING**
The AWT class hierarchy, Containers: Frame, Dialog, Panel; Events: Event Sources, Event Classes, Event Listeners, Delegation Event Model; Handling Action, Mouse, Window, Keyboard Events; Adapter Classes
- [8] **CREATING USER INTERFACE AND ADVANCED GRAPHICS**
The AWT Class Hierarchy; User Interface Components: Labels, Button, Canvas, Scrollbars, Text Components, Check Box, Check Box Groups, Choices, Lists; Panels: Scrollpane, Dialogs, Menubar, Graphics, Layout Manager; Layout Manager Types: Border, Grid, Flow, Card, Grid Bag, No layout, etc.
- [9] **INPUT AND OUTPUT**
Input/Output classes. File management using file class Streams: Byte streams, character stream; Text input/output, binary input/output; Random access file operations
- [10] **NETWORK PROGRAMMING**
Networking concepts: Introduction to TCP and UDP protocol; Socket programming classes: Socket, ServerSocket, InetAddress, URL, URL Connection; Client-server and multi-threaded application.
- [11] **JAVA UNIT TESTING – JUNIT**
JUnit: Types of Testing, Test Driven Development, Assert class, Test cases.

C. RECOMMENDED TEXT/REFERENCE BOOKS

1. An Introduction to JAVA programming, Y. Daniel Liang, Publisher: PHI
2. The Complete Reference Java, Herbert Schildt, 5th edition Publisher: Tata McGraw-Hill

B. TECH. SEMESTER – III (IT)
SUBJECT: DATA STRUCTURES AND ALGORITHMS

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
4	-	2	6	5	60	40	25	25	150

Reference Code PCC3XX

A. COURSE OBJECTIVES

The objectives of teaching this course are:

- To teach different data structures and their operations.
- To teach and demonstrate the selection of efficient data structure for improving the efficiency (time complexity and space complexity) of the system.
- To explain concepts that are useful to students to understand subjects like Database Management System and Design and Analysis of Algorithms.
- To impart the knowledge of real-world applications of the data structures.

B. DETAILED SYLLABUS

Unit	Topic(s)
[1]	BASIC CONCEPTS System Life Cycle; Object-Oriented Design: Algorithm Decomposition versus OO Decomposition, Fundamental Definitions, and Concepts of OO programming; Data Abstraction and Encapsulations; Algorithm Specification: Introduction, Recursive Algorithms.
[2]	ARRAYS Abstract Data Types and the C++ Class; The Array as an Abstract Data Type; The Polynomial Abstract Data: Polynomial Representation, Polynomial Addition, Polynomial Multiplication, Disadvantages of Representing Polynomials by Arrays.
[3]	STACK AND QUEUE The Stack Abstract Data Type; The Queue Abstract Data Type; Evaluation of Expressions: Expressions, Postfix Notation, Infix to Postfix, Multiple Stacks, and Queues.
[4]	LINKED LISTS Singly Linked Lists; Representing Lists in C++: Defining a List Node in C++, Designing a List in C++, Pointer Manipulation in C++, List Manipulation Operations, Linked List Operations, Circular Lists, Linked Stacks and Queues; Polynomials: Polynomial Representation, Adding Polynomials; Doubly Linked Lists; Generalized Lists: Representation of Generalized Lists, Recursive Algorithms for Lists, Reference Counts, Shared and Recursive Lists.
[5]	TREES Introduction: Terminology, Representation of Trees; Binary Trees: The Abstract Data Type, Properties of Binary Trees, Binary Tree Representations; Binary Tree Traversal and Tree Iterators: Introduction, Inorder Traversal, Preorder Traversal, Postorder Traversal, Iterative Inorder Traversal, Level-Order Traversal; Additional Binary Tree Operations: Copying Binary Trees, Testing Equality, The Satisfiability Problem; Threaded Binary Trees: Threads, Inorder Traversal of a Threaded Binary Tree, Inserting a Node into a Threaded Binary Tree. Heaps: Definitions, Insertion, and Deletion Of Max Heaps. Binary Search Trees: Definition, Searching a Binary Search Tree, Insertion and Deletion and Joining into a Binary Search Tree, Height of a Binary Search Tree.

[6] **GRAPHS**

The Graph Abstract Data Type: Introduction, Definitions, Graph Representations. Elementary Graph Operations: Depth First Search, Breadth-First Search, Connected Components, Spanning Trees, Biconnected Components. Shortest Paths and Transitive Closure: All-Pairs Shortest Paths.

[7] **SORTING**

Insertion Sort. Quick Sort. Merge Sort: Merging, Iterative Merge Sort, Recursive Merge Sort. Heap Sort. List and Table Sorts. Summary of Internal Sorting.

[8] **HASHING**

The Symbol Table Abstract Data Type. Static Hashing. Hash Tables. Hashing Functions. Overflow Handling.

[9] **ADVANCED SEARCH STRUCTURES**

AVL Trees. 2-3 Trees. 2-3-4 Trees. Red-Black Trees. B-Trees. Splay Trees. Digital Search Trees. Tries.

C. RECOMMENDED TEXT/REFERENCE BOOKS

1. Fundamentals of Data Structures using C++ by: Horowitz, Sahni, Galgotia Pub. 1998 ed.
2. Data Structures & Algorithms, by: Aho, Ullman, Addison Wesley
3. An Introduction to Data Structures with applications, by: Tremblay, Sorenson, McGraw Hill.
4. The art of Computer Programming Vol. I & III, by: Kunth, Addison Wesley.
5. Data Structures using C and C++, by: YedidyahLangsam, Tenenbaum

B. TECH. SEMESTER – IV (IT)
SUBJECT: UNIVERSAL HUMAN VALUES - II

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	-	-	3	3	60	-	-	-	60

Reference Code HSMC4XX

A. COURSE OBJECTIVES

The objectives of teaching this course are:

- To help the students appreciate the essential complementarity between 'VALUES' and SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement toward value-based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior, and mutually enriching interaction with Nature.

B. DETAILED SYLLABUS

Unit	Topic(s)
[1]	<p>COURSE INTRODUCTION</p> <p>Need, Basic Guidelines, Content, and Process for Value Education Self Exploration–what is it? - it's content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration, Continuous Happiness, and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfill the above human aspirations: understanding and living in harmony at various levels</p>
[2]	<p>UNDERSTANDING HARMONY IN THE HUMAN BEING</p> <p>Harmony in Myself! Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha, Understanding the Body as an instrument of 'I' (I being the doer, seer, and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, the meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya.</p>
[3]	<p>UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY</p> <p>Harmony in Human-Human Relationship Understanding Harmony in the family – the basic unit of human interaction, Understanding values in human to human relationship; the meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship, Understanding the meaning of Vishwas; Difference between intention and competence, Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in a relationship, Understanding the harmony in the society (society being an extension of the family): Samadhan, Samridhi, Abhay, Sah-astitva as</p>

comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family.

[4] UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE

Whole existence as Co-existence: Understanding the harmony in the Nature, Interconnectedness, and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature, Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence.

[5] IMPLICATIONS OF THE ABOVE HOLISTIC UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS

Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in Professional Ethics, Case studies of typical holistic technologies, management models and production systems, Strategy for the transition from the present state to Universal Human Order.

C. RECOMMENDED TEXT/REFERENCE BOOK

1. R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2
2. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
3. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj - PanditSunderlal

B. TECH. SEMESTER – IV (IT)
SUBJECT: DISCRETE MATHEMATICS

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	1	-	4	4	60	40	-	-	100

Reference Code PCC4XX

A. COURSE OBJECTIVES

The objectives of teaching this course are:

- To impart an in-depth understanding of various concepts related to Discrete Mathematics, correct terminology, and notation.
- To teach how to construct correct direct and indirect proofs, the division into cases in a proof, use of counterexamples, etc.
- To explain Sets, Functions, Relations, Groups, Graphs, Trees, and their applications using real-world examples.
- Demonstrate and teach how to apply logical reasoning to solve a variety of problems.

B. DETAILED SYLLABUS

Unit	Topic(s)
[1]	SETS AND PROPOSITIONS Combination of sets, finite, uncountable infinite, and infinite sets, mathematical induction, principles of inclusion, and exclusion, propositions.
[2]	PROPOSITIONAL LOGIC Propositional Logic, Applications of Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy.
[3]	PERMUTATIONS, COMBINATIONS, DISCRETE PROBABILITIES Rules of sums and products, permutations, combinations, generation, discrete probability, conditional probability, information.
[4]	RELATIONS AND FUNCTIONS Relational model of databases, properties of binary relations, equivalence relation, partitions, partial ordering, lattices, chains and antichains, functions, and pigeon-hole principle.
[5]	GRAPHS Basic terminology, multi- and weighted graphs, paths, circuits, shortest path, Eulerian path, Travelling Salesman problem, factors of a graph, planar graphs.
[6]	TREES Trees, rooted trees, path length, prefix codes, binary search trees, spanning trees and cut-sets, minimum spanning trees, transport networks.
[7]	RECURRENCE RELATIONS Linear recurrence relations with constant coefficient, homogeneous, particular and total solutions, generating functions, sorting algorithms, and matrix multiplication.
[8]	DISCRETE NUMERICAL FUNCTIONS Manipulations of numerical functions, asymptotic behavior, generating functions, combinatorial problems.

[9] GROUP

Groups and sub-groups, generators, evaluation of powers, cosets, Lagrange's theorem, permutation group and Burnside's theorem, group codes, isomorphism, automorphism, homomorphism, normal subgroups, rings, integral domains and fields, ring homomorphism, polynomial rings, and cyclic codes.

[10] LATTICES AND BOOLEAN ALGEBRAS

Lattices and algebraic systems, the principle of duality, properties of algebraic systems, distributive lattices, Boolean algebras, uniqueness, Boolean functions and expressions, propositional calculus.

C. RECOMMENDED TEXT/ REFERENCE BOOK

1. Discrete Mathematics Applications, Kenneth H. Rosen, 7th edition, Mc Graw Hill
2. Elements of Discrete Mathematics, by: C.L. Liu, 2nd Ed. McGraw-Hill
3. Modern Applied Algebra, by: Birkoff and Bartee, McGraw-Hill, CBS.
4. Discrete Mathematics - A Unified Approach, by: Stephen A. Wiitala. Computer Science Series, McGraw-Hill.

B. TECH. SEMESTER – IV (IT)

SUBJECT: COMPUTER AND COMMUNICATION NETWORKS

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
4	-	2	6	5	60	40	25	25	150

Reference Code PCC4XX

A. COURSE OBJECTIVES

The objectives of teaching this course are:

- To teach about network hardware, software, services, and protocols and explain the uses of computer networks in daily life.
- To explain the layered architecture of network software and compare OSI and TCP/IP model
- To explain the functionalities and working of different layers in TCP/IP protocol stack.
- To demonstrate and teach the usage of various network devices, their configurations, and setup

B. DETAILED SYLLABUS

Unit	Topic(s)
[1]	INTRODUCTION Introduction and Applications of computer Networks; Network Hardware-LAN, MAN, WAN, internetworks; Network Software, Design Issues, Interfaces & Services, Connection-Oriented & Connectionless services, Service primitives, Relationship of services to protocols.
[2]	STUDY OF REFERENCE MODELS Introduction OSI & TCP/IP, their comparison & critiques.
[3]	THE PHYSICAL LAYER Guided Transmission Media: magnetic media, twisted pair, baseband & broadband, co-axial cable, fiber optics; Wireless Transmission: radio, microwave, infrared, lightwave.
[4]	THE DATA LINK LAYER DLL Design issues Error Detection & Correction; Elementary Data link Protocols: Simplex protocol, Stop and Wait, Automatic Repeat Request, Sliding Window Protocols (1-bit sliding window, Go Back N, Selective Repeat Protocols); Examples of Data link layer protocols: HDLC, PPP.
[5]	MEDIUM ACCESS SUB LAYER Channel Allocation Problem: Static & Dynamic, Multiple Access protocols (ALOHA, CSMA/CA AND CD, Collision Free Protocols, Limited contention protocols, WDMA, FDMA, TDMA, CDMA); Wireless LAN protocols, IEEE-802.3(Ethernet), 802.4(Token Bus), 802.5(Token Ring); Bridges: From 802.x to 802.y, transparent Bridges, Spanning Tree, Source Routing Bridges, remote bridge.
[6]	THE NETWORK LAYER Network layer Design issues; Internetworking-How networks differ, how networks can be connected, concatenated virtual circuits, connectionless internetworking, and tunneling, internetwork routing; The network layer in the internet: the IP protocol, IPv4 Header, fragmentation, IP addresses & subnets, Internet Control Protocols – ARP, RARP, ICMP, IGMP; Routing Algorithms: Static Routing, Dynamic Routing, Intra-domain: Distance Vector Routing(RIP), Link-state (OSPF), Inter-domain Routing:

- Path vector (BGP).
- [7] **THE TRANSPORT LAYER**
The Transport Service: services provided to upper layers, transport services primitives; Elements of Transport Protocols; The Internet Transport Protocols; TCP service model: TCP protocol, TCP Segment Header, TCP Connection Management, TCP Transmission Policy, TCP Congestion Policy; UDP & overview of Socket.
- [8] **CONGESTION CONTROL AND QUALITY OF SERVICE**
Congestion control algorithm general policies, Congestion prevention policies, Traffic shaping, Flow specifications, Congestion control in VC subnets, Congestion controls in Datagram Subnets; Load shedding, jitter control, Quality of services-requirements, Techniques to achieve a good quality of services: Leaky bucket algorithm, Token bucket algorithm, Resource reservation, Admission control, Packet scheduling.
- [9] **THE APPLICATION LAYER**
Application Layer Protocols: File transfer protocol, Domain Name System, Electronic mail (SMTP, IMAP, POP), HTTP

C. RECOMMENDED TEXT/ REFERENCE BOOKS

1. Data Communications and Networking by Behrouz A. Forouzan, 4th Edition, Tata- McGraw Hill Edition.
2. Computer Networks By Andrew S. Tanenbaum, 4th Edition. Prentice-Hall of India(PHI)
3. Data & Computer Communications - William Stallings, 2ed, Maxell Macmillan Int.
4. Communication Networks, Fundamental Concepts & key Architectures – Leon Garcia & Widjaja, Tata- McGraw Hill Edition.

B. TECH. SEMESTER – IV (IT)
SUBJECT: DATABASE MANAGEMENT SYSTEM

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
4	-	2	6	5	60	40	25	25	150

Reference Code PCC4XX

A. COURSE OBJECTIVES

The objectives of teaching this course are:

- To explain basic database concepts, data models, schemas, instances, and applications of database systems.
- To demonstrate the use of constraints and relational algebra principles and operations.
- To describe the basics of SQL and construct queries using SQL / POSTGRESQL.
- To emphasize the importance of normalization in databases.
- To facilitate students in Database designing and implementation through projects.
- To familiarize issues of concurrency control and transaction management.

B. DETAILED SYLLABUS

Unit	Topic(s)
[1]	BASIC CONCEPTS Purpose of the database system, View of data, Database abstraction and Models, Database Languages, Transaction management, Storage management, Database administrator, Database users, Overall system structure.
[2]	ENTITY RELATIONSHIP MODEL Entity sets, Relationship sets, Attributes, Constraints, Keys. Entity-relationship diagrams, Weak entity sets, Generalization, Specialization, Aggregation; Design of an E-R database schema. Reduction of an E-R schema to tables.
[3]	RELATIONAL DATABASE MANAGEMENT SYSTEM Relational Model Structure of database, Relational algebra, Extended relational algebra operation, tuple relational calculus, Domain relational calculus; Modification of database, Views. Structured Query Language Background; Constraints (i.e. Integrity Constraints, Domain constraints, Referential integrity), Assertions, Triggers, Functional Dependencies; Database Design Pitfalls in relational database design, Normalization, I, II, III normal Forms, Normalization using functional dependencies, Normalization using multi-valued dependencies, Domain key normal form; Alternative approach to database design.
[4]	NOSQL Introduction to NoSQL, Structure of NoSQL, NoSQL Queries.
[5]	FILE SYSTEM STRUCTURE Indexing & Hashing, File organization, Organization of records in files, Data dictionary storage; Basic concepts of indexing, Order indices, B- Tree index files, B+ -Tree index files, Static hashing & Dynamic Hashing.
[6]	QUERY PROCESSING Cost estimation, Measures of query cost: Selection operation, Sorting, Join operation. Choice of evaluation plans.
[7]	TRANSACTION PROCESSING

Transaction concepts, Transaction state, Implementation of atomicity & durability, Concurrent executions, Serializability, Conflict serializability, View serializability; Testing of conflict and view serializability.

[8] **CONCURRENCY CONTROL**

Lock-based protocols, Time-stamp based protocol, Validation based protocol, Multiple granularities, Multi-version schemes, and Deadlock handling.

[9] **RECOVERY SYSTEM**

Failure classification, Storage structure, Recovery & Atomicity: Log-based recovery, Shadow paging, Recovery with concurrent transactions, Buffer management, Failure with loss of non-volatile storage, Advance recovery techniques.

[10] **DISTRIBUTED DATABASES**

Homogeneous and heterogeneous databases, Distributed Transactions

[11] **SECURITY AND INTEGRITY OF DATABASE**

Overview of Security Mechanisms, Recovery management system

C. RECOMMENDED TEXT / REFERENCE BOOK

1. Database System Concepts, by: Henry F. Korth and A. Silberschatz. 2nd Ed. McGraw-Hill 1991.
2. Fundamentals of Database Systems by: Shamkant Navathe

B. TECH. SEMESTER – IV (IT)
SUBJECT: DESIGN & ANALYSIS OF ALGORITHM

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
4	-	2	6	5	60	40	25	25	150

Reference Code PCC4XX

A. COURSE OBJECTIVES

The objectives of teaching this course are:

- To explain the fundamental concepts of algorithms, performance analysis, and problem-solving paradigm in general.
- To demonstrate and teach various methods for performance analysis of different types of algorithms
- To make the students familiar with major algorithmic design paradigms and demonstrate their application using suitable examples.
- To guide students in applying appropriate algorithm design techniques to solve common engineering design requirements.

B. DETAILED SYLLABUS

Unit	Topic(s)
[1]	INTRODUCTION TO ALGORITHMS Definition of the algorithm, Characteristic of algorithms, Types of algorithm design Paradigm, Recursive Algorithms, The Need for Analysis.
[2]	ANALYZING ALGORITHMS Analysis Techniques - Space and Time Complexity, Asymptotic Notations for analysis of algorithms - Omega, Theta, Big Oh, Little Oh, Little omega, Recurrence relations and Analysis of recursive algorithms, Homogeneous, In-homogeneous equations, Recurrence tree, Substitution method, the Master method.
[3]	DIVIDE AND CONQUER ALGORITHM DESIGN STRATEGY Introduction to Divide and Conquer, Binary search, Merge Sort, Quicksort.
[4]	GREEDY ALGORITHM DESIGN STRATEGY Introduction to Greedy Methods; Knapsack Problem, Minimum Cost Spanning Trees, Optimal Merge Patterns, Single-Source Shortest Paths.
[5]	DYNAMIC PROGRAMMING DESIGN STRATEGY Introduction to Dynamic Programming; Multistage Graphs, Matrix Chain Multiplication, Single-Source and All-Pairs Shortest Paths, Travelling Salesperson Problem, Longest Common Subsequence.
[6]	BACK TRACKING Graph Traversal using DFS/BFS; Articulation point in Graph; Introduction to Backtracking. N-Queens Problem, Graph Colouring, Hamiltonian Cycles.
[7]	BRANCH-AND-BOUND Introduction to Branch and Bound; Knapsack problem, Job assignment problem; Comparison of backtracking and branch and bound
[8]	NP-HARD AND NP-COMPLETE Definition of P and NP classes; Relation between complexity classes; Examples of problems in various classes.

C. RECOMMENDED TEXT / REFERENCE BOOKS

1. G. Brassard, P. Bratley, "Fundamentals of Algorithmics", (PHI).
2. T. H. Cormen, C. E. Leiserson, R. L. Rivest "Introduction to Algorithms", PHI.
3. Ellis Horowitz and Sartaj Sahani, "Fundamentals of Computer Algorithms", Computer Science Press.
4. Design & Analysis of Computer Algorithms, by: Aho, Ullman, Addison Wesley.
5. The art of Computer Programming Vol. I & III, by Kunth, Addison Wesley.

B. TECH. SEMESTER – IV (IT)

SUBJECT: MICROPROCESSOR ARCHITECTURE AND PROGRAMMING

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
4	-	2	6	5	60	40	25	25	150

Reference Code PCC4XX

A. COURSE OBJECTIVES

The objectives of teaching this course are:

- To explain the architecture and the instruction set of the Intel 8086/80286 and 80386 microprocessor family.
- To teach the basic concepts of microprocessor and its interfacing with memory and programmable peripheral chips involving system design.
- To impart knowledge about Interrupts and their applications.
- To demonstrate and teach assembly language programming using Turbo Assembler (TASM) software.

B. DETAILED SYLLABUS

Unit Topic(s)

[1] MICROPROCESSOR ARCHITECTURES

Introduction, Main features of 8086, 8086 Pin diagram, 8086 internal architecture, Machine cycle, and Instruction Cycle, Minimum and Maximum Mode, 8086 Memory System

[2] 8086 ASSEMBLY LANGUAGE PROGRAMMING

Program Development Steps, Constructing the Machine Codes for 8086 Instructions, Addressing Modes, Assembly Language Program Development Tools.

[3] 8086 INSTRUCTION SET AND ASSEMBLER DIRECTIVES

Assembler Directives, Data Transfer Instructions, Arithmetic Instructions, Logical Instructions, Shift and Rotate Instructions, Transfer or Branch Control Instructions, Looping or Iteration Control Instructions, String Instructions, Processor Control Instructions.

[4] STACKS, PROCEDURES, AND MACROS

Stack Instructions, Defining and Calling Procedure, Parameter Passing Methods, Working with Macros.

[5] 8086 INTERRUPTS AND I/O

The 8086 Interrupts, Interrupt types, Interrupt processing

[6] BASIC INTERFACING TECHNIQUES

Interfacing memory, Peripheral devices interfacing, programming and interfacing of VLSI based peripheral Devices like 8255, 8254, 8259, DMA Controller, etc.

[7] 80286/386/486 MICROPROCESSORS

Multi-User/Multitasking Operating System Concepts, Introduction to 80286/80386 /80486, The 80286/386 Segments, Descriptor Tables and Selectors; Real Address Mode and Protected Virtual Address Mode of 80286/80386/80486, Multitasking and Exceptions.

[8] MODERN MICROPROCESSORS

The Pentium Architecture, Hyper-Threading and Multi-core Technologies, Study of latest microprocessors.

C. RECOMMENDED TEXT/ REFERENCE BOOKS

1. Microprocessors and Interfacing (Programming & Hardware), Douglas V. Hall, McGraw Hill
2. 8086 Programming and Advance Processor Architecture, M. T. Savaliya, WIND Series, 2012
3. Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium And Pentium Pro Processor, by: Barry B. Brey