1.1.3

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*

Programme Name : *B.Tech.*

Academic Year : 2022-23

List of Courses Focus on Employability/ Entrepreneurship/Skill Development

Sr. No.	Course Code	Name of the Course
01.	IT203TPC01	DATA STRUCTURE & ALGORITHMS
02.	IT203TPC02	DIGITAL ELECTRONICS
03.	IT203TPC03	OBJECT ORIENTED PROGRAMMING
04.	IT204TPC02	COMPUTER ORGANIZATION & ARCHITECTURE
05.	IT204TPC03	OPERATING SYSTEMS
06.	IT204TPC04	DESIGN & ANALYSIS OF ALGORITHMS
07.	IT204THS02	MANAGEMENT 1 – MANAGEMENT PROCESS AND ORGANIZATIONAL BEHAVIOUR
08.	IT205TPC01	DATABASE MANAGEMENT SYSTEMS
09.	IT205TPC02	FORMAL LANGUAGE & AUTOMATA THEORY
10.	IT205TPC03	PYTHON PROGRAMMING
11.	IT206TPC01	COMPILER DESIGN
12.	IT206TPC02	COMPUTER NETWORKS
13.	IT206TPE31	GRID & CLOUD COMPUTING
14.	IT206PPE21	MICROPROCESSOR & MICROCONTROLLER LAB
15.	IT206PPE24	IMAGE PROCESSING LAB
16.	IT07TPC01	CYBER SECURITY
17.	IT07TPE42	DATA MINING
18.	IT07TPE51	INTERNET OF THINGS
19.	IT207TOE22	INTRODUCTION TO DOT NET TECHNOLOGY
20.	IT08TPE61	MACHINE LEARING
21.	IT08TOE31	WIRELESS SENSOR NETWORK
22.	IT08TOE41	ARTIFICIAL INTELIGENCE

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									

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
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.

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 1 – 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/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

Course Outcomes

1. Create processes and threads.
2. Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, and Response Time.
3. Specification of memory organization develops the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
4. Design and implement file management system.
5. For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

Reference Books

Milenkovic M. , "Operating System concepts", MGH
Tanenbaubm A. S. "Operating System design and implementation" , PHI
Silberschartz A.and Patterson J.I. , " Operating system concepts", Wisley.
Stilling William " Operating System ", Maxwell McMillan International Edition 1 992.
Dectel H.N. , "An introduction to operating system ", Addision Wisley.

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.

Suggested reference books

1. Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.
2. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley.
3. Algorithms -- A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA.

Course Outcomes

1. For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.
2. Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.
3. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.
4. Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic-programming.
5. To understand an analyses approximation algorithms, Randomized algorithms, NP and P SPACE

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 2022-23

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT205TES07	SIGNALS & SYSTEMS	3	0	0	30	70	100	3
2	IT205TPC01	DATABASE MANAGEMENT SYSTEMS	3	0	0	30	70	100	3
3	IT205TPC02	FORMAL LANGUAGE & AUTOMATA THEORY	3	0	0	30	70	100	3
4	IT205TPC03	PYTHON PROGRAMMING	3	1	0	30	70	100	4
5	IT205TPE1X	ELECTIVE – I	3	0	0	30	70	100	3
PRACTICAL									
1	IT205PPC01	DATABASE MANAGEMENT SYSTEMS LAB	0	0	4	30	20	50	2
2	IT205PPC02	PYTHON PROGRAMMING LAB	0	0	4	30	20	50	2
3	IT205PMC01	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	IT205TPE11	SOFTWARE ENGINEERING
2	IT205TPE12	REAL TIME SYSTEM
3.	IT205TPE13	CYBER LAW & ETHICS
4.	IT205TPE14	EMBEDDED SYSTEMS

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT205TPC01	3	0	0	3 HOURS	30	70	3

Database Management Systems

Course Objectives:

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

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.

Suggested books:

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

Suggested 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.

Course Outcomes:

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

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT205TPC02	3	0	0	3 HOURS	30	70	3

Formal Language & Automata Theory

Course Objectives:

1. Understand basic properties of formal languages and formal grammars.
2. Design and Understand basic properties of deterministic and nondeterministic finite automata
3. Design and Understand basic properties of pushdown automata.
4. Understand the relation between types of languages and types of finite automata
5. Design and Understanding the Context free languages and grammars, and also Normalising CFG.
6. Understanding the minimization of deterministic and nondeterministic finite automata.
7. Design and Understand basic properties of Turing machines and computing with Turing machines.
8. Design and Understand the concept of Mealy and Moore automata and its application.
9. Know the concepts of tractability and decidability, the concepts of NP-completeness and NP-hard problem.
10. Understand the challenges for Theoretical Computer Science.

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 satisfy ability problems, vertex cover problem, Hamiltonian path problem, traveling sales man problem, Partition problem etc.

Suggested books

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education Asia.

Suggested 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.

Course Outcomes :

1. Comprehend Knowledge to acquire a full understanding of Automata Theory as the basis of all computer science languages - Model building and have a clear understanding of the Automata theory concepts.
2. Cognitive skills - Be able to design FAs, NFAs, Grammars, languages modeling, small compilers basics - Be able to design sample automata - Be able to minimize FA's and Grammars of Context Free Languages.
3. Professional Skill - Perceive the power and limitation of a computer as a computing machine.
4. Attitude - Develop a perception on the importance of computational theory as model building.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT205TPC03	3	1	0	4 HOURS	30	70	4

Python Programming

Course Objectives:

1. Learn Syntax and Semantics and create Functions in Python.
2. Handle Strings and Files in Python.
3. Understand Lists, Dictionaries and Regular expressions in Python.
4. Implement Object Oriented Programming concepts in Python.
5. Build Web Services and introduction to Network and Database Programming in Python.

UNIT - I Python Basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules Sequences - Strings, Lists, and Tuples, Mapping and Set Types.

UNIT - II FILES: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Related Modules Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management, *Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, *Creating Exceptions, Why Exceptions (Now)?, Why Exceptions at All?, Exceptions and the sys Module, Related Modules Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules.

UNIT - III Regular Expressions: Introduction, Special Symbols and Characters, Res and Python Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules.

UNIT - IV GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs WEB Programming: Introduction, Wed Surfing with Python, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application Advanced CGI, Web (HTTP) Servers.

UNIT - V Database Programming: Introduction, Python Database Application Programmer's Interface (DB-API), Object Relational Managers (ORMs), Related Modules.

TEXT BOOKS:

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.

REFERENCES BOOKS:

1. Think Python, Allen Downey, Green Tea Press.
2. Introduction to Python, Kenneth A. Lambert, Cengage.

3. Python Programming: A Modern Approach, Vamsi Kurama, Pearson.
4. Learning Python, Mark Lutz, O'Really.

Course Outcomes:

1. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
2. Demonstrate proficiency in handling Strings and File Systems.
3. Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
4. Interpret the concepts of Object-Oriented Programming as used in Python.
5. Implement exemplary applications related to Network Programming, Web Services and Databases in Python.

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
THIRD YEAR, INFORMATION TECHNOLOGY
SEMESTER VI
EFFECTIVE FROM SESSION 2022-23

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT206TPC01	COMPILER DESIGN	3	0	0	30	70	100	3
2	IT206TPC02	COMPUTER NETWORKS	3	0	0	30	70	100	3
3	IT206TPE2X	ELECTIVE – II	3	0	0	30	70	100	3
4	IT206TPE3X	ELECTIVE – III	3	0	0	30	70	100	3
5		OPEN ELECTIVE - I	3	0	0	30	70	100	3
PRACTICAL									
1	IT206PPC01	COMPUTER NETWORKS LAB	0	0	4	30	20	50	2
2	IT206PPE2X	ELECTIVE – II LAB	0	0	4	30	20	50	2
3	IT206PPR11	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.	IT206TPE21	MICROPROCESSOR & MICROCONTROLLER
2.	IT206TPE22	WEB TECHNOLOGY & E-COMMERCE
3.	IT206TPE23	QUEUING THEORY & MODELING
4.	IT206TPE24	IMAGE PROCESSING

LIST OF ELECTIVE – II (LAB)

1.	IT206PPE21	MICROPROCESSOR & MICROCONTROLLER LAB
2.	IT206PPE22	WEB TECHNOLOGY & E-COMMERCE LAB
3.	IT206PPE23	QUEUING THEORY & MODELING LAB
4.	IT206PPE24	IMAGE PROCESSING LAB

LIST OF ELECTIVE-III

1.	IT206TPE31	GRID & CLOUD COMPUTING
2.	IT206TPE32	MULTIMEDIA SYSTEM DESIGN
3.	IT206TPE33	SPEECH & NATURAL LANGUAGE PROCESSING
4.	IT206TPE34	GRAPH THEORY

LIST OF OPEN ELECTIVE-I

S.No.	COURSE CODE	COURSE NAME	OFFERED BY	ELIGIBLE DEPARTMENT
1.	CH206TOE01	INDUSTRIAL UTILITIES AND SAFETY	CHEMICAL	CIVIL, CSE, ECE, IPE, IT & MECH
2.	CE206TOE01	METRO SYSTEMS AND ENGINEERING	CIVIL	CHEM, CSE, ECE, IPE, IT & MECH
3.	CS206TOE01	OBJECT ORIENTED PROGRAMMING WITH C++	CSE	CHEM, CIVIL, ECE, IPE, IT & MECH
4.	EC206TOE01	INTRODUCTION TO ELECTRONIC DEVICES AND CIRCUITS	ECE	CHEM, CIVIL, CSE, IPE, IT & MECH
5.	IP206TOE01	OPERATION RESEARCH	IPE	CHEM, CIVIL, CSE, ECE, IT & MECH
6.	IT206TOE01	COMPUTER GRAPHICS	IT	CHEM, CIVIL, CSE, ECE, IPE & MECH
7.	ME206TOE01	AUTOMOBILE ENGINEERING	MECHANICAL	CHEM, CIVIL, CSE, ECE, IPE & IT

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT206TPC01	3	0	0	3 HOURS	30	70	3

Complier Design

Course Objectives:

1. To learn the process of translating a modern high-level language to executable code.
2. To provide a student with an understanding of the fundamental principles in compiler design and to provide the skills needed for building compilers for various situations that one may encounter in a career in Computer Science.
3. To develop an awareness of the function and complexity of modern compilers.
4. To apply the code generation algorithms to get the machine code for the optimized code.
5. To represent the target code in any one of the code formats.
6. To understand the machine dependent code.
7. To draw the flow graph for the intermediate codes.
8. To apply the optimization techniques to have a better code for code generation.

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.

List of 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.

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.

Course Outcomes :

By the end of the course, the successful student will be able to do:

1. To realize basics of compiler design and apply for real time applications.
2. To introduce different translation languages.
3. To understand the importance of code optimization.
4. To know about compiler generation tools and techniques.
5. To learn working of compiler and non compiler applications.
6. Design a compiler for a simple programming language.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT206TPC02	3	0	0	3 HOURS	30	70	3

Computer Networks

Course Objectives:

- To understand the working principle of various communication protocols.
- To analyze the various routing algorithms.
- To know the concept of data transfer between nodes.

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.

Course Outcomes :

1. Understand fundamental underlying principles of computer networking
2. Understand details and functionality of layered network architecture.
3. Apply mathematical foundations to solve computational problems in computer networking.
4. Analyze performance of various communication protocols.
5. Compare routing algorithms.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT206TPE31	3	0	0	3 HOURS	30	70	3

Grid and Cloud Computing

Course Objectives:

1. Identify the technical foundations of cloud systems architectures.
2. Analyze the problems and solutions to cloud application problems.
3. Apply principles of best practice in cloud application design and management.
4. Identify and define technical challenges for cloud applications and assess their importance.

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 / REFERENCE 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-demand Computing.
3. Viktors Berstis , Grid Computing : IBM Red Book.
4. Understanding Bigdata, by Paul C. Zikopoulos et al. McGraw Hill.

5. "Introduction to Grid Computing with Globus", Luis Ferreira et al. IBM Red Books.

Course Outcomes :

1. Understand the fundamental principles of distributed computing.
2. Understand how the distributed computing environments known as Grids can be built from lower level services.
3. Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing.
4. Analyze the performance of Cloud Computing.
5. Understand the concept of Cloud Security.
6. Learn the Concept of Cloud Infrastructure Model.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT206TPE24	3	0	0	3 HOURS	30	70	3

Image processing

Course Objectives:

1. To study the image fundamentals and mathematical transforms necessary for image processing.
2. To study the image enhancement techniques.
3. To study image restoration procedures.
4. To study the image compression procedures.

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, histogram equalization 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 boundary detection, thresholding – global and adaptive, region-based segmentation.

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

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

Course Outcomes :

1. Review the fundamental concepts of a digital image processing system.
2. Analyze images in the frequency domain using various transforms.
3. Evaluate the techniques for image enhancement and image restoration.
4. Categorize various compression techniques.
5. Interpret Image compression standards.
6. Interpret image segmentation and representation techniques.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT206TPE21	3	0	0	3 HOURS	30	70	3

Microprocessor &Microcontroller

Course Objectives:

Students will be able to.

1. Outline the history of computing devices.
2. Describe the architecture of 8086 Microprocessors.
3. Understand 8051 microcontroller concepts, architecture and programming.
4. Compare microprocessors and microcontrollers.
5. Develop programs for microprocessor and microcontrollers.

UNIT 1: Architecture of Microprocessors

Architecture of 8085Microprocessor.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.

REFERENCES

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.

Course Outcomes :

At the end of the course, students will develop ability to

1. Define the history of microprocessors.
2. Describe the architectures of 8085 and 8086 microprocessors.
3. Write programs for 8086 and 8051.
4. Distinguish between the different modules of operation of microprocessors.
5. Interface peripherals to 8086 and 8051.
6. Evaluate the appropriateness of a memory expansion interface based on the address reference with particular application.
7. Apply the above concepts to real world automation and other electronics problems and applications.

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

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT07TPC01	CYBER SECURITY	3	0	0	30	70	100	3
2	IT07TPE4X	ELECTIVE – IV	3	0	0	30	70	100	3
3	IT07TPE5X	ELECTIVE – V	3	0	0	30	70	100	3
4	IT07TOE2X	OPEN ELECTIVE – II	3	0	0	30	70	100	3
PRACTICAL									
1	IT07PPC21	PROJECT-II	0	0	12	60	40	100	6
TOTAL CREDITS									**18**
IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL									

LIST OF ELECTIVE-IV

1	IT07TPE41	ADVANCE DATABASE DESIGN
2	IT07TPE42	DATA MINING
3.	IT07TPE43	GAME THEORY
4.	IT07TPE44	GLOBAL STRATEGY AND TECHNOLOGY

LIST OF ELECTIVE-V

1	IT07TPE51	INTERNET OF THINGS
2	IT07TPE52	ADVANCE OPERATING SYSTEM
3.	IT07TPE53	COMPUTER VISION
4.	IT07TPE54	OPEN SOURCE SYSTEM & PROGRAMMING

LIST OF OPEN ELECTIVE-II

1	IT07TOE21	SOFT COMPUTING
2	IT07TOE22	INTRODUCTION TO DOT NET TECHNOLOGY
3.	IT07TOE23	GIS & Remote Sensing
4.	IT07TOE24	SUPPLY CHAIN MANAGEMENT

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT07TPC01	3	0	0	3 HOURS	30	70	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 .

Text Books:

1. Cryptography and Network Security, Principles and Practice Third edition , William Stallings .
2. Atul Kahate, " Cryptography and Network Security," TMH

Reference Book

3. Introduction to network security, Krawetz, Cengage

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT07TPE42	3	0	0	3 HOURS	30	70	3

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.

Text 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

Reference Book

3. Data Mining methods for knowledge Discovery –Cios , Pedrycz , swiniarski Kluwer academic publishers London –1998

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT07TOE22	3	0	0	3 HOURS	30	70	3

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.

Text 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

Reference Books:

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	IA	ESE	CREDITS
IT07TPE51	3	0	0	3 HOURS	30	70	3

Subject : 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

TEXT BOOKS

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

REFERENCE BOOKS

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

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

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT08TPC6X	ELECTIVE – VI	3	0	0	30	70	100	3
2	IT08TOE3X	OPEN ELECTIVE - III	3	0	0	30	70	100	3
3	IT08TOE4X	OPEN ELECTIVE - IV	3	0	0	30	70	100	3
PRACTICAL									
1	IT06PPC31	PROJECT-III	0	0	18	60	40	100	9
TOTAL CREDITS									**18**

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

LIST OF ELECTIVE – VI

1.	IT08TPE61	MACHINE LEARING
2.	IT08TPE62	OBJECT ORIENTED ANALYSIS & DESIGN
3.	IT08TPE63	SOFTWARE TESTING & QUALITY MANAGEMENT
4.	IT08TPE64	HUMAN COMPUTER INTERFACE

LIST OF OPEN ELECTIVE –III

1.	IT08TOE31	WIRELESS SENSOR NETWORK
2.	IT06TOE32	DIGITAL SIGNAL PROCESSING
3.	IT06TOE33	INFORMATION TECHNOLOGY FOR AUTOMATION
4.	IT06TOE34	REAL TIME SYSTEM

LIST OF OPEN ELECTIVE-IV

1.	IT08TOE41	ARTIFICIAL INTELIGENCE
2.	IT08TOE42	ECONOMIC POLICIESIN INDIA
3.	IT08TOE43	COMPUTER APPLICATION IN SOCIAL SCIENCE
4.	IT08TOE44	MANAGING INNOVATION & ENTERPRENEURSHIP

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT08TOE41	3	0	0	3 hours	30	70	3

ARTIFICIAL INTELLIGENCE

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	IA	ESE	CREDITS
IT08TPE61	3	0	0	3 HOURS	30	70	3

MACHINE LEARNING

UNIT I

INTRODUCTION Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

UNIT II

NEURAL NETWORKS AND GENETIC ALGORITHMS Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

UNIT III

BAYESIAN AND COMPUTATIONAL LEARNING Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

UNIT IV

INSTANT BASED LEARNING 9 K- Nearest Neighbour Learning – Locally weighted Regression – Radial Bases Functions – Case Based Learning.

UNIT V

ADVANCED LEARNING Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning.

SUB CODE	L	T	P	DURATION/WEEK	I A	ESE	CREDITS
IT06TOE31	3	0	0	3 hours	30	70	3

Subject : WSN

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.