1.1.2

List of Employability/ Entrepreneurship/ Skill Development Courses with Course Contents

Colour Codes		
Name of the Subjects	Yellow	
Employability Contents	Green	
Entrepreneurship Contents	Light Blue	
Skill Development Contents	Pink	

List of Courses Focus on Employability/ Entrepreneurship/ Skill Development

Department : *Information Technology Engineering*

Programme Name : *B.Tech.*

Academic Year : 2021-22

List of Courses Focus on Employability/ Entrepreneurship/Skill Development

Sr. No.	Course Code	Name of the Course
1	IT203TES06	ANALOG ELECTRONIC CIRCUITS
2	IT203TPC01	DATA STRUCTURE & ALGORITHMS
3	IT203TPC02	DIGITAL ELECTRONICS
4	IT203TBS05	MATHEMATICS-III
5	IT203TPC03	OBJECT ORIENTED PROGRAMMING
6	IT203PES06	ANALOG ELECTRONIC CIRCUITS LAB
7	IT203PPC01	DATA STRUCTURE LAB
8	IT203PPC02	DIGITAL ELECTRONICS LAB
9	IT203PPC03	OBJECT ORIENTED PROGRAMMING LAB
10	IT204TPC01	DISCRETE MATHEMATICS
11	IT204TPC02	COMPUTER ORGANIZATION & ARCHITECTURE
12	IT204TPC03	OPERATING SYSTEMS
13	IT204TPC04	DESIGN & ANALYSIS OF ALGORITHMS
14	IT204THS02	MANAGEMENT 1 – MANAGEMENT PROCESS AND ORGANIZATIONAL BEHAVIOUR
15	IT204PPC01	COMPUTER ORGANIZATION & ARCHITECTURE LAB
16	IT204PPC02	OPERATING SYSTEMS LAB
17	IT204PPC03	IT WORKSHOP
18	IT05TES01	SIGNALS & SYSTEMS
19	IT05TPC01	DATABASE MANAGEMENT SYSTEMS
20	IT05TPC02	FORMAL LANGUAGE & AUTOMATA THEORY
21	IT05TPC03	OBJECT ORIENTED PROGRAMMING
22	IT05TPE11	SOFTWARE ENGINEERING
23	IT05TPE14	EMBEDDED SYSTEMS
24	IT06TPC01	COMPILER DESIGN
25	IT06TPC02	COMPUTER NETWORKS

26	IT06PPC01	COMPUTER NETWORKS
27	IT06PPR11	PROJECT - I
28	IT06TPE21	MICROPROCESSOR & INTERFACING
29	IT06TPE22	WEB TECHNOLOGY & E-COMMERCE
30	IT06TPE23	QUEUING THEORY & MODELING
31	IT06TPE24	IMAGE PROCESSING
32	IT06PPE21	MICROPROCESSOR & INTERFACING
33	IT06PPE24	IMAGE PROCESSING
34	IT06TPE32	MULTIMEDIA SYSTEM DESIGN
35	IT06TPE33	SPEECH & NATURAL LANGUAGE PROCESSING
36	IT06TPE34	GRAPH THEORY
37	IT06TOE11	COMPUTER GRAPHICS
38	IT06TOE12	WIRELESS & MOBILE COMMUNICATION
39	IT7TPC01	INTERNETWORKING AND NETWORK PROGRAMMING
40	IT7TPC02	WIRELESS SENSOR NETWORK
41	IT7LPC01	INTERNETWORKING AND NETWORK PROGRAMMING LAB
42	IT7LPC02	WIRELESS SENSOR NETWORK LAB
43	IT7LPC03	PROJECT
44	IT7LPC04	INTERNSHIP
45	IT7TPE11	COMPILER DESIGN
46	IT7TPE13	ADVANCE COMPUTER ARCHITECTURE
47	IT7TPE14	BIG DATA
48	IT7TPE22	MOBILE COMPUTING
49	IT7TPE24	SOFTWARE ARCHITECTURE
50	IT7TPE25	VLSI DESIGN
51	IT7TOE11	ARTIFICIAL INTELLIGENCE & EXPERT SYSTEMS
52	IT7TOE12	DIGITAL IMAGE PROCESSING
53	IT7TOE13	REAL TIME SYSTEM
54	IT7TOE14	WEB TECHNOLOGY
55	IT8TPC01	CYBER SECURITY
56	IT8TPC02	SOFT COMPUTING

57	IT8LPC01	CYBER SECURITY LAB
58	IT8LPC02	SOFT COMPUTING LAB
59	IT8LPC03	PROJECT
60	IT8LPC04	SEMINAR
61	IT8TPE11	OPEN SOURCE SYSTEM & PROGRAMMING
62	IT8TPE12	GAME THEORY
63	IT8TPE13	OBJECT ORIENTED ANALYSIS AND DESIGN
64	IT8TPE14	COMPUTER VISION
65	IT8TPE21	INTRODUCTION TO .NET TECHNOLOGY
66	IT8TPE22	INFORMATION SECURITY AUDIT AND RISK ASSESSMENT
67	IT8TPE23	DATA MINING
68	IT8TPE24	SOFTWARE TESTING AND QUALITY MANAGEMENT
69	IT8TOE11	DIGITAL SIGNAL PROCESSING

Scheme and Syllabus

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
SECOND YEAR, INFORMATION TECHNOLOGY
SEMESTER III
EFFECTIVE FROM SESSION 2021-22

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT203TES06	ANALOG ELECTRONIC CIRCUITS	3	0	0	30	70	100	3
2	IT203TPC01	DATA STRUCTURE & ALGORITHMS	3	0	0	30	70	100	3
3	IT203TPC02	DIGITAL ELECTRONICS	3	0	0	30	70	100	3
4	IT203TBS05	MATHEMATICS-III	3	1	0	30	70	100	4
5	IT203TPC03	OBJECT ORIENTED PROGRAMMING	3	1	0	30	70	100	4
PRACTICAL									
1	IT203PES06	ANALOG ELECTRONIC CIRCUITS LAB	0	0	4	30	20	50	2
2	IT203PPC01	DATA STRUCTURE LAB	0	0	4	30	20	50	2
3	IT203PPC02	DIGITAL ELECTRONICS LAB	0	0	4	30	20	50	2
4	IT203PPC03	OBJECT ORIENTED PROGRAMMING LAB		0	4	30	20	50	2
TOTAL CREDITS									25

IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
SECOND YEAR, INFORMATION TECHNOLOGY
SEMESTER IV
EFFECTIVE FROM SESSION 2021-22

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT204TPC01	DISCRETE MATHEMATICS	3	1	0	30	70	100	4
2	IT204TPC02	COMPUTER ORGANIZATION & ARCHITECTURE	3	0	0	30	70	100	3
3	IT204TPC03	OPERATING SYSTEMS	3	0	0	30	70	100	3
4	IT204TPC04	DESIGN & ANALYSIS OF ALGORITHMS	3	0	0	30	70	100	3
5	IT204THS02	MANAGEMENT I – MANAGEMENT PROCESS AND ORGANIZATIONAL BEHAVIOUR	3	0	0	30	70	100	3
PRACTICAL									
1	IT204PPC01	COMPUTER ORGANIZATION & ARCHITECTURE LAB	0	0	4	30	20	50	2
2	IT204PPC02	OPERATING SYSTEMS LAB	0	0	4	30	20	50	2
3	IT204PPC03	IT WORKSHOP	1	0	2	30	20	50	2
TOTAL CREDITS									22

IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT203TES06	3	0	0	3 HOURS	30	70	3

ANALOG EL ECTRONIC CIRCUITS

Course Objective

1. To apply concepts for the design of low frequency Amplifiers
2. To apply concepts for the design of high frequency Amplifiers
3. To analyze the effects of negative feedback on amplifier circuits.
4. To analyze and determine the different oscillator circuits for waveform Generation
5. To apply concept of the operation of various types of power amplifier circuits.
6. To apply concept of Millers Theorem.

UNIT- I

Low frequency transistor, amplifier, graphical analysis of CE Amplifier, h-parameter models for CB, CE, CC configurations and their interrelationship, analysis and comparison of the three configurations, linear analysis of transistor circuits, Miller's Theorem: Cascading, simplified models and calculation of CE and CC Amplifiers, effect of emitter resistance in CE amplifiers, cascade amplifiers, Darlington pair, analysis of single stage FET amplifiers-CS and CD configuration.

UNIT II

High frequency transistor amplifier, CE hybrid pi model, validity and parameter variation, current gain with resistive load, frequency response of a single stage CE amplifier, gain bandwidth product, CC stage high frequencies, multistage amplifier, classification, distortion in amplifiers, frequency response, bode plots, step response, pass band of cascaded stages, response of a two stage RC coupled amplifier at low and high frequencies, sources of noise in transistor circuits, noise figure.

UNIT III

Feedback Amplifiers: Classification, feedback concept, ideal feedback amplifier, properties of negative feedback amplifier topologies: method of analysis of feedback amplifier, voltage series feedback, voltage series feedback pair, current series, current shunt, voltage shunt feedback, effect of feedback on amplifier bandwidth and stability.

UNIT IV

Large Signal/power amplifier, classification, large signal amplifier characteristics, class A amplifiers, class A amplifier with direct coupled resistive load, transformer coupled class A amplifier, class A push pull amplifiers, class B amplifiers, transformer coupled push pull class B amplifier, complementary symmetry push pull class B amplifier, class AB amplifier, class C amplifier, Harmonic Distortion, Push Pull Amplifiers, Cross over Distortion.

UNIT V

Oscillator: Sinusoidal oscillator, phase shift oscillator, Wien bridge oscillator, Resonant circuit oscillator, LC Colpitt, LC Hartley, Amplitude, Frequency, and phase stability analysis of all oscillators. General form of oscillator configuration, crystal oscillator, tuned Amplifiers, classification of tuned

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT203TPC01	3	0	4	3 HOURS	30	70	3

DATA STURCTURE & ALGORITHMS

Course Objective

- CO1 - To impart the basic concepts of data structures and algorithms and understand concepts about searching and sorting techniques.
- CO2 - To understand basic concepts about Linked lists and master the implementation of linked data structures.
- CO3 - To understand basic concepts about stacks and queues.
- CO4 - To understand basic concepts about Tree.
- CO5 - To understand basic concepts about Graph and be familiar with some graph algorithms such as shortest path and minimum spanning tree.

Course Outcome

Upon completion of this course, the students will be able to

- Student will be able to choose appropriate data structure as applied to specified problem definition.
- Student will be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
- Students will be able to apply concepts learned in various domains like DBMS, compiler construction etc.
- Students will be able to use linear and non-linear data structures like stacks, queues, linked list etc.

UNIT- I

Introduction: Basic Terminology, Definition of Data Structure, Types of Data Structure, Operation on Data Structure, **Arrays:** Array Definition, Representation of Arrays: Row Major Order, and Column Major Order.

Searching and Sorting: Selection Sort, Insertion Sort, Bubble Sort, Quick Sort, Merge Sort, Binary Search, Linear Search.

UNIT II

Linked lists: Definition, Representation and Implementation of Singly Linked Lists, Traversing and Searching of Linked List, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, Doubly Linked List, Circularly Linked List.

UNIT III

Stacks: Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack.,

Queue: Array and linked representation of queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Deques.

UNIT IV

Trees: Basic Technology , Binary Tree , Binary tree representation , Algebraic Expressions , Complete Binary Tree, Extended Binary Tree, Full Binary Tree, Array and linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees, Binary search trees (BST), Insertion and deletion in BST, AVL trees, Heap and heap sort.

UNIT V

Graph: Terminology & Representations, Graphs & Multi-graphs, Directed Graphs, Weighted Graph, Sequential Representations of Graphs, Adjacency Matrices, Adjacency List, Path Matrices, Linked Representations of Graphs, Graph Traversal - DFS, BFS, Shortest Path algorithm: Warshal Algorithm and Dijikstra Algorithm, Spanning Trees, Minimum Cost Spanning Trees: Prims and Kruskal algorithm.

References books:

1. Lipschutz, "Data Structures with C" Schaum's Outline Series, TMH.
2. Horowitz and Sahani, "Fundamentals of data Structures", Galgotia Publication Pvt. Ltd.
3. R. Kruse etal, "Data Structures and Program Design in C", Pearson Education Asia.
4. A. M. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd.
5. K Loudon, "Mastering Algorithms with C", Shroff Publisher & Distributors Pvt. Ltd.
6. Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGraw Hill.
7. G A V Pai, "Data Structures and Algorithms", TMH.
8. G.S.Baluja, "Data Structures through C", Dhanpat Rai & Co.
9. Yashavant Kanetkar, "Data Structure Through C", BPB Publication.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT203TPC02	3	0	0	3 HOURS	30	70	3

DIGITAL ELECTRONICS

Course Objectives:

1. To understand the basic knowledge of digital logic and components.
2. Design of combinational circuits and sequential circuits.
3. Application of knowledge to understand digital electronics circuits.
4. To impart how to design Digital Circuits.

Course Outcome (COs):

At the end of this course, students will demonstrate the ability to

- Convert different type of codes and number systems which are used in digital communication and computer systems.
- Employ the codes and number systems converting circuits and Compare different types of logic families which are the basic unit of different types of logic gates in the domain of economy, performance and efficiency.
- Analyze different types of digital electronic circuit using various mapping and logical tools and know the techniques to prepare the most simplified circuit using various mapping and mathematical methods.
- Design different types of with and without memory element digital electronic circuits for particular operation, within the realm of economic, performance, efficiency, user friendly and environmental constraints.
- Apply the fundamental knowledge of analog and digital electronics to get different types analog to digitalized signal and vice-versa converters in real world with different changing circumstances.
- Assess the nomenclature and technology in the area of memory devices and apply the memory devices in different types of digital circuits for real world application.

UNIT 1 - Fundamentals of Digital systems and logic families

Digital signals, digital circuits, AND,OR, NOT, NAND, NOR and Exclusive OR operations, Boolean algebra, examples of IC gates, number systems- binary, signed binary, octal, Hexadecimal number, binary arithmetic, Once's and two's complements, arithmetic codes, error detecting, and correcting codes, characteristics of digital ICs, digital logic families, TTL, schottky TTL and CMOS logic , interfacing CMOS and TTL, Tri-state logic.

UNIT 2 - Combinational Digital Circuits

Standard representation for logic function, K map representation, simplification of logic functions, using K map, minimization of logical functions. Don't care conditions, Multiplexes, De- Multiplexes, / Decoders, Adders, Sub tractors, BCD arithmetic, carry look ahead, serial adders , ALU , elementary ALU design, popular MSI chips , digital comparator , parity checker, / generator, code converters, priority encoders, decoders/ drivers, for display devices. Q-M method of function realization.

UNIT 3 - Sequential circuits and systems

A 1 bit memory, the circuits properties, of Bi-stable latch, the clocked SR flip flop, JK flip flops, T flip flops, D flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counter's design using flip flops, special counter IC's, Asynchronous sequential counters, applications of counters.

UNIT 4 – A/D and D/A converters

Digital to analog converters: weighted registers/ converters, R-2R Ladder, D/A converters, specifications for D /A converters, examples of D /A converter ICs, sample and hold circuits, Analog to digital converters: quantization and encoding, parallel comparator, A/D converter, successive approximation A/D converter, counting A/D converter, dual slop A / D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs.

UNIT 5 - Semiconductor memories and Programmable logic devices

Memory organization and operation, expanding memory size, classification and characteristics of memories, Sequential memories, read-only memory(ROM), read and write memory (RAM), content addressable memory (CAM) , charge coupled device memory (CCD) , commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS) , Field Programmable Gate Array (GPGA).

Text / References:

1. M M Mano, "Digital logic and Computer design", Pearson Education India.
2. R P. Jain, " Modern Digital Electronics" , McGraw Hill Education.
3. A kumar, "Fundamentals of Digital Circuits ", Prentice Hall India.
4. S Salivahanan and S Arivazhagan " Digital Circuits and Design" OXFORD University Press.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT203TBS05	3	1	0	4 HOURS	30	70	4

Course Objective

1. To provide knowledge of various methods for numerical solutions of algebraic and transcendental equations, simultaneous equation and ordinary differential equations.

2. To provide a thorough understanding of interpolation and numerical differentiation and integration.

Mathematics - III

UNIT- I Introduction of Errors and their Analysis, types of errors, numerical problems on error analysis, curve fitting: method of least squares, fitting of exponential curves $y = ae^{bx}$ fitting of the curve $y = ab^x$, fitting of the curve $y = ax^b$. Method or moments

UNIT- II Numerical Solution of Algebraic and Transcendental Equations: Graphical method bisection Method, Secant Method, Regula-falsi Method, Newton Raphson Method, Solution of a system of simultaneous linear algebraic Equations Direct methods: Gauss elimination Method, Gauss Jordan method. Iterative methods. Jacobi Iterative Method, Gauss Seidel Iterative method.

UNIT- III The Calculus of Finite Differences: Finite differences, Difference formula, operators and relation between operators, Inverse Operator, Interpolation with equal intervals: - Newton's forward and backward interpolation formula, Interpolation with Unequal intervals: - Lagrange's interpolation Newton's difference formula, inverse interpolation.

UNIT- IV Numerical Differentiation and Integration: - Numerical Differentiation Newton's forward and Backward difference interpolation form ul a. Maxirnn and Minima of aTabulated function, Numerical Integration :-Trapezoidal rule, simpson's (1/3) rd and (3/8) th rule, Boole's rule, weddle rule.
Difference Equations: Definition, order and degree of a difference equation, Linear difference equations, Difference equations reducible to Linear form, simultaneous difference equations with constant coefficients.

UNIT- V Numerical solution of ordinary differential equation: Taylor series meth od, Euler's method, Modified Euler method Runge's method Runge-Kutta method, numerical method for solution of partial differential equations. General linear partial differential equation. Laplace equation and Poisson equation.

Text Books:

1. JAIN & IYNGAR Numerical Methods for Scientific and Engineering Computations.
2. RAO G.S. Numerical Anlysis.
3. Grewal B S Numerical Methods In Engineering and Science.
4. Das K K Advance Engineering Methods.

Reference Books:

5. Rajaraman V Computer Oriented Numerical Methods
6. P. Kandasamy K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
7. S.S. Sastry, Introduction methods of Numerical Analysis, PHI, 4th Edition, 2005.
8. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT203TPC03	3	1	0	3 HOURS	30	70	4

Object Oriented Programming

Course Objectives:

1. To understand and Practice Programming Construct: Variable, Operators, Control Structures, Loop, Functions, learn the concept of class and object and develop classes for simple applications with C++.
2. To learn how to implement Constructors, copy constructors and destructor functions.
3. To learn how to overload functions and operators in C++.
4. To learn how to design C++ classes for code reuse and perform inheritance.
5. To learn working with files and handle exceptions in program.

UNIT I

Overview of C++ : Object oriented programming, Concepts, Advantages, Usage. C++ Environment: Program development environment, the language and the C++ language standards. Introduction to various C++ compilers, C++ standard libraries, Prototype of main() function, Data types. C++ as a superset of C, New style comments, main function in C++, meaning of empty argument list, function prototyping, default arguments and argument matching.

User defined data types: enumerated types, use of tag names, anonymous unions, scope of tag names Classes & Objects : Classes, Structure & Classes, Inline Function, Scope Resolution operator, Static Class Members: Static Data Member, Static Member Function, Passing Objects to Function, Returning Objects, Object Assignment. Friend Function, Friend Classes

UNIT II

Array, Pointers References & The Dynamic Allocation Operators: Array of Objects, Pointers to Object, Type Checking C++ Pointers, The This Pointer, Pointer to Derived Types, Pointer to Class Members, References: Reference Parameter, call by reference and return by reference Passing References to Objects, Returning Reference, Independent Reference, C++'S Dynamic Allocation Operators, Initializing Allocated Memory, Allocating Array, Allocating Objects.

Constructor & Destructor: Introduction, Constructor, access specifies for constructors, and instantiation, Parameterized Constructor, Multiple Constructor in A Class, Constructor with Default Argument, Copy Constructor, Destructor.

UNIT III

Overloading as polymorphism: Function & Operator Overloading : Function Overloading, Overloading Constructor Function Finding the Address of an Overloaded Function, Operator Overloading: Creating A Member Operator Function, Creating Prefix & Postfix Forms of the Increment & Decrement Operation, Overloading The Shorthand Operation (i.e., +=, -= etc), Operator Overloading Restrictions, Operator Overloading Using Friend Function, Overloading Some Special Operators like [ ], ( ), -, Comma Operator, Overloading << etc.

UNIT IV

Inheritance : Base Class Access Control, Inheritance & Protected Members, Protected Base Class Inheritance, Inheriting Multiple Base Classes, Constructors, Destructors & Inheritance, When

Constructor & Destructor Function are Executed, Passing Parameters to Base Class Constructors, Granting Access, Virtual Base Classes.

Virtual Functions & Polymorphism: Virtual Function, Pure Virtual Functions, Early Vs. Late Binding.

UNIT V

Working with files: File & stream, Opening and closing a file, read ( ) and write ( ) functions, detecting end of file.

Templates and Exception Handling: Exception handling in C++, try, throw, catch sequence, multiple catch blocks, uncaught exceptions, catch-all exception handler

Course Outcomes:-

1. Understand the C++ language features. Use the control structure and data types in C++. Write simple programs using classes and objects.
2. Understand the concepts of arrays, pointers, references and use of dynamic allocation operators. Write simple programs to implement Constructor & destructor concepts.
3. Understand the concept of Operator overloading and type conversion.
4. Understand the concepts of inheritance and virtual functions.
5. Understand file handling concepts, generic class and I/O exception handling.

Reference Books:

Object Oriented Programming with C++ by M. P. Bhave, S. A. Patekar, Pearson Education

Object Oriented Programming With C++ by E. Balaguruswamy.

Object Oriented Programming in turbo C++ by Robert Lafore.

Programming with C++ by D. Ravichandan.

Programming with C++ (SOS) by Hubbard.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT204TPC01	3	1	0	4 HOURS	30	70	4

Course Objective

1. To introduce a number of discrete mathematical structures found to be serving as tools in the development of theoretical computer science.
2. Course focuses on how discrete structures actually helped computer engineers to solve problems occurred in the development of programming languages.
3. Course highlights the importance of discrete structures towards simulation of a problem in computer science engineering.

Discrete Mathematics

Unit 1:

Sets, Relation and Function: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Bijective functions, Inverse and Compo site Function, Size of a Set, Finite and infinite Set s, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.

Unit 2:

Basic counting technique s-inclusion and exclusion, pigeon-hole principle, permutation and combination. Principle of Mathematical Induction, The Well -Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor, Euclidean Algorithm, The Fundamental
Theorem of Arithmetic.

Unit 3:

Propositional Logic: Basic Connectives and Truth Tables, Logical Equivalence, The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers.

Proof Techniques: Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.

Unit 4:

Algebraic Structures and Morphism: Algebraic Structures with one Binary Operation, Semi Groups, **Monoids, Groups, Congruence** Relation and Quotient Structures, Free and Cyclic Monoids and Groups, **Permutation Groups, Substructures,** Normal Subgroups, Algebraic Structures with two Binary Operation, **Rings, Integral Domain and** Fields, Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, **Duality, Representation** of Boolean Function, Disjunctive and Conjunctive Normal Form

Unit 5:

Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, **Isomorphism, Eulerian and** Hamiltonian Walks, Graph Colouring, Colouring maps and Planar Graphs, **Four colour conjecture, trees** and rooted trees, binary trees.

Text books:

1. **Kenneth H. Rosen, Discrete** Mathematics and its Applications, Tata McGraw - Hill
2. **Susanna S. Epp, Discrete** Mathematics with Applications, 4th edition, Wadsworth Publishing Co. Inc.
3. **C L Liu and D P Mahapatra,** Elements of Discrete Mathematics A Comput er Oriented App roach, 3rd **Edition by, Tata McGraw - Hill.**

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT204TPC02	3	0	0	3 hours	30	70	3

COMPUTER ORGANIZATION & ARCHITECTURE

Course Objectives:

CO1: Conceptualize the basics of organizational and architectural,
CO2: Learn about various basic arithmetic operation
CO3: Learn about various control unit design and Input-output subsystems
CO4: Understand the basics pipeline.
CO5: Understand the basics Memory organization and their basic working.

UNIT 1

Functional blocks of a computer: CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU – registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Case study – instruction sets of some common CPUs.

UNIT 2

Data representation: signed number representation, fixed and floating point representations, character representation. Computer arithmetic – integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication – shift-and add, Booth multiplier, carry save multiplier, etc. Division restoring and non-restoring techniques, floating point arithmetic.

UNIT 3

Introduction to x86 architecture. CPU control unit design: hardwired and micro-programmed design approaches, Case study – design of a simple hypothetical CPU. Memory system design: semiconductor memory technologies, memory organization. Peripheral devices and their characteristics: Input-output subsystems, I/O device interface, I/O transfers – program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes – role of interrupts in process state transitions, I/O device interfaces – SCII, USB

UNIT 4

Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards. Parallel Processors: Introduction to parallel processors, Concurrent access to memory and cache coherency.

UNIT 5

Memory organization: Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies.

Suggested books:

1. "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
2. "Computer Organization and Embedded Systems", 6th Edition by Carl Hamacher, McGraw Hill Higher Education.

Suggested reference books:

1. "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill
2. "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.
3. "Computer System Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.

Course Outcomes:

After the course the students are expected to be able to

1: Demonstrate computer organization and architecture concepts of a computer system
2: Describe the Computer arithmetic operation algorithm and hardware
3: Understand the basics of hardwired and micro-programmed control of the CPU, Memory, I/O system
4: Describe fundamentals concepts of pipeline and issues
5: Describe the memory hierarchy and related function,

Aradhana Soni

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT204TPC03	3	0	4	3 hours	30	70	3

OPERATING SYSTEMS

Objectives of the course

1. To learn the fundamentals of Operating Systems.
2. To learn the mechanisms of OS to handle processes and threads and their communication
3. To learn the mechanisms involved in memory management in contemporary OS
4. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
5. To know the components and management aspects of concurrency management

UNIT I - INTRODUCTION TO OPERATING SYSTEM:

Objective and function of operating system. The evaluation of the operating system, system components operating system services, system structure, batch interactive, time sharing and real time operating system, Protection. File system: File concepts, file organization and access mechanism.

UNIT II - CONCURRENT PROCESS:

Process concepts, principal of concurrency. The producer consumer problem, the critical section problem , semaphore, classical problem in concurrency , inter process communication , process generation , process scheduling .

UNIT III - CPU SCHEDULING:

Scheduling concepts, performance criteria scheduling algorithms. Algorithm evaluation, multiprocessor scheduling. I/O management and Disk scheduling I/O devices and organization of the I/O functions. I/O buffering disk I/O operating system design issues.

UNIT IV - DEAD LOCKS:

System models, deadlock characterization, prevention, avoidance and detection recovery from deadlock, combined approach.

UNIT V - MEMORY MANAGEMENT:

Base machine , Residence monitor , multiprogramming with fixed partition , multiprogramming with variable partitions, multiple base register, paging, segmentation, paging segmentation, virtual memory concepts , demand paging performance , page replacement algorithms, allocation of frames, thrashing , cache memory organization impact on performance .

Aradhana Soni

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT204TPC04	3	0	0	3 hours	30	70	3

DESIGN & ANALYSIS OF ALGORITHMS

Course Objectives

1. To develop proficiency in problem solving and programming.
2. To be able to carry out the Analysis of various Algorithms for mainly Time and Space Complexity.
3. To get a good understanding of applications of Data Structures.
4. To develop a base for advanced study in Computer Science.
5. To teach various advanced design and analysis techniques such as greedy algorithms, dynamic programming & Know the concepts of tractable and intractable problems and the classes P, NP and NP-complete problems.

Unit 1:
Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

Unit 2:
Fundamental Algorithmic Strategies: Brute-Force, Greedy, Dynamic Programming, Branchand-Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving , Bin Packing, Knap Sack TSP. Heuristics – characteristics and their application domains.

Unit 3:
Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

Unit 4:
Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques.

Unit 5:
Advanced Topics: Approximation algorithms, Randomized algorithms, Class of problems beyond NP – P SPACE

Suggested books:

1. Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L. Rivest and Clifford Stein, MIT Press/McGraw-Hill.

2. Fundamentals of Algorithms – E. Horowitz et al.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT204THS02	3	0	0	3 hours	30	70	3

MANAGEMENT PROCESS AND ORGANIZATIONAL BEHAVIOUR

Course Objectives:

1. To help the students to develop cognizance of the importance of Management processes.
2. To enable students to describe how people behave under different conditions and understand why people behave as they do.
3. To provide the students to analyse specific strategic human resources demands for future action.
4. To enable students to synthesize related information and evaluate options for the most logical and optimal solution such that they would be able to predict and control management processes, human behaviour and improve results.

Course Outcomes (Cos):

On completion of this course, the students will be able to

1. To understand the concept of Management.
2. Demonstrate the applicability of the concept of Management processes to understand the functioning of the organization.
3. Demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization.
4. Analyze the complexities associated with management of the group behavior in the organization.
5. Demonstrate the applicability to manage the organization.

UNIT -I

School of Management Thought: Evolution of Management thought, Systems and Contingency approach of management, Decision Theory School.

UNIT -II

Managerial processes, functions, skills and roles in an organization. Nature, process and technique of planning, Organizing, Staffing, Directing, Coordinating, Control.

UNIT -III

Organizational Behavior: Concept, Significance, Understanding and Managing individual behavior – Personality, Perceptions, Values, Attitudes, Learning, Work-motivation, Individual Decision Making and Problem solving.

UNIT -IV

Understanding and Managing Group Processes: Interpersonal and Group dynamics. Applications of emotional intelligence in organizations. Group decision making. Leadership and Influence Process : Concept, styles and Theories.

UNIT – V

Understanding and Managing Organizational Systems. Organizational Conflict — sources, pattern levels and types of conflict. Organizational design and structure. Work stress.

Suggested Readings

1. Koontz, Harold, Cyril O'Donnell, and Heinz, Whelrich. Essentials of Management. New Delhi: Tata Mc Graw Hill.
2. Robbins, S.P. Organizational Behaviour. New Delhi: PHI.
3. Luthans, F. Organisational Behaviour. NewYork: Mc Graw Hill.

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
THIRD YEAR, INFORMATION TECHNOLOGY
SEMESTER V
EFFECTIVE FROM SESSION 2020-21

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT05TES01	SIGNALS & SYSTEMS	3	0	0	30	70	100	3
2	IT05TPC01	DATABASE MANAGEMENT SYSTEMS	3	0	0	30	70	100	3
3	IT05TPC02	FORMAL LANGUAGE & AUTOMATA THEORY	3	0	0	30	70	100	3
4	IT05TPC03	OBJECT ORIENTED PROGRAMMING	3	1	0	30	70	100	4
5	IT05TPE1X	ELECTIVE – I	3	0	0	30	70	100	3
PRACTICAL									
1	IT05PPC01	DATABASE MANAGEMENT SYSTEMS LAB	0	0	4	30	20	50	2
2	IT05PPC02	OBJECT ORIENTED PROGRAMMING LAB	0	0	4	30	20	50	2
3	IT05PMC01	CONSTITUTION OF INDIA/ ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	-	-	2	-	-	-	0
TOTAL CREDITS									**20**

IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL

LIST OF ELECTIVE-I

1	IT05TPE11	SOFTWARE ENGINEERING
2	IT05TPE12	REAL TIME SYSTEM
3.	IT05TPE13	CYBER LAW & ETHICS
4.	IT05TPE14	EMBEDDED SYSTEMS

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SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
THIRD YEAR, INFORMATION TECHNOLOGY
SEMESTER VI
EFFECTIVE FROM SESSION 2020-21

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT06TPC01	COMPILER DESIGN	3	0	0	30	70	100	3
2	IT06TPC02	COMPUTER NETWORKS	3	0	0	30	70	100	3
3	IT06TPE2X	ELECTIVE – II	3	0	0	30	70	100	3
4	IT06TPE3X	ELECTIVE – III	3	0	0	30	70	100	3
5	IT06TOE11	OPEN ELECTIVE - I	3	0	0	30	70	100	3
PRACTICAL									
1	IT06PPC01	COMPUTER NETWORKS	0	0	4	30	20	50	2
2		ELECTIVE – II LAB	0	0	4	30	20	50	2
3	IT06PPR11	PROJECT - I	0	0	6	30	20	50	3
TOTAL CREDITS									22

IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL

LIST OF ELECTIVE – II

1.	IT06TPE21	MICROPROCESSOR & INTERFACING
2.	IT06TPE22	WEB TECHNOLOGY & E-COMMERCE
3.	IT06TPE23	QUEUING THEORY & MODELING
4.	IT06TPE24	IMAGE PROCESSING

LIST OF ELECTIVE – II (LAB)

1.	IT06PPE21	MICROPROCESSOR & INTERFACING
2.	IT06PPE22	WEB TECHNOLOGY & E-COMMERCE
3.	IT06PPE23	QUEUING THEORY & MODELING
4.	IT06PPE24	IMAGE PROCESSING

LIST OF ELECTIVE-III

1.	IT06TPE31	GRID & CLOUD COMPUTING
2.	IT06TPE32	MULTIMEDIA SYSTEM DESIGN
3.	IT06TPE33	SPEECH & NATURAL LANGUAGE PROCESSING
4.	IT06TPE34	GRAPH THEORY

LIST OF OPEN ELECTIVE-I

1.	IT06TOE11	COMPUTER GRAPHICS
2.	IT06TOE12	WIRELESS & MOBILE COMMUNICATION
3.	IT06TOE13	DISTRIBUTED SYSTEM
4.	IT06TOE14	BIOMETRICS

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT05TES01	3	0	0	3 HOURS	30	70	3

SIGNALS & SYSTEM

UNIT – I Signals & Systems: Classification of Signals, Energy and Power Signals, Classification of systems, Properties of systems – Linearity: additivity and homogeneity, Shift-invariance, Causality, Stability. Time domain Analysis of Discrete time and Continuous time System – Impulse Response, Step Response and Convolution, Properties of Convolution, system representation of differential and difference equation.

UNIT – II Analysis of Continuous & Discrete time Signals: Fourier series Representation, Continuous Time Fourier Transform (CTFT), Magnitude & Phase response, Properties of CTFT, System Analysis with Fourier Transform.

Discrete-Time Fourier Transform (DTFT), Properties of DTFT, Frequency response of discrete time LTI systems. Discrete Fourier Transform (DFT)

UNIT – III Review of Laplace transform: Laplace transforms, Laplace transforms of common signals, Properties of Laplace transforms, Inverse Laplace transforms, Region of Convergence, Poles and Zeros of the system, Laplace domain analysis of continuous time systems, solution to differential equations & system behavior.

UNIT – IV Z-Transform: Z-transforms of common sequences, Properties of Z-transforms, Region of Convergence, Inverse Z-transforms, Analysis of discrete time systems using Z-transforms.

UNIT – V State space Analysis: State Space analysis and multi-input multi-output representation, State Transition Matrix (STM) and its role. The Sampling theorem and its implications- Spectra of sampled signals, Reconstruction: Ideal interpolator, zero order hold, first order hold, Aliasing & its effect.

Text Books

1. Signal & System, A V Oppenheim, PHI
2. Signal & System, P Ramesh Babu, Scitech Publication
3. Signal & System, F Hussain, Umesh Publication
4. Discrete Time Signal Processing, A V Oppenheim, Pearson Education

Reference Books

5. Signals and Systems, by Simon Haykin and Barry Van Veen. Wiley, 1999.
6. Schaum's Outline of Signals and Systems – H Hsu, TMH.
7. Signal & System, Samarjit Ghosh, TMH.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT05TPC01	3	0	0	3 HOURS	30	70	3

Database Management Systems

Unit 1: Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). Data models: Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.

Unit 2: Relational query languages: Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server. Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design. Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

Unit 3: Storage strategies: Indices, B-trees, hashing. Transaction processing: Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.

Unit 4: Database Security: Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.

Unit 5: Advanced topics: Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.

Text books:

1. "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.

Reference books

1 "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.

2 "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education

3 "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT05TPC02	3	0	0	3 HOURS	30	70	3

Formal Language & Automata Theory

Unit-I Automata: Basic machine, FSM, Transition graph, Transition matrix, Deterministic and nondeterministic FSM'S, Equivalence of DFA and NDFA, Mealy & Moore machines, minimization of finite automata, Two-way finite automata, Regular Sets and Regular Grammars: Alphabet, words, Operations, Regular sets, Finite automata and regular expression, MyhillNerode theorem Pumping lemma and regular sets, Application of pumping lemma, closure properties of regular sets.

Unit-II Context –Free Grammars: Introduction to CFG, Regular Grammars, Derivation trees and Ambiguity, Simplification of Context free grammars, Normal Forms (Chomsky Normal Form and Greibach Normal forms).

Unit-III Pushdown Automata: Definition of PDA, Deterministic Pushdown Automata, PDA corresponding to given CFG, CFG corresponding to a given PDA. Context Free Languages: The pumping lemma for CFL's, Closure properties of CFL's, Decision problems involving CFL's.

Unit-IV Turing Machines: Introduction, TM model, representation and languages acceptability of TM Design of TM,Universal TM & Other modification, Church's hypothesis, composite & iterated TM. Turing machine as enumerators.Properties of recursive & recursively enumerable languages,Universal Turing machine

Unit V Tractable and Untractable Problems: P, NP, NP complete and NP hard problems, examples of these problems like satisfiability problems, vertex cover problem, Hamiltonian path problem, traveling sales man problem, Partition problem etc.

Text books

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education Asia.
2. Peter Linz, An Introduction to Formal Languages and Automata, Viva Publisher.

Reference books:

1. Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory of Computation, Pearson Education Asia.
2. Dexter C. Kozen, Automata and Computability, Undergraduate Texts in Computer Science, Springer.
3. Michael Sipser, Introduction to the Theory of Computation, PWS Publishing.
4. John Martin, Introduction to Languages and The Theory of Computation, Tata McGraw Hill.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT05TPC03	3	1	0	3 HOURS	30	70	4

OBJECT ORIENTED PROGRAMMING

UNIT I

Overview of C++ : Object oriented programming, Concepts, Advantages, Usage. C++ Environment: Program development environment, the language and the C++ language standards. Introduction to various C++ compilers, C++ standard libraries, Prototype of main() function, Data types. C++ as a superset of C, New style comments, main function in C++, meaning of empty argument list, function prototyping, default arguments and argument matching.

User defined data types: enumerated types, use of tag names, anonymous unions, scope of tag names Classes & Objects : Classes, Structure & Classes, Inline Function, Scope Resolution operator, Static Class Members: Static Data Member, Static Member Function, Passing Objects to Function, Returning Objects, Object Assignment. Friend Function, Friend Classes

UNIT II

Array, Pointers References & The Dynamic Allocation Operators: Array of Objects, Pointers to Object, Type Checking C++ Pointers, The This Pointer, Pointer to Derived Types, Pointer to Class Members, References: Reference Parameter, call by reference and return by reference Passing References to Objects, Returning Reference, Independent Reference, C++'S Dynamic Allocation Operators, Initializing Allocated Memory, Allocating Array, Allocating Objects.

Constructor &Destructor : Introduction, Constructor, access specifiers for constructors, and instantiation, Parameterized Constructor, Multiple Constructor in A Class, Constructor with Default Argument, Copy Constructor, Destructor.

UNIT III

Overloading as polymorphism: Function & Operator Overloading : Function Overloading, Overloading Constructor Function Finding the Address of an Overloaded Function, Operator Overloading: Creating A Member Operator Function, Creating Prefix & Postfix Forms of the Increment & Decrement Operation, Overloading The Shorthand Operation (i.e., +=, -= etc), Operator Overloading Restrictions, Operator Overloading Using Friend Function, Overloading Some Special Operators like [ ], ( ), -, Comma Operator, Overloading << etc.

UNIT IV

Inheritance : Base Class Access Control, Inheritance & Protected Members, Protected Base Class Inheritance, Inheriting Multiple Base Classes, Constructors, Destructors & Inheritance, When Constructor & Destructor Function are Executed, Passing Parameters to Base Class Constructors, Granting Access, Virtual Base Classes .

Virtual Functions &Polymorphism : Virtual Function, Pure Virtual Functions, Early Vs. Late Binding.

UNIT V

Working with files: File & stream, Opening and closing a file, read ( ) and write ( ) functions, detecting end of file.

Templates and Exception Handling: Exception handling in C++, try, throw, catch sequence, multiple catch blocks, uncaught exceptions, catch-all exception handler

Text Books :

Object Oriented Programming With C++ by M. P. Bhave, S. A. Patekar, Pearson Education

Object Oriented Programming With C++ by E. Balaguruswamy.

Object Oriented Programming in turbo C++ by Robert Lafore.

Reference Books :

Programming with C++ by D. Ravichandan.

Programming with C++(SOS) by Hubbard.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT05TPE11	3	0	0	3 HOURS	30	70	3

SOFTWARE ENGINEERING

UNIT I Software Engineering – What is software, Characteristics of software, Application of software, Software Development Life Cycle, Software Process Models - Linear Sequential model, Prototype model, RAD model, Incremental model, Component Based Development Model, Fourth Generation Techniques.

UNIT II . Software Requirement Specification-Problem Analysis, Requirement Specification, Validation, metrics, monitoring and control.

UNIT III System Design - Problem portioning, abstraction, top-down and bottom-up design, Structured approach, Coupling and Cohesion,Functional versus Object oriented approach, design specification and verification, metrics.

UNIT IV Coding: Top–down and bottom-up structured programming, information hiding, programming style, internal documentation,verification. Metrics, Monitoring and Control

UNIT V Software testing – Software Testing fundamentals, Black Box Testing, White box testing, Basics path testing, A strategic Issues, Types of Testing-Unit testing, Integration testing, validation testing, System Testingsoftware metrics, software evaluation, software maintenance & reliability.

Text Books:

1. Software Engg, Pressmen
2. Software Engg, Pankaj Jalote

Reference Books:

3. Software Engg, Shaum's Outline Series
4. Fundamentals of Software Engineering, Rajib Mal.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT05TPE14	3	0	0	3 HOURS	30	70	3

EMBEDDED SYSTEMS

UNIT 1: Introduction of Embedded systems

An Embedded system, processor in system, Hardware units, Software embedded in systems, Exemplary Embedded systems, Embedded Systems-On-Chip(SOC) and VLSI circuit.

UNIT 2: Processor and memory Organization Structural units in a Processor, Processor selection for an embedded system, memory devices, memory selection for an embedded system, allocation of memory to programme segments and blocks and memory map of a system, direct memory access, Interfacing Processor, memories and I/O devices.

UNIT 3: Devices and Buses for Device Network

I/O devices, Timer and counting devices, Serial communication using 'I²-C', 'CAN' and advanced I/O buses, between the networked multiple devices, Host system or computer parallel communication between the networked I/O multiple devices using the ISA,PCI, PCI-X and advanced buses.

UNIT 4: Devices Derivers and Interrupts Service Mechanism

Device drivers, parallel port device drivers in a system, serial port device drivers in a system, Device drivers for Internal programmable timing devices, Interrupt Servicing (Handling) Mechanism, context and periods for context-switching, deadline and interrupt latency.

UNIT 5: Hardware-Software Co-design in an Embedded System

Embedded System project management, Embedded System design and co-design issues in system development process, design cycle in the development phase for an embedded system, uses of target systems or its emulator and in-circuit emulator (ICE), use of software tools for development for an embedded system, use of scopes and logic analysers for system hardware tests, Issues in embedded system design.

Text Book

1. Embedded Systems (Architecture, programming and design) by Raj Kamal ,Tata McGraw-Hill Publishing Company Limited.

Reference Book

2. Embedded systems design by RajeshwarSingh ,Dhanpat Rai publications.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TPC01	3	0	0	3 HOURS	30	70	3

Complier Design

UNIT 1: Introduction: Phases of compilation and overview. Lexical Analysis (scanner): Regular languages, finite automata, regular expressions, from regular expressions to finite automata, scanner generator (lex, flex).

UNIT 2: Syntax Analysis (Parser): Context-free languages and grammars, push-down automata, LL(1) gram-mars and top-down parsing, operator grammars, LR(O), SLR(1), LR(1), LALR(1) grammars and bottom-up parsing, ambiguity and LR parsing, LALR(1) parser generator (yacc, bison)Semantic Analysis: Attribute grammars, syntax directed definition, evaluation and flow of attribute in a syntax tree.

UNIT 3: Symbol Table: Its structure, symbol attributes and management. Run-time environment: Procedure activation, parameter passing, value return, memory allocation, and scope.

UNIT 4: Intermediate Code Generation: Translation of different language features, different types of intermediate forms. Code Improvement (optimization): Analysis: control-flow, data-flow dependence etc.; Code improvement local optimization, global optimization, loop optimization, peep-hole optimization etc.

UNIT 5: Architecture dependent code improvement: instruction scheduling (for pipeline), loop optimization (for cache memory) etc. Register allocation and target code generation Advanced topics: Type systems, data abstraction, compilation of Object Oriented features and non-imperative programming languages.

Text Books:

1. A.V.Aho, Ravi Sethi, J.D.Ullman, Compilers tools and Techniques, Addison Wesley,

2. D.M.Dhamdhere, Compiler Construction-Principles and practice Macmillan, India.

Reference Books:

3. Tremblay J.P. and Sorenson, P.G. the theory and practice of compiler writing, Mc Graw Hil,

4. Waite W.N. and Goos G., Compiler construction' springer verlag

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TPC02	3	0	4	3 HOURS	30	70	3

Computer Networks

UNIT I - Introduction: OSI and TCP/IP Reference models, Function of layers, Network Topologies, Categories of Network - LAN, WAN, MAN, Line Configuration, Transmission Modes, Networking Devices.

UNIT II - Data link layer: Design issues, framing, error detection and correction, CRC, Hamming Code Method, Elementary Protocol- stop and wait, Sliding Window, HDLC, Ethernet, CSMA/CD.

UNIT III - Network Layer: Design Issues, Forwarding and Routing, Virtual Circuit and Datagram Networks, shortest path routing – Dijkstra's algorithms, Link State Routing, Distance Vector Routing, Internet Protocol (IP), Hierarchical Routing – RIP – OSPF – BGP.

UNIT IV - Transport Layer: Transport Layer Services, Transmission Control Protocol, TCP header, 3 way Handshake, UDP, UDP header, Difference between TCP and UDP, Reliable Data Transfer – Go Back N and Selective Repeat.

UNIT V - Application Layer: Principles of Network Applications, Encryption, Compression, Cryptography: Substitution and Transposition Ciphers, Data functions: translation, Encryption standards (DES), RSA, Email, World Wide Web, file transfer protocol, VoIP, TFTP.

TEXT BOOKS

1. Data Communications and Networking – Behrouz A. Forouzan. TMH.
2. Computer Networks — Andrew S Tanenbaum, Pearson Education/PHI.
3. Data and Computer Communication by William Stalling (Pearson Education).

REFERENCE BOOKS

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.
3. Computer Networking by Ed Tittel (Schaum's series) (TMH).
4. Comer, "Computer Networks and Internets with Internet Applications", Pearson Education.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TOE11	3	0	0	3 HOURS	30	70	3

COMPUTER GRAPHICS

UNIT-I OVERVIEW OF GRAPHICS SYSTEM:

I/O devices, Raster scan & Random scan system, DDA &Bresenhams Line drawing Algorithm,Mid-Point &Bresenhamscircle drawing Algorithm,Midpoint ellipse generating algorithm, Clipping: Sutherland Cohen LineClipping, Polygon clipping: Hodgeman-Sutherland&Weiler-Atherton polygon clipping.2-D & 3-D Transformation.

UNIT-II CURVES &SURFACES:

Conics-Parametric forms for circle, ellipse, parabola, Bezier Curves-Need for cubic parametric curves c0, c1, c2 continuity, Generation though Bernstein polynomials, Condition for smooth joining of 2 segments, Convex Hull property, B-Spline Curves: Knot vectors-uniform and open uniform curves, Uniform, Periodic B-splines, Open B-splines, Uniform B-splines, Non-uniformB-splines, Rational B-splines, Beta splines.

UNIT-III PROJECTIONS & HIDDEN SURFACE REMOVAL :

Parallel projection on xy plane (including oblique view), Perspective projection-1, 2 and 3 Vanishing points, Reconstruction of 3-D images. Hidden Surface Removal: Back face removal, Floating Horizon method for curved objects, Z-Buffer or Depth Buffer Algorithm, Painters algorithm (Depth sorting method), Binary space partitioning trees, Scan-line algorithm, Warnock's algorithm.

UNIT-IV SHADING & COLOR ISSUES :

Filled Area Primitives,Illumination model for diffused & specular reflection, Computing reflection vector,Gouraud and Phog Shading, Texture mapping, Bump mapping, Handling shadows, Radiosity: Lambert's Law, Basic element, Modeling transparency, Visualization of data sets, volume rendering, Color issues: Additive, Subtractive primaries,Filled Area Primitives.

UNIT-V FRACTALS &ANIMATION:

Fractals: self-similar fractals-fractal dimension, Generation of Terrain-random midpoint displacement, Self-squaring fractals. SolidModeling: Generation through sweep techniques, Constructive sold geometry, B representations, Octrees, Ray Tracing & their Theory, Animation: In-between using rotation and translation, Procedural animation, Morphing, Motion Control (Key framing).

Text Books:

1. Computer graphics, Hearn and Baker, PHI
2. Computer Graphics, Foley, PE-LPE.

Reference Books:

1. Procedural Elements of Computer graphics, Rogers, McGraw Hill
2. Computer graphics, Harringtons S., McGraw Hill.
3. Computer Graphics, Schoum Series.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TOE12	3	0	0	3 HOURS	30	70	3

WIRELESS & MOBILE COMMUNICATION

UNIT-I INTRODUCTION TO MOBILE & WIRELESS DEVICES:
Mobile and Wireless Devices, Simplified Reference Model: Wireless Transmission, Frequencies for Radio Transmission, Regulations, Technology ; Cellular Systems, Specialized MAC; SDMA; FDMA; TDMA; CDMA.

UNIT-II TELECOMMUNICATION & BROADCAST SYSTEMS GSM:
Satellite Systems, Applications, GEO, LEO, MEO, Routing, Localization, Handover; Broadcast Systems, Cyclic Repetition of Data, Digital Audio Broadcasting.

UNIT-III WIRELESS NETWORKS Wireless LAN:
IEEE 802.11, HIPERLAN, Wireless ATM, Services, Reference Model, Functions, Handover, Location Management, Addressing, QOS.

UNIT-IV MOBILE NETWORK AND TRANSPORT LAYERS:
Mobile Network Layer; Mobile IP, Transport Layer; Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP; Fast Transmit/Fast Recovery, Transmission/Time Out Freezing, Selective Retransmission, Transaction Oriented TCP.

UNIT-V: Mobile Ad Hoc Networks (MANETs)
Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs. Protocols and Tools: Wireless Application Protocol-WAP, Bluetooth and J2ME.

Text Book

1. Mobile Communications – Schiller, Jochen; 2nd Indian Reprint, Pearson Education Asia-Addison Wesley Longman PTE. Ltd.

Reference Books:

1. Mobile Data Wireless LAN Technologies – Dayem, Rifaat A.; Prentice Hall International.
2. The Essential Guide To Wireless Communication Applications – Dornan, A.; 1st Indian Reprint, Pearson Education Asia.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TPE21	3	0	0	3 HOURS	30	70	3

MICROPROCESSOR AND INTERFACE

UNIT 1: Architecture of Microprocessors

Architecture of 8085 Microprocessor.Architecture of 8086 Microprocessor. Signals and pins of 8086 microprocessor

UNIT 2: Assembly Language of 8086

Description of Instructions, Assembly Directives Assembly, Software Programs with Algorithms

UNIT 3: Interfacing with 8086

Interfacing with RAMs, ROMs along with the explanation of timing diagrams.Interfacing with Peripheral ICs like 8255, 8254, 8279, 8259 etc.Architecture of 8087, Interfacing with 8086.

UNIT 4: Architecture of Micro controllers

Architecture of Microcontroller, Family members, Microcontroller Resources, Architecture of 8051 Microcontroller, Internal External memories, Counters &Timers, Synchronous Serial-Cum-Asynchronous Serial Communication USART Interface in Intel 8051, Interrupts.

UNIT 5: Assembly language of 8051

Basic Assembly Language Programming in 8051, 8051 family Microcontrollers Instruction set.

TEXT/REFERENCE BOOKS

1. Advanced Microprocessor and peripherals by K M Bhurchandi and A K Ray, McGraw Hill Education (India).
2. Architecture programming, interfacing and system design by raj kamal ,pearson education.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TPE22	3	0	0	3 HOURS	30	70	3

WEB TECHNOLOGY & E-COMMERCE

UNIT I

Fundamentals of Web, History of the Web, Growth of the Web in post decade, Web function. Security aspects on the web, Computational features encompassing the Web. Working Web Browsers, concepts of search Engines, Searching the Web, Web Servers.

UNIT II

HTML: - Introduction, , content positioning HTML content, Layer object, Handling events using localized scripts, Animating images.HTML List,HTML Table & DHTML. Cascading style sheets.

UNIT III

Active Server Page(ASP) Introduction , Internet Information System , Basic authentication , active server page, asp objects , server objects , file system objects , session ,accessing database with an ASP page, create an ODBC ADO connection object, common methods & Properties events , ADO record set object.

UNIT IV

XML: Introduction, difference between XML & HTML, building application with XML, XML schemas. DTD & XSLT.

UNIT V

Security of E-Commerce transactions, E-Commerce models- B2B, B2C, review of cryptographic tools,authentication,signatures, observers, anonymity, privacy, tractability, key certification, managementetc.EDI, Payment protocols and standards, smart card, e-card, e-wallet technologies, electronic money and electronic payment systems.

Text Books:

1. Minoli and Minoli, Web technology and Commerce, TMH
2. Web Technology, Achyut Godbole, Atul Kahate, TMH
3. Principles of Web Design, Sklar, Cengage
4. Electronic Commerce, Schneider, cengage Learn
5. The E-Business revolution, Daniel Amor, PHI

Reference Books:

6. E-Government, Satyanarayana, PHI
7. E-Commerce, Greenstein, TMH
8. Koisur David : Electronic Commerce, Microsoft
9. Ravi Kalakota : Frontiers of Electronic commerce

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TPE23	3	0	0	3 HOURS	30	70	3

QUEUEING THEORY

UNIT 1 RandomeVariables

Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions.

UNIT 2 Two-Dimentional Random Variables Joint distributions – Marginal and conditional distributions – Covariance – Correlation and & Linear regression – Transformation of random variables.

UNIT 3 Random Processes Classification – Stationary process – Markov process - Poisson process – Discrete parameter Markov chain – Chapman Kolmogorov equations – Limiting distributions.

UNIT 4 Queueing Model MarKovian queues – Birth and Death processes – Single and multiple server queueing models –Little's formula -Queues with finite waiting rooms – Queues with impatient customers : Balkingand reneging.

UNIT 5 Advanced Queueing Models Finite source models – M/G/1 queue – Pollaczekkhinchin formula – M/D/1 and M/E_k/1 asspecial cases – Series queues – Open Jackson networks.

TEXT BOOKS:

1. Ibe. O.C., "Fundamentals of applied Probability and Random Processes", Elsevier, 1st Indian Reprint, 2007
2. Gross. D. and Harris. C.M., "Fundamentals of Queueing Theory", WileyStudent edition,2004.

REFERENCE BOOKS:

1. Robertazzi, "Computer Networks and Systems: Queueing Theory and performance evaluation",Springer, 3RdEdition, 2006.
2. Taha. H.A., "Operations Research", Pearson Education, Asia, 8th Edition, 2007.
3. Trivedi.K.S.,"Probability and Statistics with Reliability, Queueing and Computer Science applications", John Wiley and Sons, 2nd Edition, 2002.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TPE24	3	0	0	3 HOURS	30	70	3

Image processing

Unit 1 Digital Image Fundamentals-Elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels – neighborhood, adjacency, connectivity, distance measures.

Unit 2 Image Enhancements and Filtering-Gray level transformations, histogramequalization and specifications, pixel-domain smoothing filters – linear and order-statistics, pixel-domain sharpening filters – first and second derivative, two-dimensional DFT and its inverse, frequency domain filters – low-pass and high-pass.

Unit 3 Color Image Processing-Color models–RGB, YUV, HSI; Color transformations– formulation, color complements, color slicing, tone and color corrections; Color image smoothing and sharpening; Color Segmentation.

Unit 4 Image Segmentation- Detection of discontinuities, edge linking and boundarydetection, thresholding – global and adaptive, region-based segmentation.

Unit 5 Image Compression-Redundancy–inter-pixel and psycho-visual; Losslesscompression – predictive, entropy; Lossy compression- predictive and transform coding; Discrete Cosine Transform; Still image compression standards – JPEG and JPEG-2000.

Text Books:

1. R.C. Gonzalez and R.E. Woods, Digital Image Processing, Second Edition, Pearson Education 3rd edition 2008
2. Anil Kumar Jain, Fundamentals of Digital Image Processing, Prentice Hall of India.2nd edition 2004

Reference Books:

3. Murat Tekalp , Digital Video Processing" Prentice Hall, 2nd edition 2015

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TPE31	3	0	0	3 HOURS	30	70	3

GRID AND CLOUD COMPUTING

UNIT I

Cloud Computing, Cloud Architecture, Cloud Storage, Advantages and Disadvantages of Cloud Computing, Companies inthe Cloud Today, Cloud Services, Web-Based Application.Ubiquitous computing, On-Demand Computing,Cloud Computing for theCommunity, Collaborating on Group Projects and Events, Cloud Computing for the Corporation.

UNIT II

Infrastructure as a Service: Introduction, Virtualization, Client and Server, Storage, RAID, IBM SAN, Infrastructure creation, Elastic Computing: Amazon Ec2, Computation Services, Case Study.

UNIT III

Platformas a Service: Microsoft AZURE, Google App Engine, Amazon Web Services, IBM Clouds, Software as a Service, IBM Websphere Cast Iron, Case studies.

UNIT IV

MapReduce, GFS, Hadoop, HDFS,Bigdata, business perspectives, IBM InfosphereBiginsight, Analytics of BigData, Infosphere Streams,

UNIT V

Grid Computing: History, Definition, Types, Architecture and GoalsApplications and Challenges of Grid Computing, Providers of Grid Computing. IBM Globus Toolkit, Grid Security Infrastructure, Open Grid Service Architecture.

Text Books:

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work andCollaborate Online, Que Publishing, August 2008.

2. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demandComputing.

Reference Books

3. ViktorsBerstis , Grid Computing : IBM Red Book
4. Understanding Bigdata, by Paul C. Zikopoulos et al. McGrawHill,
5. "Introduction to Grid Computing with Globus", Luis Ferreira et al. IBM Red Books

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TPE32	3	0	0	3 HOURS	30	70	3

MULTIMEDIA SYSTEM

UNIT 1: Introduction to Multimedia System: An overview of multimedia system and media streams architecture and components, synchronization & quality of service (QOS).

UNIT 2: Audio and Speech: Data acquisition, sampling and quantization, human speech, digital model of speech production, analysis and synthesis, psychoacoustics, low bit rate speech compression, MPEG audio compression.

UNIT 3: Images and Video: Image acquisition and representation, bi-level image compression standards: ITU (formerly CCITT) Group III and IV standards, JPEG image compression standards, MPEG, H.264/AVC video compression standards, Transcoding.

UNIT 4: Multimedia Communication: Fundamentals of data communication and networking. Bandwidth requirements of different media, Real time constraints: latency, video data rate, multimedia over LAN and WAN, Multimedia conferencing, video-on-demand broadcasting issues.

UNIT 5: Hypermedia Presentation: Authoring and publishing, Linear and non-linear presentation, Structuring Information, Different approaches of authoring hypermedia documents, Hyper-media data models and standards.

Text Book:

1. Jerry D. Gibson, Toby Berger, Tom Lookabaugh, Dave Lindergh and Richard L. Baker Digital Compression for Multimedia: Principles and Standards Elsevier, 2006.

2. Ralf Steinmetz and Klara Nahrstedt, Multimedia: Computing, Communications, and Application, Prentice Hall, 1995.

Reference Book:

3. Khalid Sayood Introduction to Data Compression 3rd Edition, Elsevier, 2006.

4. Asit Dan and Dinkar Sitaram Multimedia Servers Elsevier, 2006.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TPE33	3	0	0	3 HOURS	30	70	3

Speech and Natural Language Processing

UNIT 1 Sound : Biology of Speech Processing; Place and Manner of Articulation; Word Boundary Detection; Argmax based computations; HMM and Speech Recognition.

UNIT 2 Words and Word Forms : Morphology fundamentals; Morphological Diversity of Indian Languages; Morphology Paradigms; Finite State Machine Based Morphology; Automatic Morphology Learning; Shallow Parsing; Named Entities; Maximum Entropy Models; Random Fields.

UNIT 3 Structures : Theories of Parsing, Parsing Algorithms; Robust and Scalable Parsing on Noisy Text as in Web documents; Hybrid of Rule Based and Probabilistic Parsing; Scope Ambiguity and Attachment Ambiguity resolution.

UNIT 4 Meaning : Lexical Knowledge Networks, Wordnet Theory; Indian Language Wordnets and Multilingual Dictionaries; Semantic Roles; Word Sense Disambiguation; WSD and Multilinguality; Metaphors; Coreferences.

UNIT 5 Applications : Sentiment Analysis; Text Entailment; Robust and Scalable Machine Translation; Question Answering in Multilingual Setting; Cross Lingual Information Retrieval (CLIR).

Text Books

1. Allen, James, Natural Language Understanding, Second Edition, Benjamin/Cumming, 1995.
2. Charniack, Eugene, Statistical Language Learning, MIT Press, 1993.

Reference Books

3. Jurafsky, Dan and Martin, James, Speech and Language Processing, Second Edition, Prentice Hall, 2008.
4. Manning, Christopher and Heinrich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 1999.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TPE34	3	0	0	3 HOURS	30	70	3

Graph Theory

Unit-I Preliminaries:Graphs, isomorphism, subgraphs, matrix representations,degree, operations on graphs, degree sequences.

Connected graphs and shortest paths: Walks, trails, paths, connected graphs, distance, cut-vertices, cut-edges, blocks, weighted graphs, connectivity, Dijkstra's shortest path algorithm, Floyd-Warshall shortest path algorithm

Unit-II Trees: Characterizations, number of trees, minimum spanning trees

Special classes of graphs : Bipartite graphs, line graphs, chordal graphs

Unit-III

Eulerian graphs: Characterization, Fleury's algorithm, chinese-postmanproblem

Hamilton graphs: Necessary conditions and sufficient conditions

Unit-IV

Independent sets, coverings and mathcings: Basic equations, matchings in bipartite graphs, perfect matchings, greedy and approximation algorithms

Vertexcolorings: Chromatic number and cliques, greedy coloring algorithm, coloring of chordal graphs, Brook's theorem

Edgecolorings: Gupta-Vizing theorem, Class-1 graphs and class-2 graphs, equitable edge-coloring.

Unit-V

Planar graphs :Basic concepts, Eulers formula, polyhedrons and planar graphs, charactrizations, planarity testing, 5-color-theorem Directed graphs: Directed graph, underlying graph, outdegree, in-degree, connectivity, orientation, Eulerian directed graphs, Hamilton directed graphs, tournaments

References:

Text Books:

1. J.A. Bondy and U.S.R.Murty: Graph Theory and Applications (Freely downloadable from Bondy's website; Google-Bondy)
2. D.B.West: Introduction to Graph Theory, Prentice-Hall of India/Pearson, 2009 (latest impression)

Reference Books:

1. J.A.Bondy and U.S.R.Murty: Graph Theory, Springer, 2008.
2. R.Diestel: Graph Theory, Springer(low price edition) 2000.

SCHEME FOR EXAMINATION									
B.TECH (FOUR YEAR) DEGREE COURSE									
FOURTH YEAR, INFORMATION TECHNOLOGY									
SEMESTER VII									
EFFECTIVE FROM SESSION 2018-19									
SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT7TPC01	INTERNETWORKING AND NETWORK PROGRAMMING	3	0	0	40	60	100	3
2	IT7TPC02	WIRELESS SENSOR NETWORK	3	0	0	40	60	100	3
3		PROFESSIONAL ELECTIVE-5	3	1	0	40	60	100	4
4		PROFESSIONAL ELECTIVE-6	3	1	0	40	60	100	4
5		OPEN ELECTIVE- 3	3	0	0	40	60	100	3
PRACTICAL									
1	IT7LPC01	INTERNETWORKING AND NETWORK PROGRAMMING LAB	0	0	3	30	20	50	2
2	IT7LPC02	WIRELESS SENSOR NETWORK LAB	0	0	3	30	20	50	2
3	IT7LPC03	PROJECT	0	0	6	60	40	100	4
4	IT7LPC04	INTERNSHIP	0	0	0	30	20	50	2
		TOTAL						750	27
IA – INTERNAL ASSESSMENT ESE – END SEMESTER EXAM L- LECTURE T-TUTORIAL P-PRACTICAL									

PROFESSIONAL ELECTIVE-5		PROFESSIONAL ELECTIVE-6	
Subject Code	Name	Subject Code	Name
IT7TPE11	COMPILER DESIGN	IT7TPE21	ADVANCE INFORMATION SYSTEMS
IT7TPE12	INFORMATION STORAGE & MANAGEMENT	IT7TPE22	MOBILE COMPUTING
IT7TPE13	ADVANCE COMPUTER ARCHITECTURE	IT7TPE23	INFORMATION RETRIVAL
IT7TPE14	BIG DATA	IT7TPE24	SOFTWARE ARCHITECTURE
IT7TPE15	COMBINATIONAL OPTIMIZATION	IT7TPE25	VLSI DESIGN

OPEN ELECTIVE-3	
Subject Code	Name
IT7TOE11	ARTIFICIAL INTELLIGENCE & EXPERT SYSTEMS
IT7TOE12	DIGITAL IMAGE PROCESSING
IT7TOE13	REAL TIME SYSTEM
IT7TOE14	WEB TECHNOLOGY
IT7TOE15	DISASTER MANAGEMENT

SCHEME FOR EXAMINATION									
B.TECH (FOUR YEAR) DEGREE COURSE									
FOURTH YEAR, INFORMATION TECHNOLOGY									
SEMESTER VIII									
EFFECTIVE FROM SESSION 2018-19									
SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT8TPC01	CYBER SECURITY	3	0	0	40	60	100	3
2	IT8TPC02	SOFT COMPUTING	3	0	0	40	60	100	4
3		PROFESSIONAL ELECTIVE-7	3	1	0	40	60	100	3
4		PROFESSIONAL ELECTIVE-8	3	1	0	40	60	100	4
5		OPEN ELECTIVE- 4	3	0	0	40	60	100	3
PRACTICAL									
1	IT8LPC01	CYBER SECURITY LAB	0	0	3	30	20	50	2
2	IT8LPC02	SOFT COMPUTING LAB	0	0	3	30	20	50	2
3	IT8LPC03	PROJECT	0	0	6	60	40	100	4
4	IT8LPC04	SEMINAR	0	0	3	30	20	50	2
		TOTAL						750	27
IA – INTERNAL ASSESSMENT ESE – END SEMESTER EXAM. L- LECTURE T-TUTORIAL P-PRACTICAL									

PROFESSIONAL ELECTIVE-7		PROFESSIONAL ELECTIVE-8	
Subject Code	Name	Subject Code	Name
IT8TPE11	OPEN SOURCE SYSTEM & PROGRAMMING	IT8TPE21	INTRODUCTION TO .NET TECHNOLOGY
IT8TPE12	GAME THEORY	IT8TPE22	INFORMATION SECURITY AUDIT AND RISK ASSESSMENT
IT8TPE13	OBJECT ORIENTED ANALYSIS AND DESIGN	IT8TPE23	DATA MINING
IT8TPE14	COMPUTER VISION	IT8TPE24	SOFTWARE TESTING AND QUALITY MANAGEMENT
IT8TPE15	HUMAN COMPUTER INTERFACE	IT8TPE25	IOT

OPEN ELECTIVE-4	
Subject Code	Name
IT8TOE11	DIGITAL SIGNAL PROCESSING
IT8TOE12	SUPPLY CHAIN MANAGEMENT
IT8TOE13	MANAGING INNOVATION AND ENTERPRENEURSHIP
IT8TOE14	GLOBAL STRATEGY AND TECHNOLOGY
IT8TOE15	COMPUTER APPLICATION IN SOCIAL SCIENCES

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT7TPC01	3	0	0	3 hours	40	60	3

INTERNETWORKING AND NETWORK PROGRAMMING

UNIT I

Networking & TCP/IP: Protocols, Network architecture, IPv4 & IPv6 address structures, Subnetting and IP Addressing, Transport layer: TCP / UDP Ports, Sockets.

UNIT II

Internetworking: Routing and Switching, basic switching concepts and the operation of Cisco Switches and Router, STP, VLAN, PVSTP, IP Routing Technologies: Cisco IOS, OSPF, EIGRP, DHCP, ACL, NAT, SNMP.

UNIT III

Socket Programming: Creating sockets, Posix data type, Socket addresses, Assigning address to a socket, Programming Applications: Time & date routines, Chat, Email, Web server working method & programming.

UNIT IV

Berkeley Sockets: Overview, socket address structures, byte manipulation & address conversion functions, elementary socket system calls – socket, connect, bind, listen, accept, fork, exec, close, I/O asynchronous & multiplexing models.

UNIT V

APIs & Winsock Programming, ASP, Java network programming, RMI, JSP, CORBA, HTTP server, FTP server, CGI programming.

List of Books:

1. Behrouz A. Forouzan: Data Communications And Networking, TMH
2. Todd Lammle: CCNA Routing and Switching Study Guide, SYBEX
3. Steven.W.R: UNIX Network Programming, PHI (VOL I& II)
4. Window Socket Programming by Bobb Quinn and Dave Schutes
5. Elliotte Rusty Harold: Java Network Programming, O'Reilly

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT7TPC02	3	0	0	3 hours	40	60	3

WIRELESS SENSOR NETWORK

UNIT I – FUNDAMENTALS OF SENSOR NETWORKS

Introduction to computer and wireless sensor networks , Motivation for a network of Wireless Sensor nodes- Sensing and sensors-challenges and constraints - node architecture-sensing subsystem, processor subsystem-communication interfaces- prototypes, Application of Wireless sensors

UNITII- COMMUNICATION CHARACTERISTICS AND DEPLOYMENT MECHANISMS Wireless Transmission Technology and systems-Radio Technology Primer-Available Wireless Technologies - Hardware- Telosb, Micaz motes- Time Synchronization-Clock and the Synchronization Problem - Basics of time synchronization-Time synchronization protocols - Localization- Ranging Techniques- Range based Localization-Range Free Localization- Event driven Localization

UNIT III- MAC LAYER Overview-Wireless Mac Protocols-Characteristics of MAC protocols in Sensor networks – Contention free MAC Protocols- characteristics- Traffic Adaptive Medium Access-Y-MAC, Low energy Adaptive Clustering - Contention based MAC Protocols- Power Aware Multi-Access with signalling

UNIT IV- ROUTING IN WIRELESS SENSOR NETWORKS

Design Issues in WSN routing- Data Dissemination and Gathering-Routing Challenges in WSN - Flooding-Flat Based Routing – SAR, Directed Diffusion, Hierarchical Routing- LEACH, PEGASIS - Query Based Routing- Negotiation Based Routing- Geographical Based Routing-Transport layer- Transport protocol Design issues- Performance of Transport Control Protocols.

UNIT V - MIDDLEWARE AND SECURITY ISSUES WSN middleware principles-Middleware architecture-Existing middleware - operating systems for wireless sensor networks-performance and traffic management - Fundamentals of network security-challenges and attacks - Protocols and mechanisms for security.

REFERENCES

1. Waltenegus Dargie, Christian Poellabauer , "Fundamentals of Wireless Sensor Networks, Theory and Practice", Wiley Series on wireless Communication and Mobile Computing, 2011
2. Kazem Sohraby, Daniel manoli , "Wireless Sensor networks- Technology, Protocols and Applications", Wiley InterScience Publications 2010.
3. Bhaskar Krishnamachari , " Networking Wireless Sensors", Cambridge University Press, 2005
4. C.S Raghavendra, Krishna M.Sivalingam, Taiebznati , "Wireless Sensor Networks", Springer Science 2004.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT7TPE11	3	1	0	4 hours	40	60	4

COMPILER DESIGN

UNIT I

INTRODUCTION: Introduction to Compiler, single and multi-pass compilers, Translators, Phases of Compilers, Compiler writing tools, Bootstrapping, Backpatching. Finite Automata and Lexical Analyzer: Role of Lexical Analyzer, Specification of tokens, Recognition of tokens, Regular expression, Finite automata, from regular expression to finite automata transition diagrams, Implementation of lexical analyzer Tool for lexical analyzer LEX, Error reporting.

UNIT II

SYNTAX ANALYSIS AND PARSING TECHNIQUES: Context free grammars, Bottom-up parsing and top down parsing. Top down Parsing : elimination of left recursion, recursive descent parsing, Predicative Parsing ,Bottom Up Parsing : Operator precedence parsing, LR parsers, Construction of SLR, canonical LR and LALR parsing tables, Construction of SLR parse tables for Ambiguous grammar, the parser generator – YACC, error recovery in top down and bottom up parsing.

UNIT III

SYNTAX DIRECTED TRANSLATION & INTERMEDIATE CODE GENERATION : Synthesized and inherited attributes, dependency graph, Construction of syntax trees, bottom up and top down evaluation of attributes, Sattributed and L-attributed definitions ,Postfix notation; Three address codes, quadruples, triples and indirect triples, Translation of assignment statements, control flow, Boolean expression and Procedure Calls.

UNIT IV

RUNTIME ENVIRONMENT: Storage organization, activation trees, activation records, allocation strategies, Parameter passing symbol table, dynamic storage allocation.

UNIT V

CODE OPTIMIZATION & CODE GENERATION: Basic blocks and flow graphs, Optimization of basic blocks, Loop optimization, Global data flow analysis, Loop invariant computations. Issue in the design of Code generator, register allocation, the target machine, and simple Code generator.

Text Books:

1. Compilers-Principles, Techniques and Tools, Alfred V. Aho, Ravi Sethi and Ullman J.D., Addison Wesley, 2 nd Ed.
2. Principle of Compiler Design, Alfred V. Aho, and J.D. Ullman, Narosa Publication.

Reference Books:

1. Compiler design in C, A.C. Holub, PHI.
2. Compiler construction (Theory and Practice), A.Barret William and R.M. Bates, Galgotia Publication.
3. Compiler Design, Kakde.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT7TPE13	3	1	0	4 hours	40	60	4

ADVANCED COMPUTER ARCHITECTURE

UNIT I : FUNDAMENTALS OF COMPUTER DESIGN

Review of Fundamentals of CPU, Memory and IO – Trends in technology, power, energy and cost, Dependability – Performance Evaluation

UNIT II : INSTRUCTION LEVEL PARALLELISM

ILP concepts – Pipelining overview – Compiler Techniques for Exposing ILP – Dynamic Branch Prediction – Dynamic Scheduling – Multiple instruction Issue – Hardware Based Speculation – Static scheduling – Multi-threading – Limitations of ILP – Case Studies.

UNIT III : DATA-LEVEL PARALLELISM

Vector architecture – SIMD extensions – Graphics Processing units – Loop level parallelism.

UNIT IV:THREAD LEVEL PARALLELISM

Symmetric and Distributed Shared Memory Architectures – Performance Issues – Synchronization – Models of Memory Consistency – Case studies: Intel i7 Processor, SMT & CMP Processors

UNIT V : MEMORY AND I/O

Cache Performance – Reducing Cache Miss Penalty and Miss Rate – Reducing Hit Time – Main Memory and Performance – Memory Technology. Types of Storage Devices – Buses – RAID – Reliability, Availability and Dependability – I/O Performance Measures.

TEXT BOOK:

- John L Hennessey and David A Patterson, "Computer Architecture A Quantitative Approach", Morgan Kaufmann/ Elsevier, Fifth Edition, 2012.

REFERENCES:

- Kai Hwang and Faye Briggs, "Computer Architecture and Parallel Processing", Mc Graw-Hill International Edition, 2000.
- Sima D, Fountain T and Kacsuk P, "Advanced Computer Architectures: A Design Space Approach", Addison Wesley, 2000.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT7TPE14	3	1	0	4 hours	40	60	4

BIG DATA

UNIT I

CONCEPTS OF BIG DATA: Concept of Big Data Platform – Evolution and Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools- Applications of big data.

UNIT II

MINING DATA STREAMS :Introduction To Streams Concepts – characteristics, Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window, Role of high speed mass storage.

UNIT III

HADOOP: History of Hadoop- The Hadoop Distributed File System – Components of HadoopAnalyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Map Reduction Working - Anatomy of a Map Reduce Job run Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features.

UNIT IV

HADOOP ENVIRONMENT: Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation - Hadoop Configuration-Security in Hadoop - Administering Hadoop – HDFS - Monitoring-Maintenance-Hadoop benchmarks Hadoop in the cloud.

UNIT V

FRAMEWORKS: Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper. Visualizations - Visual data analysis techniques, interaction techniques.

Text Books:

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. Tom White " Hadoop: The Definitive Guide" Third Edition, O'reilly Media, 2012.
3. Anand Rajaraman and Jeffrey David Ullman,"Mining of Massive Datasets", Cambridge University Press, 2012.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT7TPE22	3	1	0	4 hours	40	60	4

MOBILE COMPUTING

UNIT I INTRODUCTION
Mobile Computing – Mobile Computing Vs wireless Networking – Mobile Computing Applications – Characteristics of Mobile computing – Structure of Mobile Computing Application. MAC Protocols – Wireless MAC Issues – Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes.

UNIT II MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER
Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization. Overview of TCP/IP – Architecture of TCP/IP- Adaptation of TCP Window – Improvement in TCP Performance.

UNIT III MOBILE TELECOMMUNICATION SYSTEM
Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System (UMTS).

UNIT-III WIRELESS NETWORKS Wireless LAN:
IEEE 802.11, HIPERLAN, Wireless ATM, Services, Reference Model, Functions, Handover, Location Management, Addressing, QOS.

UNIT-V MOBILE SYSETEM DEVELOPMENT & SUPPORT:
File Systems; World Wide Web, HTTP; HTML; System Architectures; WAP; Architecture, Wireless Datagram Protocol, Wireless Transport Layer Security, Wireless Transaction Protocol, Wireless Session Protocol, Wireless Application Environment.

Text Book

1. Mobile Communications – Schiller, Jochen; 2nd Indian Reprint, Pearson Education Asia-Addison Wesley Longman PTE. Ltd.

Reference Books:

1. Mobile Data Wireless LAN Technologies – Dayem, Rifaat A.; Prentice Hall International.
2. The Essential Guide To Wireless Communication Applications – Dornan, A.; 1st Indian Reprint, Pearson Education Asia.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT7TPE24	3	1	0	4 hours	40	60	4

SOFTWARE ARCHITECTURE

Unit-1

Basic Concepts: Concepts of Software Architecture, Models, Processes, Stakeholders.

Designing Architectures: The Design Process, Architectural Conception, Refined Experience in Action: Styles and Architectural Patterns, Architectural Conception in Absence of Experience.

Unit-2

Connectors: Connectors in Action: A Motivating Example, Connector Foundations, Connector Roles, Connector Types and Their Variation Dimensions, Example Connectors.

Unit-3

Modeling: Modeling Concepts, Ambiguity, Accuracy, and Precision, Complex Modeling: Mixed Content and Multiple Views, Evaluating Modeling Techniques, Specific Modeling Techniques.

Unit-3

Analysis: Analysis Goals, Scope of Analysis, Architectural Concern being Analyzed, Level of Formality of Architectural Models, Type of Analysis, Analysis Techniques.

Implementation and Deployment: Concepts, Existing Frameworks, Software Architecture and Deployment, Software Architecture and Mobility.

Unit-4

Conventional Architectural styles: Pipes and Filters, Event- based, Implicit Invocation, Layered systems, Repositories, Interpreters, Process control

Unit-5

Applied Architectures and Styles: Distributed and Networked Architectures, Architectures for Network-Based Applications, Decentralized Architectures,Service-Oriented Architectures and Web Services.

Text Books:

1. "Software Architecture: Foundations, Theory, and Practice" by Richard N. Taylor, NenadMedvidovic, Eric Dashofy , ISBN: 978-0-470-16774-8

2. M. Shaw: Software Architecture Perspectives on an Emerging Discipline, Prentice-Hall.

3. Len Bass, Paul Clements, Rick Kazman: Software Architecture in Practice, Pearson

References:

1. "Pattern Oriented Software Architecture" by Frank Buchnanetal, Wiley India.

2. "The Art of Software Architecture" by Stephen T. Albin

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT7TPE25	3	1	0	4 hours	40	60	4

VLSI Design

Unit-I: Overview of VLSI Design Methodology

VLSI design process-Architectural design-Logical design-Physical design-Layout styles-Full customsemi custom approaches. Basic Electrical properties of MOS & CMOS circuits: NMOS enhancement transistor- PMOS enhancement transistor-threshold voltage-threshold voltage equations-MOS devices equations-Basic DC equations-Second order effects-MOS modules-small signal AC characteristics - NMOS inverter-Steered input to an NMOS modules-Depletion mode & enhancement mode pull upsCMOS inverter-DC characteristics-Inverter delay-pass transistor- transmission gate

Unit-II: VLSI Fabrication Techniques

An overview of wafer fabrication -wafer Processing-Oxidation-Patterning- Diffusion -Ion implantation- Deposition-Silicon gate NMOS process-CMOS processes-Nwell-Pwell-Wintub-Silicon on insulator- CMOS process enhancement-Interconnect-Circuit elements.

Unit-III: Layout Design Rules

Need for design rules-Mead Conway design rule for the silicon gate NMOS process-CMOS Nwell/Pwell design rules-Simple layout examples-sheet resistance-area Capacitance-Wiring Capacitance-drive large capacitive loads

Unit-IV: Logic Design

Switch logic-pass transistor & transmission gate-Gate logic-Inverter-two point, NAND gate-NOR gate-other forms of CMOS logic-Dynamic CMOS logic-clocked CMOS logic-Precharged domino CMOS logic-structured design-simple combinational logic design examples-Parity generatorMultiplexes-clocked sequential circuits- two phase clocking-charge storage-dynamic register elementNMOS &CMOS- dynamic shift register-semi static register-JK flip flop circuit.

Unit-V: Subsystem Design Process

Design of a 4 bit shifter-General arrangement of a 4 bit arithmetic processor-Design of a ALU subsystem- Implementing ALU functions with an adder-Carry look ahead adders-Multipliers-serial parallel multipliers- Pipelined multiplier array-Modified Booth's Algorithm

Text Books:

1. Douglas A.Pucknell & Kamran Eshranghian,"Basic VLSI Design", Prentice Hall of India, New Delhi,3rd edition 1994.
2. Neil H.E.West & Kamran Eshranghian,"Principles of CMOS VLSI Design: A system perspective", Addison-Wesley, 2nd edition, 1993.
3. Amar Mukherjee, "Introduction to NMOS & CMOS VLSI system design" Prentice Hall, USA, 1986

Reference books:

1. Caver Mead & Lynn Conway, "Introduction to VLSI system," Addison Wesley. Eugene D.Fabricus,"Introduction to VLSI design", McGraw Hill International edition, 1990.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT7TOE11	3	0	0	3 hours	40	60	3

ARTIFICIAL INTELLIGENCE & EXPERT SYSTEMS

UNIT I Overview & Search Techniques:
Introduction to AI, Problem Solving, State space search, Blind search: Depth first search, Breadth first search, Informed search: Heuristic function, Hill climbing search, Best first search, A* & AO* Search, Constraint satisfaction. Game tree, Evaluation function, Mini-Max search, Alpha-beta pruning, Games of chance.

UNIT II Knowledge Representation (KR):
Introduction to KR, Knowledge agent, Predicate logic, WFF, Inference rule & theorem proving forward chaining, backward chaining, resolution; Propositional knowledge, Boolean circuit agents. Rule Based Systems, Forward reasoning: Conflict resolution, backward reasoning: Use of Back tracking, Structured KR: Semantic Net - slots, inheritance, Frames- exceptions and defaults attached predicates, Conceptual Dependency formalism and other knowledge representations.

UNIT III Handling uncertainty & Learning:
Source of uncertainty, Probabilistic inference, Bayes' theorem, Limitation of naïve Bayesian system, Bayesian Belief Network (BBN), Inference with BBN, Dempster-Shafer Theory, Fuzzy Logic, Fuzzy function, Fuzzy measure, Non monotonic reasoning: Dependency directed backtracking, Truth maintenance systems. Learning: Concept of learning, Learning model, learning decision tree, Paradigms of machine learning, Supervised & Unsupervised learning, Example of learning, Learning by induction, Learning using Neural Networks.

UNIT IV Natural Language Processing (NLP) & Planning:
Overview of NLP tasks, Parsing, Machine translation, Components of Planning System, Planning agent, State-Goal & Action Representation, Forward planning, backward chaining, Planning example: partial-order planner, Block world.

UNIT V Expert System & AI languages:
Need & Justification for expert systems- cognitive problems, Expert System Architectures, Rule based systems, Non production system, knowledge acquisition, Case studies of expert system. Ai language: Prolog syntax, Programming with prolog, backtracking in prolog, Lisp syntax, Lisp programming.

Text Books:-
1. Artificial Intelligence by Elaine Rich and Kevin Knight, Tata MeGraw Hill. 2. Introduction to Artificial Intelligence and Expert Systems by Dan W.Patterson, Prentice Hall of India.
Reference Books:-
1. Principles of Artificial Intelligence by Nils J.Nilsson, Narosa Publishing house.
2. Programming in PROLOG by Clocksin & C.S. Melish, Narosa Publishing house. 3. Rule based Expert Systems-A practical Introduction by M. Sasikumar, S.Ramani, et. al., Narosa Publishing House.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT7TOE12	3	0	0	3 hours	40	60	3

DIGITAL IMAGE PROCESSING

UNIT – I

Introduction: Digital Image Representation, Components of Digital Image Processing System. Elements of Visual Perception, Image Sensing and Acquisition, Simple Image Formation Model, Image Sampling and Quantization, Basic Relationship between Pixels, Image Transforms.

UNIT –II

Intensity Transformation and Filtering: Basic Intensity Transformation Functions, Histogram Processing, Fundamentals of Spatial Filtering, Smoothing and Sharpening Spatial Filters, Fundamentals of Frequency Domain Filtering, Smoothing and Sharpening Frequency Domain Filters.

UNIT – III

Image Enhancement: Spatial and Frequency domain methods, Contrast Stretching, Bit Extraction, Range Compression, Algebraic Operations on an Image, Histogram Modelling, Image Smoothing, Multispectral Image Enhancement, Color Image Enhancement.

UNIT – IV

Image Restoration and Compression: Image Restoration: Image Degradation Model, Restoration in the Presence of Noise only, Periodic Noise Reduction by Frequency Domain Filtering, Inverse & Wiener Filtering. Image Compression: Basics of Image Compression, Image Compression Models, Basic Compression Methods- Huffman Coding, LZW Coding, Bit Plane Coding, Predictive Coding, Wavelet Coding.

UNIT – V

Image Analysis and Applications: Image Analysis: Edge Detection, Segmentation, Texture, Image Features and its Extraction. Applications of Image Processing: Fingerprint Recognition, Face Recognition, Iris Recognition, Speaker Recognition, Medical Image Processing, Image Processing in Remote Sensing, Digital Watermarking.

Text Books:

1. Digital Image Processing, R C Gonzalez & R E Woods, Pearson.
2. Digital Image Processing- An Algorithm Approach, Madhuri A. Joshi, PHI.

Reference Books:

1. Digital Image Processing- W K Pratt, Wiley International.
2. Digital Image Processing & Analysis- B. Chanda & D. Dutta Majumder, PHI.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT7TOE13	3	0	0	3 hours	40	60	3

REAL TIME SYSTEMS

Unit-I

Basic Real- Time Concepts, Computer Hardware, Language Issues: Basic component Architecture, terminology, Real Time Design Issues, CPU, Memories, Input- Output, Other Devices Language Features, Survey of Commonly Used Programming Languages, Code Generation

Unit-II

Software life cycle, Real Time Specification and Design Techniques, Real Time Kernels: Phases of software life cycle, Non-temporal Transition in the software life cycle, Spiral model, Natural languages, Mathematical Specification, Flow Charts, Structure Charts, Pseudocode and programmable Design Languages, Finite state Automata, Data Flow Diagrams, Petrinets, Statecharts, Polled Loop Systems, phase/State Driven Code, Coroutines, Interrupt Driven System, Foreground/Background Systems Full Featured Real Time OS

Unit-III

Intertask Communication and Synchronization, Real Time memory Management, System Performance Analysis and Optimization: Buffering Data, Mail boxes Critical Region, Semaphores, Event Flags and Signals, Deadlock, Process Stack Management, Dynamic Allocation, Static Schemes, Response Time Calculation, Interuupt Latency, Time Loading and its Measurement, Scheduling NP Complete, Relocating Response Times And time Loading, Analysis of Memory Requirements, Reducing Memory Loading, I/O Performance.

Unit-IV

Queuing Models, Reliability, Testing, And Fault Tolerance, Multiprocessing Systems: Basic Buffer size Calculation, Classical Queuing Theory, Little's Law, Faults, Failures ,bugs AND effects. Reliability, Testing, Fault Tolerence, Classification of Architectures, Distributed Systems, Non Von Neumann Architectures.

Unit-V

Hardware/ Software Integration, Real Time Applications: Goals of Real Time System Integration, Tools, Methodology, The Software HesisenbergUncertainity Principle, Real Time Systems As Complex System, First Real Time Application Real Time Databases, Real time Image Processing Real Time UNIX, building Real Time Applications with Real Time Programming Languages.

Text Books :

1. Real Time System, Jane W.S.Liu 2. Real Time Systems Design and Analysis by Phillip A. Laplante,PHI

Reference Books:

1 Hard Real Time Computing Systems Predictable Scheduling Algorithms and applications by Giorgio C. Buttazzo

2 Real Time Design Patterns: Robust Scalable Architecture for Real Time System by BrucePowel Douglass 3. Real Time System: Scheduling, Analysis and Verification by Albert M.K. Change

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT8TPC01	3	0	0	3 hours	40	60	3

CYBER SECURITY

UNIT I

A Model for Network Security Services, Mechanisms, and Attacks, Viruses & Worms, The OSI Security Architecture, symmetric cipher model, substitution techniques Transposition techniques, Steganography.

UNIT II

Block ciphers and the data encryption standard , simplified DES , Block cipher principles , The data Encryption Standard , Differential and Linear Cryptanalysis ,Block Cipher Design principles , The AES cipher , Triple DES , blowfish , RC5, Rc4 Stream Cipher

UNIT III

principles of public –Key Cryptosystems , public –Key cryptosystems , Requirements for public –Key Cryptosystems, The RSA Algorithm , Key management , key Distribution ,Hash Functions SHA, MD5. Diffie-Hellman Key Exchange Algorithm

UNIT IV

WEB & IP Security: Web Security Threats, SSL Architecture, SSL Record Protocol, Alert Protocol , Handshake Protocol , Transport Layer Security , Secure Electronic Transaction , IP Security

UNIT V

Intruders : Intrusion Techniques , Firewall Design principles , Block Chain Technology, BitCoin, Types of Firewalls .

List of Books:

1. Cryptography and Network Security, Principles and Practice Third edition , William Stallings .
2. Atul Kahate, " Cryptography and Network Security," TMH
3. Introduction to network security, Krawetz, Cengage

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT8TPE11	3	0	0	3 hours	40	60	3

OPEN SOURCE SYSTEMS AND PROGRAMMING

UNIT 1

Open Source System Fundamentals: Open Source Operating Systems, Linux, GNU, POSIX standards, open source software development, open source licenses.Kernel, shell, memory management, Inter-process communication, file system, device drivers, Networking, modules and debugging.

UNIT 2

System Programming: System Calls, Library Functions, GNU C library, error handling, File I/O handling, process, IDs, memory layout, virtual memory, stack, command line arguments, memory allocation, user and groups, time, system limits and options, system and process information,

UNIT 3

File Systems: File I/O buffering, devices, I-nodes, Virtual file system, Mount point, file attributes, access control list, directories and links, monitoring file events, file locking

UNIT 4

Process: creation, termination, monitoring, execution, signals, handlers, timers, threads, process control, priorities and scheduling, daemons, secure privileged programs, capabilities, login accounting, shared libraries, pipes,

UNIT 5

Security: Security Policies, SE Linux,GRsecurity, tripwire, firewalls, network access control, authorization control, SSH, openSSH, protecting files and emails, testing and monitoring,

References

1. "The Linux Programming Interface", Michael Kerrisk, nostarch press,
2. "Linux kernel programming", Michael Beck ET. Al., Pearson Education
3. "Linux Security Cookbook", Daniel j. Barrett ET. Al., O'Reilly publication,

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT8TPC02	3	1	0	4 hours	40	60	4

SOFT COMPUTING

Unit I: Introduction to Neural Network:
Concept, biological neural network, evolution of artificial neural network, McCulloch-Pitts neuron models, Learning (Supervise & Unsupervised) and activation function ,Models of ANNFeed forward network and feedback network, Learning Rules- Hebbian, Delta, Perceptron Learningand Windrow-Hoff,winnertakeall.

Unit II: Supervised Learning:
Perceptron learning,- Single layer/multilayer, linear Separability, Adaline, Madaline, Back propagation network, RBFN. Application of Neural network in forecasting, data compression and image compression.

Unit III: Unsupervised learning:
Kohonen SOM (Theory, Architecture, Flow Chart, Training Algorithm)Counter Propagation (Theory , Full Counter Propagation NET and Forward only counter propagation net).ART (Theory, ART1, ART2). Application of Neural networks in pattern and face recognition, intrusion detection,roboticvision.

Unit IV: Fuzzy Set:
Basic Definition and Terminology, Set-theoretic Operations, Member Function ,Formulation and Parameterization, Fuzzy rules and fuzzy Reasoning, Extension Principal and Fuzzy Relations, Fuzzy if-then Rules, Fuzzy Inference Systems. Hybrid system including neuro fuzzy hybrid, neuro genetic hybrid and fuzzy genetic hybrid, fuzzy logic controlled GA. Application of Fuzzy logic in solving engineering problems.

Unit V: Genetic Algorithm:
Introduction to GA, Simple Genetic Algorithm, terminology and operators of GA (individual, gene, fitness, population, data structure, encoding, selection, crossover, mutation ,convergence criteria). Reasons for working of GA and Schema theorem, GA optimization problem s including JSPP (Job shop scheduling problem), TSP (Travelling salesman problem), Network design routing ,timetabling problem.

Text Book

1. S.N. Shivnandam, "Principle of soft computing", Wiley.
2. S. Rajshekaran and G.A.V. Pai, "Neural Network , Fuzzy logic And Genetic Algorithm", PHI.

References Book: -

1. Jack M. Zurada, "Introduction to Artificial Neural Network System" JAico Publication.
2. Simon Haykins, "Neural Network- A Comprehensive Foudation"
3. Timothy J.Ross, "Fuzzy logic with Engineering Applications", McGraw-Hills 1

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT8TPE12	3	1	0	4 hours	40	60	4

GAME THEORY

Unit 1

Introduction to game theory, routing games and mechanism design, Strategies, cost and payoffs; prisoner's dilemma, nash equilibrium, Strategic games; Best response; dominant Strategies; pure Strategy v/s mixed Strategy.

Unit 2

Repeated games; Bayesian games Routing games; Selfish routing; Quantifying inefficiency of equilibria; Price of Anarchy

Unit 3

Social optimum; price of stability; Scheduling games.
Population games; Evolutionary game theory;

Unit 4

Evolutionary stable Strategy; Replicator dynamics. Non cooperative games , cooperative game theory

Unit 5

Nash bargaining Mechanism design,Algorithmic mechanism design, distributed algorithmic mechanism design

Text Books:

1.Game Theory,by D. Fudenberg and j.Tirole, MIT press 1991.
2.Algorithmic Game Theory, edited by N.nisan, T. Roughgarden, E. Tardos, and v.v. vazirani,Cambridge University press 2007.

References books:

1.Auction Thoery, by v. Krishna, academic press,2002.
2.A course in Game theory, by M.J . Osborne,A.Rubinstein,MIT press,1994.
3.Dynamic Non cooperative Game Theory, byT Basar and G.J. Olsder,1999
4. Evolutionary Game Theory, Jorgen W.Weibull,The MIT presss 1997.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT8TPE13	3	1	0	4 hours	40	60	4

OBJECT ORIENTED ANALYSIS AND DESIGN

UNIT I INTRODUCTION TO UML
Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle.

UNIT II OBJECT MODELING :
Objects and classes, links and association, generalization and inheritance, aggregation, abstract class, candidates keys, constraints.

UNIT III DYNAMIC MODELING :
Events and states, operations, nested state diagrams and concurrency, advanceddynamic modeling concept, a sample dynamic model.

UNIT IV FUNCTIONAL MODELING :
Data flow diagram, specifying operations, constraints, a sample functional model. OMT (Object modeling techniques) methodologies, SA/SD, JSD

UNIT V: ARCHITECTURAL MODELING
Architectural Modeling : Component, Deployment, Component diagrams and Deployment diagrams.

Text Books

1. James Rumbaugh et al " object Oriented Modeling and design" PHI
2. Herbert Schieldt " The complete Reference : Java" TMH
3. E. Balagurusamy " Programming in Java", TMH

Reference Books :

1. Booch Grady, " Object Oriented Analysis & design with application 3/e", Person
2. Bjarne Stroustrup " C++ Programming Language" Addison Wesley
3. E Balagurusami " Object Oriented Programming with C++, TMH

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT8TPE14	3	1	0	4 hours	40	60	4

COMPUTER VISION

Unit-1

Recognition Methodology: Conditioning, Labeling, Grouping,Extracting, Matching.
Morphological Image Processing: Introduction, Dilation, Erosion,Opening, Closing,Hit-or-Miss transformation, Morphologicalalgorithm operations on binary images, Morphological algorithm
Operations on gray-scale images, Thinning, Thickining, Regiongrowing, region shrinking.

Unit-2

Image Representation and Description: Representation schemes,Boundary descriptors, Region descriptors
Binary Machine Vision: Thresholding, Segmentation, Connectedcomponent labeling, Hierarchal segmentation, Spatial clustering,Split & merge, Rule-based Segmentation, Motion-based
segmentation.

Unit-3

Area Extraction: Concepts, Data-structures, Edge, Line-Linking,Hough transform, Line fitting, Curve fitting (Least-square fitting).
Region Analysis: Region properties, External points, Spatialmoments, Mixed spatial gray-level moments, Boundary analysis:Signature properties, Shape numbers.

Unit-4

Facet Model Recognition: Labeling lines, Understanding linedrawings,Classification of shapes by labeling of edges, Recognition ofshapes, Consisting labeling problem, Back-tracking AlgorithmPerspective Projective geometry, Inverse perspective
Projection, Photogrammetry - from 2D to 3D, Image matching:Intensity matching of ID signals, Matching of 2D image,Hierarchical image matching.

Unit-5

Object Models And Matching: 2D representation, Global vs. Localfeatures
General Frame Works For Matching: Distance relational approach,Orderedstructural matching, View class matching, Modelsdatabase organization.

BOOKS

Text Books:

1.RobertHaralick and Linda Shapiro, "Computer and Robot Vision", Vol I, II, Addison-Wesley, 1993.
2. David A. Forsyth, Jean Ponce, "Computer Vision: A Modern Approach"

References:

3. 1. Milan Sonka,VaclavHlavac, Roger Boyle, "Image Processing, Analysis, and Machine Vision" Thomson Learning

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT8TPE15	3	1	0	4 hours	40	60	4

HUMAN COMPUTER INTERFACE

UNIT1: Introduction0 The human, The computer, The interaction, Paradigms, Usability of Interactive Systems, Guidelines, Principles, and Theories

UNIT2: Design Process- Interaction design basics, HCI in the software process, Design rules, Implementation support, Evaluation techniques, Universal design, User support

UNIT3: Models and Theories0 Cognitive models, Socio-organizational issues and stakeholder requirements, Communication and collaboration models,Task analysis, Dialogue notations and design, Models of the system, Modelling rich interaction

UNIT4: Interaction Styles- Direct Manipulation and Virtual Environments, Menu Selection, Form Filling and Dialog Boxes, Command and Natural Languages, Interaction Devices, Collaboration and Social Media Participation

UNIT5: Design Issues- Quality of Service, Balancing Function and Fashion, User Documentation and Online Help, Information Search, Information Visualization

Text Books:

1,"Human Computer Interaction" by Alan Dix, Janet Finlay , ISBN :9788131717035, Pearson Education (2004)
2."Designing the User Interface - Strategies for Effective Human Computer Interaction", by Ben Shneiderman
ISBN : 9788131732557, Pearson Education (2010).

Reference Books:

1.Usability Engineering: Scenario-Based Development of Human-Computer Interaction , by Rosson, M. and
Carroll, J. (2002)
2.The Essentials of Interaction Design, by Cooper, et al. , Wiley Publishing(2007)
3.Usability Engineering, by Nielsen, J. Morgan Kaufmann, San Francisco, 1993. ISBN 0-12-518406-9
4.The Resonant Interface: HCI Foundations for Interaction Design , by Heim, S. , Addison-Wesley. (2007)
5.Usability engineering: scenario-based development of human-computer interaction, By Rosson, M.B &
Carroll, J.M. , Morgan Kaufman.(2002)

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT8TPE21	3	1	0	4 hours	40	60	4

INTRODUCTION TO .NET TECHNOLOGY

UNIT I

Introduction to .NET framework, Managed Code and the CLR- Intermediate Language, Metadata and JIT Compilation, Automatic Memory Management, CLR, The Framework Class Library, IDE of .Net, Introduction to C# Language

UNIT II

.Net Elements, Variables and constants, Data types, Operators , Loops and Program flow, Decision statements Type, Arrays with various types , Collections , Windows Forms , Windows controls – Button, Check box, Combo box, Label, List box, Radio Button, Text box, Various Events , Creating menus – menu items – context menu - Common dialog boxes & MDI

UNIT III

Architecture of ADO.NET – ADO.NET providers – Connection – Command – Data Adapter – Dataset. Connecting to Data Source, Accessing Data with Data set and Data Reader - Create an ADO.NET application - Using Stored Procedures.

UNIT IV

ASP.NET Features, IIS Configuration, ASP.Net Web Controls - HTML Controls, Using Intrinsic Controls, Using Input Validation Controls, Selecting Controls for Applications - Adding Web controls to a Page.

UNIT V

XML Serialization in the .NET Framework, Introduction to Web services and AJAX, Crystal Reports.

List of Books:

1. Introduction to Visual basic.NET - NIIT Prentice Hall of India,2005
2. Introducing Microsoft .NET- David S. Platt Microsoft Press", Saarc Edition, 2001
3. Introduction to Microsoft® ASP.NET Work Book - Microsoft- Microsoft Press
4. Developing XML Web Services Using Microsoft® ASP.NET -Microsoft- Microsoft Press
5. Designing Microsoft ASP.NET Applications-Douglas J. Reilly-Microsoft Press
6. ASP.NET-Danny Ryan and Tommy Ryan-Hungry Minds Maran Graphics

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT8TPE22	3	1	0	4 hours	40	60	4

INFORMATION SECURITY AUDIT AND RISK ASSESSMENT

UNIT I - INTRODUCTION

Information Security Assessments, security audit process, Information Security Risk Assessment Overview- Drivers, Laws and Regulations- Risk Assessment Frame work and methodology, Generations of risk assessment techniques

UNIT II – VULNERABILITIES and PENETRATION TESTING

Information gathering methodologies,security threats, DNS Enumerations SocialEngineering attacks. Port Scanning, Network Scanning, Vulnerability Scanning,OS Fingerprinting, Enumeration attacks, Active and passive sniffing, ARP Poisoning, Session Hijacking, DNS Spoofing, SQL Injection attack, Countermeasures.

UNIT III - DATA COLLECTION and ANALYSIS

Data Collection Mechanisms, IT Assets, Profile & Control Survey Consolidation, Compiling Observations, Preparation of catalogues, System Risk Computation, Impact Analysis Scheme, Final Risk Score.

UNIT IV - RISK ASSESSMENT

System Risk Analysis, Risk Prioritization, System Specific Risk Treatment, Issue Registers, Methodology, Result, Risk Registers Post Mortem.

UNIT V - SECURITY AUDIT PROCESS

Pre-planning audit, Audit Risk Assessment, Performing Audit, Internal Controls, Audit Evidence, Audit Testing, Audit Finding, Follow-up activities

REFERENCES

1. Mark Talabis, "Information Security Risk Assessment Toolkit: PracticalAssessments through Data Collection and Data Analysis", Syngress; st1 edition,ISBN: 978-1-59749-735-0, 2012.
2. David L. Cannon, "CISA Certified Information Systems Auditor Study Guide",John Wiley & Sons, ISBN: 978-0-470-23152-4, 2009.
3. Shakeel Ali &TediHeriyanto, "Backtrack -4: Assuring security by penetrationtesting", PACKT Publishing., ISBN: 978-1-849513-94-4, 2011.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT8TPE23	3	1	0	4 hours	40	60	4

DATA MINING

UNIT I

Data ware Housing: What is a data warehouse?, definition, Multidimensional data model, OLAP operation, warehouse schema, data ware housing architecture, warehouse serve, metadata, OLAP, engine, Data warehousing backend process, other features.

Data Mining: what is data mining? KDD Vs. data mining, DBMS Vs DM other related areas, DM techniques, other mining problem, issues & challenges in DM, Dm application areas.

UNIT II

Association rules: Methods to discover association rules, apriori algorithm ,partition algorithm, pincer –search algorithm, Dynamic Item set counting algorithm, FP-tree Growth algorithm, Incremental algorithm, Border algorithm, hierarchical association rule, generalized association rules, Association rules with item constraints.

UNIT III

Clustering Techniques: Introduction, clustering paradigms, partitioning algorithms, k-Medoid Algorithm, CLARA, CLARANS, Hierarchical clustering, DBSCAN, BIRCH, CURE, Categorical clustering algorithms , STIRR, ROCK , CACTUS.

UNIT IV

Decision trees: Tree construction principal, Best spilt splitting indices, splitting criteria, Decision tree construction algorithm, CART, ID3, C4.5, CHAID, Decision tree construction with pre-sorting, rainforest, approximate method, CLOUDS, BOAT, pruning technique, integration of pruning & construction, Hierarchcal associtation rule.

UNIT V

Web Mining: Web mining ,web content mining ,web structure mining ,web usage mining ,text mining , unstructured text , Episode rule discovery for texts , Hierarchy of categories , text clustering , Paging algorithm.

List of Books:

1. Data Mining techniques – Arun K Pujari Universities press
2. Data Mining concepts & techniques – Jiawei han , Micheline kamber Morgan Kaufmann publisher Elsevier India –2001
3. Data Mining methods for knowledge Discovery –Cios , Pedrycz , swiniarski Kluwer academic publishers London –1998

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT8TPE24	3	1	0	4 hours	40	60	4

SOFTWARE TESTING & QUALITY MANAGAEMENT

Unit-I
Quality Revolution, Software Quality, Role of Testing, Objectives of Testing, Concept of Complete Testing, Central Issue of Testing, Sources of Information for Test Case selection, Test Planning and Design, Monitoring and Measuring Test Execution, Test Tools and Automation, Test Team Organization and Management.

Unit-II
Basic Concepts of Testing Theory, Theory of Goodenough and Gerhart, Theory of Weyuker and Ostrand, Theory of Gourlay, Adequacy of Testing, Limitations of Testing, Static Unit Testing, Defect Prevention, Dynamic Unit Testing, Debugging.

Unit-III
Outline of Control Flow Testing, Control Flow Graph, Paths in Control Flow Graphs, Path Selection Criteria, Data Flow Testing criteria, Comparison of Data Flow and Test Selection Criteria, Domain Error, Testing of Domain Errors.

Unit-IV
System Test design, Test design Factors, Requirement Identification, Test Objective Identification, Structure of a System Test Plan, Assumptions, Test Approach, Test Suite Structure, Types of Acceptance Testing

Unit-V
Five Views of Software Quality, Quality Control, Quality assurance, Cost of quality, Software Quality Assurance, SQA Plan, ISO 9000, Capability Maturity Model, McCall s Quality Factors.

Text Books
1. KshirasagarNaik, "Software Testing and Quality Assurance", John Wiley & Sons.
2. William Perry, "Effective Methods for Software Testing", John Wiley & Sons.

Reference Books
1. CemKaner and Jack Falk, "Testing Computer Software", Wiley.
2. Ron Patton, "Software Testing", SAMS Publications.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT8TPE25	3	1	0	4 hours	40	60	4

IOT

UNIT I – OVERVIEW IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management

UNIT II – REFERENCE ARCHITECTURE IoT Architecture-State of the Art – Introduction, State of the art, Reference Model and architecture, IoT reference Model - IoT Reference Architecture Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints-Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control.

UNIT III – IOT DATA LINK LAYER & NETWORK LAYER PROTOCOLS PHY/MAC Layer(3GPP MTC, IEEE 802.11, IEEE 802.15), WirelessHART, Z-Wave, Bluetooth Low Energy, Zigbee Smart Energy, DASH7 - Network Layer-IPv4, IPv6, 6LoWPAN, 6TiSCH,ND, DHCP, ICMP, RPL, CORPL, CARP

UNIT IV – TRANSPORT & SESSION LAYER PROTOCOLS Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS) – Session Layer-HTTP, CoAP, XMPP, AMQP, MQTT

UNIT V – SERVICE LAYER PROTOCOLS & SECURITY Service Layer -oneM2M, ETSI M2M, OMA, BBF – Security in IoT Protocols – MAC 802.15.4 , 6LoWPAN, RPL, Application Layer

REFERENCES

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1 st Edition, Academic Press, 2014.
2. Peter Waher, "Learning Internet of Things", PACKT publishing, BIRMINGHAM – MUMBAI
3. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer
4. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118- 47347-4, Willy Publications
5. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-onApproach)", 1 st Edition, VPT, 2014. 6. http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/index.htm

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT8TOE11	3	0	0	3 hours	40	60	3

DIGITAL SIGNAL PROCESSING

UNIT I

Analysis of Discrete Time Signals and Systems: Discrete Fourier analysis, Classification, Discrete Time Fourier Transform (DTFT) & its properties, Inverse DTFT. Discrete Fourier Transform (DFT) & its Properties, Inverse DFT. Fast Fourier Transform, Properties, Types of FFT, N-point Radix-2 FFT, Inverse FFT. Discrete Linear Convolution, Circular Convolution, Fast Convolution, Frequency Response of LTI system using Discrete Fourier Analysis. Discrete Cosine Transform.

UNIT II

Implementation of Discrete-time Systems: Structures for the Realization of discrete-time systems, Structures for FIR systems: Direct, Cascade, Frequency Sampling & Lattice structures. Structures for IIR systems: Direct, Signal Flow Graphs & Transposed, Cascade, Parallel, Lattice & Lattice-Ladder structures. State space system analysis and structures.

UNIT III

FIR Filter Design: Symmetric and Anti-symmetric FIR filters, FIR Filter design by window method (Rectangular, Bartlett, Hamming, Hanning, Blackman and Kaiser window), Frequency Sampling method, Optimum approximation of FIR filters, Design of FIR differentiators, Design of Hilbert transformers.

UNIT IV

IIR Filter Design: Design of Discrete-time IIR filters from Continuous-time Filters: Filter design by Impulse invariant and bilinear transformation method: Butterworth, Chebyshev& Elliptic approximation Filter, Frequency transformation.

UNIT V

Multirate Digital Signal Processing: Introduction, Decimation, Interpolation, Sampling rate conversion by rational factor, Filter design and implementation for sampling rate conversion: Direct form FIR digital filter structure, Polyphase filter structure, Time varying digital filter structure, Sampling rate conversion by an arbitrary factor.

Name of Text Books:

1.Discrete Time Signal Processing by A.V. Oppenheim, R. W. Schafer, & John R. Buck, , 2nd Edition, Prentice Hall, 1999. (Unit I, Unit II, Unit III, Unit IV)
2.Digital Signal Processing: Principles, Algorithms and Applications by John G. Proakis& D.G. Manolakis, Prentice Hall, 1997. (Unit II, Unit III, Unit IV, Unit V)
3.Digital Signal Processing by S. K. Mitra, 3rd edition, McGraw-Hill, 2007. (Unit V)

Name of Reference Books:

1. Signals and Systems by A. V. Oppenheim, A. S. Willsky& S. H. NAWAB, 2nd edition, Prentice Hall, 1996.
2. Digital Signal Processing by S. Salivahanan, A. Vallavaraj, C. Gnanapriya, Tata McGraw-Hill, 2000.
3. Digital Signal Processing by A. Anand Kumar, PHI Learning Pvt. Ltd, 2012.