

UNIVERSITY INSTITUTE OF ENGINEERING AND TECHNOLOGY
UNIVERSITY OF JAMMU



SYLLABUS
FOR
B.Tech COMPUTER SCIENCE AND ENGINEERING
3rd To 8th SEMESTER
BATCH 2018 Onwards

University Institute of Engineering and Technology

University of Jammu

**B.Tech Computer Science and Engineering Third Semester Examinations to be held in the
Year December 2019, 2020,2021, 2022**

Contract Hours:-27

Bachelor of Technology (Computer Science & Engineering) Semester III										
Credit-Based Scheme of Studies/Examination										
S.No.	Course Code	Subject	Hours Per Week			Credits	Marks Distribution			
			L	T	P		Major	Minor	Practical	Total
1.	ES-301	Analog Electronics	3	-	-	3	100	50	-	150
2.	BS-301	Numerical	2	1	-	3	100	50	-	150
3.	CS-301	Object Oriented Programming Using C++	3	1	-	4	100	50	-	150
4.	CS-302	Principles of Programming Languages	3	-	-	3	100	50	-	150
5.	CS-303	Computer Organization & Architecture	3	-	-	3	100	50	-	150
6.	HSM-301	Business Intelligence and Entrepreneurship	3	-	-	3	100	50	-	150
7.	ES-311	Analog Electronics Lab	-	-	2	1	-	-	50	50
8.	CS-311	Object Oriented Programming Using C++ Lab	-	-	2	1	-	-	50	50
9.	CS-312	Computer Organization & Architecture Lab	-	-	2	1	-	-	50	50

10.	MOOC-01	MOOCs	-	-	2	1	-	50	-	50
Total			17	2	8	23	600	350	150	1100

B.Tech Computer Science and Engineering Third Semester Examinations (ES-301) to be held in the Year December 2019, 2020,2021, 2022
Semester III

ES-301

3L:0T:0P

ANALOG ELECTRONICS

Major	Minor	Credits
100	50	3

UNIT I:

Bipolar Junction Transistors (BJTs): Generalized transistor equation, Transistor current equations, Reach through and avalanche mechanism, different methods of biasing, Bias stabilization, Thermal runaway, Bias Compensation;
(10hrs)

UNIT II:

Hybrid parameters: Hybrid model for CE, CB, CC configuration with necessary derivations, Analysis of CE amplifier with and without emitter resistance, Miller theorem, Approximation model of h-parameter;
(10hrs)

UNIT III:

Feedback Amplifiers: Principle, Advantages of Negative Feedback, Topologies, Current Series and Voltage Series Feedback Amplifiers; Oscillators – Classification, RC oscillators and Phase Shift, Wien Bridge, High Frequency LC and Non-Sinusoidal type Oscillators;
(10hrs)

UNIT IV:

Operational Amplifiers and Applications: Introduction to Op-Amp, Differential Amplifier Configurations, CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp, Concept of Virtual Ground; **(10hrs)**

Suggested Books:

1. David. A. Bell (2003), Laboratory Manual for Electronic Devices and Circuits, Prentice Hall, India
2. Santiram Kal (2002), Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India
3. Thomas L. Floyd and R. P. Jain (2009), Digital Fundamentals by Pearson Education,

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4. Paul B. Zbar, A.P. Malvino and M.A. Miller (2009), Basic Electronics – A Text-Lab. Manual, TMH
5. R.T. Paynter (2009), Introductory Electronic Devices & Circuits, Conventional Flow Version, Pearson

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

**B.Tech Computer Science and Engineering Third Semester Examinations(BS-301) to be
held in the Year December 2019, 2020,2021, 2022
Semester III**

BS-301

2L:1T:0P

Numerical Methods

Major	Minor	Credits
100	50	3

Unit I:Interpolation:

(07 Hours)

Definition of operators, Newton's Forward, Backward & Divided difference interpolation, Central difference interpolation formula, Stirling's & Bessel's formula, and Lagrange's Interpolation formulas,

UNIT II:Numerical Integration:

(08 Hours)

Derivatives using Forward Difference Formula, Backward difference formula & Central difference formula, Numerical integration, Trapezoidal and Simpson's one-third Rule.

UNIT II:Numerical Solutions of Algebraic and Transcendental Equations

(07 Hours)

Numerical Solutions of Algebraic and Transcendental Equations by Regula Falsi, Newton-Raphson and direct iterative methods.

UNIT IV:Difference equations & their solutions

(08 Hours)

Solution of difference equations, solution of differential equations by Picard's method, Euler's method, Taylor's series method, Runge-Kutta method.

BOOKS RECOMMENDED:

01. Advance Engineering Mathematics by Jain &Iyengar
02. Numerical Methods in Engg. & Science by B.S. Grewal
03. Engineering Mathematics by S.S. Sastry
04. Text Book on Complex Analysis and Numerical Methods by Dr. Bhopinder Singh, Kirti Publisher,Jammu 2017

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

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Semester III

CS-301

3L:1T:0P

Object Oriented Programming using C++

Major	Minor	Credits
100	50	4

Course Objectives

- To teach the basic concepts and techniques which form the object oriented programming paradigm using C++.

Unit I

(12 Hours)

Introduction to C++, C++ Standard Library, Illustrative Simple C++ Programs. Header Files, Namespaces, Application of object oriented programming.

Object Oriented Concepts, Introduction to Objects and Object Oriented Programming, Encapsulation, Polymorphism, Overloading, Inheritance, Abstract Classes, Accessifier (public/ protected/ private), Class Scope and Accessing Class Members, Controlling Access Function, Constant, Class Member, Structure and Class

Unit II

(12 Hours)

Friend Function and Friend Classes, This Pointer, Dynamic Memory Allocation and Deallocation (New and Delete), Static Class Members, Constructors, parameter Constructors and Copy Constructors, Deconstructors, Introduction of inheritance, Types of Inheritance, Overriding Base Class Members in a Derived Class, Public, Protected and Private Inheritance, Effect of Constructors and Deconstructors of Base Class in Derived Classes.

Unit III (10 Hours)

Polymorphism, Pointer to Derived class, Virtual Functions, Pure Virtual Function, Abstract Base Classes, Static and Dynamic Binding, Virtual Deconstructors. Fundamentals of Operator Overloading, Rules for Operators Overloading, Implementation of Operator Overloading Like <> Unary Operators, Binary Operators.

Unit IV (12 Hours)

Text Streams and binary stream, Sequential and Random Access File, Stream Input/ Output Classes, Stream Manipulators. Basics of C++ Exception Handling, Try, Throw, Catch, multiple catch, Re-throwing an Exception, Exception specifications.

Templates: Function Templates, Overloading Template Functions, Class Template, Class Templates and Non- Type Template arguments.

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Suggested Books:

1. The complete reference C ++ by Herbert shieldt Tata McGraw Hill.
2. Object Oriented Programming in Turbo C++ by Robert Lafore, 1994, The WAITE Group Press.
3. Shukla, Object Oriented Programming in c++, Wiley India.
4. C++ How to Program by H M Deitel and P J Deitel, 1998, Prentice Hall.
5. Programming with C++ By D Ravichandran, 2003, T.M.H.

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
C01	To introduce the basic concepts of object oriented programming language and the its representation

C02	To allocate dynamic memory, access private members of class and the behavior of inheritance and its implementation.
C03	To introduce polymorphism, interface design and overloading of operator.
C04	To handle backup system using file, general purpose template and handling of raised exception during programming.

B.Tech Computer Science and Engineering Third Semester Examinations(CS-302) to be held in the Year December 2019, 2020,2021, 2022

Semester III

CS-302

3L:0T:0P

Principles of Programming Language

Major	Minor	Credits
100	50	3

Course Objectives:-

1. To study and appreciate different types of languages and the underlying mathematical theories.
2. To understand, design and appreciate new language features.

Unit I (06 Hours)

Introduction: Overview of different programming paradigms e.g. imperative, object oriented, functional, logic and concurrent programming.

Syntax and semantics of programming languages: A quick overview of syntax specification and semiformal semantic specification using attribute grammar.

Unit II (08 Hours)

Imperative and OO Languages: Names, their scope, life and binding. Control-flow, control abstraction; in subprogram and exception handling. Primitive and constructed data types, data abstraction, inheritance, type checking and polymorphism.

Unit III (12 Hours)

Functional Languages: Typed-calculus, higher order functions and types, evaluation strategies, type checking, implementation, case study.

Logic Programming Languages: Computing with relation, first-order logic, SLD-resolution, unification, sequencing of control, negation, implementation, case study.

Unit IV (06 Hours)

Concurrency: Communication and synchronization, shared memory and message passing, safety and liveness properties, multithreaded program.

Unit V (10 Hours)

Formal Semantics: Operational, denotational and axiomatic semantics of toy languages, languages with higher order constructs and types, recursive type, subtype, semantics of non determinism and concurrency.

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Reference Books:-

1. Glynn Winskel, A Formal Semantics of Programming Languages: An Introduction, MIT Press.
2. John C. Mitchell, Foundations for Programming Languages, MIT Press.

3. Benjamin C. Pierce, Types and Programming Languages, MIT Press.
4. Daniel P. Friedman, Mitchell Wand and Christopher T. Haynes, Essentials of Programming Languages, Prentice Hall of India.
5. Ravi Sethi, Programming Languages: Concepts and Constructs, Addison-Wesley.
6. H. P. Barendregt, The Lambda Calculus: Its Syntax and Semantics, North-Holland.

NOTE: There shall be total ten questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
C01	Understand syntax related concepts and semantic issues associated with function implementations.
C02	Analyze operational and notational definitions for basic programming language constructs.
C03	Evaluate the programming languages to make a better choice.
C04	Design new language and develop effective algorithms.

**B.Tech Computer Science and Engineering Third Semester Examinations(CS-303) to be
held in the Year December 2019, 2020,2021, 2022
Semester III**

Computer Organization and Architecture

Major	Minor	Credits
100	50	3

Objectives of the course:

To expose the students to the following :

1. How Computer Systems work & the basic principles
2. Instruction Level Architecture and Instruction Execution
3. The current state of art in memory system design
4. How I/O devices are accessed and its principles.
5. To provide the knowledge on Instruction Level Parallelism
6. To impart the knowledge on micro programming
7. Concepts of advanced pipelining techniques.

Unit 1:**(12 Hours)**

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.

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.

Unit 2:**(12 Hours)**

Introduction to x86 architecture. CPU control unit design: hardwired and micro-programmed design approaches.

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.

Unit 3:**(10 Hours)**

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

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Unit 4: (10 Hours)

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.
3. “Computer Architecture and Organization”, 3rd Edition by John P. Hayes, WCB/McGraw-Hill
4. “Computer Organization and Architecture: Designing for Performance”, 10th Edition by William Stallings, Pearson Education.
5. “Computer System Architecture”, by Morris Mano, Pearson Education.

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
C01	Be familiar with the functional units of the processor such as the register file and arithmetic- logical unit, and with the basics of systems topics
C02	Be familiar with the design trade-offs in designing and constructing a computer
C03	Differentiate different kinds of memories and to know their performance.
C04	Be familiar with the basic knowledge of I/O devices and interfacing of I/O devices with computer.

B.Tech Computer Science and Engineering Third Semester Examinations(HSM-301) to be held in the Year December 2019, 2020,2021, 2022

Semester III

HSM-301

3L:0T:0P

BUSINESS INTELLIGENCE AND ENTREPRENEURSHIP

Major	Minor	Credits
100	50	3

Objectives of the Course:-

1. Students will be able understand who the entrepreneurs are and what competences needed to become an Entrepreneur.
2. Students will be able understand insights into the management, opportunity search, identification of a Product; market feasibility studies; project finalization etc. required for small business enterprises.
3. Students can be able to write a report and do oral presentation on the topics such as product identification, business idea, export marketing etc.
4. Students be able to know the different financial and other assistance available for the establishing small industrial units.

Unit -I

Entrepreneurship: Concept and Definitions; Entrepreneurship and Economic Development; Classification and Types of Entrepreneurs; Entrepreneurial Competencies; Factor Affecting Entrepreneurial Growth – Economic, Non-Economic Factors; EDP Programmes; Entrepreneurial Training; Traits/Qualities of an Entrepreneurs; Entrepreneur; Manager Vs. Entrepreneur.

Unit –II

Opportunity / Identification and Product Selection: Entrepreneurial Opportunity Search and Identification; Criteria to Select a Product; Conducting Feasibility Studies; Project Finalization; Sources of Information.

Unit -III

Small Enterprises and Enterprise Launching Formalities : Definition of Small Scale; Rationale; Objective; Scope; Role of SSI in Economic Development of India; SSI; Registration; NOC from Pollution Board; Machinery and Equipment Selection; Project Report Preparation; Specimen of Project Report; Project Planning and Scheduling using Networking Techniques of PERT / CPM; Methods of Project Appraisal.

Unit -IV

Role of Support Institutions and Management of Small Business : Director of Industries; DIC; SIDO; SIDBI; Small Industries Development Corporation (SIDC); SISI; NSIC; NISBUD;

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State Financial Corporation SIC; Marketing Management; Production Management; Finance Management; Human Resource Management; Export Marketing; Case Studies-At least one in whole course.

Suggested Books:

1. Small-Scale Industries and Entrepreneurship. Himalaya Publishing House, Delhi -Desai, Vasant, 2003.
2. Entrepreneurship Management -Cynthia, Kaulgud, Aruna, Vikas Publishing House, Delhi, 2003.
3. Entrepreneurship Ideas in Action- L. Greene, Thomson Asia Pvt. Ltd., Singapore, 2004.

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
C01	Students will be able understand who the entrepreneurs are and what competences needed to become an Entrepreneur.
C02	Students will be able understand insights into the management, opportunity search, identification of a Product; market feasibility studies; project finalization etc. required for small business enterprises.

C03	Students can be able to write a report and do oral presentation on the topics such as product identification, business idea, export marketing etc.
C04	Students be able to know the different financial and other assistance available for the establishing small industrial units.

B.Tech Computer Science and Engineering Third Semester Examinations(ES-311) to be held in the Year December 2019, 2020,2021, 2022

Semester III

ES-311

0L:0T:2P

ANALOG ELECTRONICS LAB

Practical	Credits
50	1

List of Practical:

- 1: Design of self bias circuit using BJT.
- 2: To study operation characteristics of PNP/NPN Transistor (CE/CB)
- 3: Determination of h-parameters from transistor characteristics.
- 4: Determination of voltage gain, Input/output resistance of amplifiers using with and without feedback.
- 5: Op-Amp Applications – Adder, Subtractor, Voltage Follower and Comparator.
- 6: Op-Amp Applications – Differentiator and Integrator, Square Wave and Triangular Wave Generation.
7. Study of Wein bridge, Phase regulator and determine frequency of output waveform.

B.Tech Computer Science and Engineering Third Semester Examinations(CS-311) to be held in the Year December 2019, 2020,2021, 2022

Semester III

CS-311

0L:0T:2P

Object Oriented Programming using C++ Lab

Practical	Credits
50	1

COURSE OBJECTIVES

1. To introduce the basic concepts of object oriented programming language and the its representation.
2. To allocate dynamic memory, access private members of class and the behavior of inheritance and its implementation.

3. To introduce polymorphism, interface design and overloading of operator.
4. To handle backup system using file, general purpose template and handling of raised exception during programming.

The Practical will be based on Computer Languages Theory Syllabus. The students are required to submit at least 10 Programs covering at least 2 programs from each unit.

COURSE OUTCOMES	
C01	To introduce the basic concepts of object oriented programming language and the its representation.
C02	To allocate dynamic memory, access private members of class and the behavior of inheritance and its implementation.
C03	To introduce polymorphism, interface design and overloading of operator.
C04	To handle backup system using file, general purpose template and handling of raised exception during programming.

B.Tech Computer Science and Engineering Third Semester Examinations(CS-312) to be held in the Year December 2019, 2020,2021, 2022

Semester III

CS-312

0L:0T:2P

Computer Organization and Architecture Lab

Practical	Credits
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50	1
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COURSE OBJECTIVES

1. To understand assembly language programming.

Implement atleast 10 assembly language programs using 8085 simulator like GNUsim8085.

COURSE OUTCOMES	
C01	Familiarization with assembly language programming.
C02	Be familiar with the basic knowledge of the design of digital logic circuits and apply to computer organization and Architecture

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Year June 2020,2021, 2022, 2023**

Contract Hours:-29

Bachelor of Technology (Computer Science & Engineering) Semester IV										
Credit-Based Scheme of Studies/Examination										
S.No.	Course Code	Subject	Hours Per Week			Credits	Marks Distribution			
			L	T	P		Major	Minor	Practical	Total
1.	ES-401	Digital Electronics	3	-	-	3	100	50	-	150
2.	CS-401	Discrete Mathematics	3	-	-	3	100	50	-	150
3.	CS-402	Data Structures	3	1	-	4	100	50	-	150
4.	CS-403	Operating Systems	3	1	-	4	100	50	-	150
5.	CS-404	Design & Analysis of Algorithms	3	1	-	4	100	50	-	150
6.	HSM-401	Organizational Behaviour	3	-	-	3	100	50	-	150
7.	CS-411	Data Structures Lab	-	-	2	1	-	-	50	50
8.	CS-412	Operating Systems Lab	-	-	2	1	-	-	50	50
9.	CS-413	Design & Analysis of Algorithms Lab	-	-	2	1	-	-	50	50
10.	ES-411	Digital Electronics	-	-	2	1	-	-	50	50
Total			18	3	8	25	600	300	200	1100

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B.Tech Computer Science and Engineering Fourth Semester Examinations(ES-401) to be held in the Year June 2020,2021, 2022, 2023

Semester IV

ES-401

3L:0T:0P

DIGITAL ELECTRONICS

Major	Minor	Credits
100	50	3

UNIT 1 FUNDAMENTALS OF DIGITAL TECHNIQUES:

Digital signal, logic gates: AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR, Boolean algebra. Review of Number systems. Binary codes: BCD, Excess-3, Gray codes, Error correcting and detecting code (Hamming code), Karnaugh map and Quine Mcluskey methods of simplification. **(10hrs)**

UNIT 2 COMBINATIONAL DESIGN USING MSI DEVICES:

Multiplexers and Demultiplexers and their use as logic elements. Decoders. Adders / Subtractors. BCD adder, Encoders, Comparator. **(8hrs)**

UNIT 3 DIGITAL LOGIC FAMILIES:

Bipolar logic families: RTL, DTL, DCTL, HTL, TTL, ECL, MOS, and CMOS logic families.

(8hrs)

UNIT 4 SEQUENTIAL CIRCUITS:

Flip Flops: S-R, J-K, T, D, master-slave, conversion of flip flops, edge triggered- shift registers, sequence generators. Counters. Asynchronous and Synchronous Ring counters and Johnson Counter, Design of Synchronous and Asynchronous sequential circuits. **(11hrs)**

TEXT BOOKS:

1. Modern Digital Electronics (Edition III): R. P. Jain;
1. Digital Integrated Electronics: Taub & Schilling: MGH
2. Digital Principles and Applications: Malvino & Leach: McGraw Hill.

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3. Digital Design: Morris Mano:.

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

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Semester IV

CS-401

3L:0T:0P

DISCRETE MATHEMATICS

Major	Minor	Credits
100	50	3

Unit I: Set Relations and Functions

(10 Hours)

Finite and infinite sets, countable and uncountable sets, Principle of inclusion and exclusion, Mathematical Induction, Pigeon-Hole principle. Logical operators, truth tables, Law of inferences and propositional calculus.

Unit II: Algebraic Structures

(10 Hours)

Relations and functions, types of functions, Lattice, chains, Anti chains. Groups and sub groups, Related theorems, cosets, normal subgroups and group Homomorphism, Rings, integral domains and fields; examples and related results.

Unit III: Graph Theory

(10 Hours)

Basic terminology, multi graphs and weighted graphs, connectivity; walk, trail and path, circuits & Cycles, shortest path in weighted graphs, Algorithm of shortest path. Hamiltonian and Eulerian paths and circuits, Eulerian trail & circuit, Eulerian graphs, Hamiltonian cycle, Hamiltonian graph, Konisberg Bridge problem, Chinese Postman problem, Traveling Sales Person problem, Planar graph and Euler's formula.

Unit IV: Trees

(10 Hours)

Trees and cut sets: - Trees, Rooted Trees, path lengths in rooted trees, prefix codes binary search trees, spanning trees and cut sets.

BOOKS RECOMMENDED

- i) C. L. Liu, Elements of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill, 2000.
- ii) R. C. Penner, Discrete Mathematics: Proof Techniques and Mathematical Structures, WorldScientific, 1999.
- iii) N. Deo, Graph Theory, Prentice Hall of India, 1974.
- iv) J. P. Tremblay and R. P. Manohar, Discrete Mathematics with Applications to Computer Science, Tata McGraw-Hill, 1997.

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

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COURSE OUTCOMES	
CO1	Understand basic principles of sets and operations in sets.
CO2	Apply logical notation to describe an argument.
CO3	Analyze relations and functions and be able to determine their properties.
CO4	Evaluate the basics concepts of groups, its examples and related results.
CO5	Create trees and graphs using different transversal methods.

B.Tech Computer Science and Engineering Fourth Semester Examinations(CS-402) to be held in the Year June 2020,2021, 2022, 2023

Semester IV

CS-402

3L:1T:0P

Data Structures

Major	Minor	Credits
100	50	4

Objectives of the course:

1. To impart the basic concepts of data structures and algorithms.
2. To understand concepts about searching and sorting techniques.
3. To understand basic concepts about stacks, queues, lists, trees and graphs.
4. To enable them to write algorithms for solving problems with the help of fundamental data structures

Unit 1: (08 Hours)

Introduction: Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Searching: Linear Search and Binary Search Techniques and their complexity analysis.

Unit 2: (10 Hours)

Stacks and Queues: ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.

Unit 3: (08 Hours)

Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.

Unit 4: (08 Hours)

Sorting and Hashing: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.

Unit 5: (12 Hours)

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with

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complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.

Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

Suggested Books:

1. “Fundamentals of Data Structures”, Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.
2. “Algorithms, Data Structures, and Problem Solving with C++”, Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
3. “Data Structures and Algorithms”, by Alfred V. Aho, Jeffrey D. Ullman and John E. Hopcroft, Pearson Education.

NOTE: There shall be total ten questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	To introduce the basic concepts of Data structure , basic data types ,searching and sorting based on array data types.
CO2	To introduce the structured data types like Stacks and Queue and its basic operations's implementation.
CO3	To introduces dynamic implementation of linked list.
CO4	To introduce the concepts of Tree and graph and implementation of traversal

B.Tech Computer Science and Engineering Fourth Semester Examinations (CS-403) to be held in the Year June 2020,2021, 2022, 2023

Semester IV

CS-403

3L:1T:0P

Operating Systems

Major	Minor	Credits
100	50	4

Objectives of the course

To learn the fundamentals of Operating Systems.

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

Unit 1: (08 Hours)

Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.

Unit 2: (10 Hours)

Processes: Definition, , Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching

Thread: Definition, Various states, Types of threads, Concept of multithreads,

Process Scheduling: Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

Unit 3: (12 Hours)

Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, The Producer\ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dining Philosopher Problem etc.

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

B.Tech Computer Science and Engineering Fourth Semester Examinations(CS-403) to be held in the Year June 2020,2021, 2022, 2023

Unit 4:

(08 Hours)

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition– Internal and External fragmentation and Compaction; Paging. Virtual Memory: Basics of Virtual Memory –Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms.

Unit 5:

(10 Hours)

I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping).

Suggested Books:

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.
3. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley
4. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India
5. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

NOTE: There shall be total ten questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	To understand the structure and functions of Operating system
CO2	To learn about processes, threads and scheduling algorithms.

CO3	To understand the principle of concurrency.
CO4	To understand the concept of deadlocks.
CO5	To learn various memory management schemes.
CO6	To study I/O management and file systems.
CO7	To study the concept of protection and security.

B.Tech Computer Science and Engineering Fourth Semester Examinations(CS-404) to be held in the Year June 2020,2021, 2022, 2023

Semester IV

CS-404

3L:1T:0P

Design and Analysis of Algorithms

Major	Minor	Credits
100	50	4

Objectives of the course :

Analyze the asymptotic performance of algorithms.

- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations.

Unit 1: (12 Hours)

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: (12 Hours)

Fundamental Algorithmic Strategies: Brute-Force, Greedy, Dynamic Programming, Branch and-Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving , Bin Packing, Knap Sack TSP.

Unit 3: (12 Hours)

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

Unit 4: (10 Hours)

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.

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.

B.Tech Computer Science and Engineering Fourth Semester Examinations(CS-404) to be held in the Year June 2020,2021, 2022, 2023

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	Learn the basic concepts of data structures and their analysis.
CO2	Study the concept of Greedy, Dynamic Programming, Branch and-Bound and Backtracking techniques for algorithm design.
CO3	Learn various graph algorithms and concepts of computational complexities
CO4	Evaluate the concepts of P, NP and NP-Complete problems and synthesize algorithm in common engineering designing situations.

B.Tech Computer Science and Engineering Fourth Semester Examinations(HSM-401) to be held in the Year June 2020,2021, 2022, 2023

Semester IV

HSM-401

3L:0T:0P

Organizational Behavior

Major	Minor	Credits
100	50	3

Unit 1: (08 Hours)

Organizational Behavior: Fundamental Concepts, Nature of people, Nature of organization, Features, need to study O.B, Models of organizational behavior. Motivation-Concept & Importance, Theories of motivation – Maslow’s Need Hierarchy Theory & Herzberg’s Motivation-Hygiene Theory.

Unit 2: (08 Hours)

Individual behavior and its determinants: Personality-Concept & Determinants; Perception-Meaning, Definition, Perceptual Process, internal & external factors in perceptual selectivity;

Attitude–Features, Components, Formation of Attitudes; OB Modification: Steps in OB Mod & Utility of OB Mod

Unit 3: (06 Hours)

Communication: Characteristics, Process, Types, Barriers & Breakdowns in Communication, Overcoming Communication Barriers, Guidelines for Effective Communication.

Unit 4: (08 Hours)

Organization as a Social system: Concept, Characteristics & Objectives of Organization Development, Organization Development Process. Organizational Change: Nature of Organizational Change, Forces to Change, Causes of Resistance to Change, Techniques of overcoming Resistance to Change, Response & Reactions to Change

Unit 5: (08 Hours)

Leadership and Organization Development: Leadership–Characteristics and Functions of Leader, Qualities of a good Leader, Importance of leadership, Styles of Leadership; Dynamics of Conflict – Nature of Conflict, Types of Conflict, Stages in conflict, Resolution of conflicts.

Suggested Books:-

1. “Organisational Behaviour”, by John W. Newstrom& Keith Davis.
2. “Organisational Behaviour”, by Robbins.
3. “Management”, by G. S. Sudha.
4. “Principles of Management”, Dr. NeeruVaisisth.

**B.Tech Computer Science and Engineering Fourth Semester Examinations(HSM-401)
to be held in the Year June 2020,2021, 2022, 2023**

NOTE: There shall be total ten questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	Remember and understand work in organizations by gaining proper knowledge about concepts, models, and theories of O.B and detail knowledge about personality, perception etc.

C02	Apply and transmit their ideas, facts, thoughts, feelings, and values effectively through effective communication tools.
C03	Analyze and cope up with the organizational changes in future.
C04	Evaluate the work for development of the organizations.
C05	create to work as an effective leader for organizational development and organizational change

B.Tech Computer Science and Engineering Fourth Semester Examinations(CS-411) to be held in the Year June 2020,2021, 2022, 2023

Semester IV

CS-411

0L:0T:2P

Data Structures Lab

Practical	Credits
50	1

COURSE OBJECTIVES

1. To introduce the basic concepts of Data structure, basic data types, searching and sorting based on array data types.
2. To introduce the structured data types like Stacks and Queue and its basic operation's implementation.
3. To introduce dynamic implementation of linked list.
4. To introduce the concepts of Tree and graph and implementation of traversal algorithms.

List of Practical

1. Write a program for Binary search methods.
2. Write a program for insertion sort, selection sort and bubble sort.
3. Write a program to implement Stack and its operation.
4. Write a program for quick sort.
5. Write a program for merge sort.
6. Write a program to implement Queue and its operation.
7. Write a program to implement Circular Queue and its operation.
8. Write a program to implement singly linked list for the following operations: Create, Display, searching, traversing and deletion.
9. Write a program to implement doubly linked list for the following operations: Create, Display, inserting, counting, searching, traversing and deletion.
- 10 Write a program to implement circular linked list for the following operations: Create, Display, inserting, counting, searching, traversing and deletion.
11. Write a program to implement insertion, deletion and traversing in B tree.

COURSE OUTCOMES	
CO1	To introduce the basic concepts of Data structure, basic data types, searching and sorting based on array data types.
CO2	To introduce the structured data types like Stacks and Queue and its basic operation's implementation
CO3	To introduces dynamic implementation of linked list.
CO4	To introduce the concepts of Tree and graph and implementation of traversal

B.Tech Computer Science and Engineering Fourth Semester Examinations(CS-412) to be held in the Year June 2020,2021, 2022, 2023

Semester IV

CS-412

0L:0T:2P

Operating Systems Lab

Practical	Credits
50	1

COURSE OBJECTIVES

1. To understand the CPU scheduling.
2. To learn about memory management.
3. To understand system calls.
4. To understand the concept of file operations.
5. To learn various classical problems.

List of Practical

1. Simulation of the CPU scheduling algorithms a) Round Robin b) SJF c) FCFS d) Priority
2. Program for paging techniques of memory management.
3. Program for page replacement algorithms
4. Simulation of Bankers Deadlock Avoidance and Prevention algorithms.
5. Program for Implementation of System Calls.
6. Program for File Permissions
7. Program for File Operations.
8. Program for File Copy and Move.
9. Program for Dining Philosophers Problem.
10. Program For Producer – Consumer Problem concept.
11. Program for disk scheduling algorithms.

COURSE OUTCOMES	
CO1	Build program for process and file system management using system calls (preferably C programs)

CO2	Choose the best CPU scheduling algorithm for a given problem
CO3	Identify the performance of various page replacement algorithms.
CO4	Develop algorithm for deadlock avoidance, detection and file allocation strategies.

B.Tech Computer Science and Engineering Fourth Semester Examinations(CS-413) to be held in the Year June 2020,2021, 2022, 2023

Semester IV

CS-413

0L:0T:2P

Design and Analysis of Algorithms Lab

Practical	Credits
50	1

COURSE OBJECTIVES

1. The student should be able to Design algorithms for various computing problems.
2. The student should be able to Analyze the time and space complexity of algorithms.
3. The student should be able to Critically analyze the different algorithm design techniques for a given problem.
4. The student should be able to Modify existing algorithms to improve efficiency.

List of Practical

1. Sort a given set of elements using the Quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.

2. Using Open, implement a parallelized Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n , the number of elements in the list to be sorted and plot a graph of the time taken versus n . The elements can be read from a file or can be generated using the random number generator.
3. a. Obtain the Topological ordering of vertices in a given digraph.
b. Compute the transitive closure of a given directed graph using Warshall's algorithm.
4. Implement 0/1 Knapsack problem using Dynamic Programming.
5. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.
6. Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm.
7. Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.
8. a. Print all the nodes reachable from a given starting node in a digraph using BFS method.
b. Check whether a given graph is connected or not using DFS method.
9. Find a subset of a given set $S = \{s_1, s_2, \dots, s_n\}$ of n positive integers whose sum is equal to a given positive integer d . For example, if $S = \{1, 2, 5, 6, 8\}$ and $d = 9$ there are two

**B.Tech Computer Science and Engineering Fourth Semester Examinations(CS-413)
to be held in the Year June 2020,2021, 2022, 2023**

solutions $\{1,2,6\}$ and $\{1,8\}$. A suitable message is to be displayed if the given problem instance doesn't have a solution.

10. Implement any scheme to find the optimal solution for the Traveling Salesperson problem and then solve the same problem instance using any approximation algorithm and determine the error in the approximation.
11. Implement All-Pairs Shortest Paths Problem using Floyd's algorithm. Parallelize this algorithm, implement it using Open and determine the speed-up achieved.
12. Implement N Queen's problem using Back Tracking.
13. Use divides and conquers method to recursively implement Binary Search.

Note :- At least eight experiments are to be performed from above list.

COURSE OUTCOMES

CO1	The student should be able to Design algorithms for various computing problems.
CO2	The student should be able to analyze the time and space complexity of algorithms.
CO3	The student should be able to critically analyze the different algorithm design techniques for a given problem.
CO4	The student should be able to modify existing algorithms to improve efficiency.

B.Tech Computer Science and Engineering Fourth Semester Examinations(ES-411) to be held in the Year June 2020,2021, 2022, 2023

Semester IV

ES-411

0L:0T:2P

Digital Electronics Lab

Practical	Credits
50	1

LIST OF EXPERIMENTS

1. Study of TTL gates – AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR
2. Design & realize a given function using K-maps and verify its performance.

3. To verify the operation of multiplexer & Demultiplexer.
4. To verify the operation of comparator.
5. To verify the truth tables of S-R, J-K, T & D type flip flops
6. To verify the operation of bi-directional shift register.
7. To design & verify the operation of 3-bit synchronous counter.
8. To design and verify the operation of synchronous UP/DOWN decade counter using J K flip- flops & drive a seven-segment display using the same.
9. To design and verify the operation of asynchronous UP/DOWN decade counter using J K flip- flops & drive a seven-segment display using the same.
10. Design a 4-bit shift-register and verify its operation . Verify the operation of a ring counter and a Johnson counter.

**University Institute of Engineering and Technology
University of Jammu**

**B.Tech Computer Science and Engineering Fifth Semester Examinations to be held in the
Year December 2020,2021, 2022, 2023**

Contract Hours:- 25

Bachelor of Technology (Computer Science & Engineering) Semester V

Credit-Based Scheme of Studies/Examination										
S.No.	Course Code	Subject	Hours Per Week			Credits	Marks Distribution			
			L	T	P		Major	Minor	Practical	Total
1.	CS-501	Software Engineering	3	-	-	3	100	50	-	150
2.	CS-502	Database Management Systems	3	1	-	4	100	50	-	150
3.	CS-503	Formal Language & Automata	3	1	-	4	100	50	-	150
4.	CS-504	IT Workshop (Sci Lab/MATLAB)	1	-	-	1	-	50	-	50
5.	PECS-51	Elective-1	3	-	-	3	100	50	-	150
6.	HSM-501	Law and engineering	3	-	-	3	100	50	-	150
7.	CS-511	Database Management Systems Lab	-	-	2	1	-	-	50	50
8.	CS-512	IT Workshop (Sci Lab/MATLAB) Lab	-	-	2	1	-	-	50	50
9.	MOOC-02	MOOCs	-	-	2	1	-	50	-	50
10	SEM-513	Seminar on Summer Internship	1	-	-	1	-	50	-	50
Total			17	2	6	22	500	400	100	1000

PECS-51 Elective-I
Information Theory and Coding (T1)
Advanced Algorithms (T2)
Parallel and Distributed Algorithms (T3)

B.Tech Computer Science and Engineering Fifth Semester Examinations(CS-501) to be held in the Year December 2020,2021, 2022, 2023

Semester V

CS-501

3L:0T:0P

Software Engineering

Major	Minor	Credits
100	50	3

Course Objectives:-

- Use effective communication skills and technical skills to assure production of quality software, on time and within budget.
- Build upon and adapt knowledge of science, mathematics, and engineering to take on more expansive tasks that require an increased level of self-reliance, technical expertise, and leadership.

Unit I: Introduction

(06 Hours)

The role of Software, Software Characteristics, Industrial strength software, Classification of software products, Legacy Software, Software Engineering Challenges, Software Development Life Cycle.

Unit II: Software Process

(08 Hours)

Software Development Process Models: Waterfall, Prototyping, Iterative, Spiral. Comparison of Models, Project Management Process, Inspection Process, Software Configuration management Process, Requirements Change management Process, Agile Process.

Unit III: Feasibility Study, Requirements Engineering & Analysis Modeling

(10 Hours)

Feasibility study: Technical, Economic & Behavioral; Data Gathering: Sources of Data, Observation, Interviewing, Questioners, On-site Observation, Software Process & Characteristics, Software Requirements, Problem Analysis: Data Flow Modeling, Object Oriented Modeling, Prototyping, Cost Benefit Analysis, SRS, Developing Use Cases. Validation & Metrics

Unit IV:

(10 Hours)

Planning Software Projects

Effort Estimation: Constructive Cost Model (COCOMO), Project Scheduling, SCM planning, Quality Planning, Risk Management, Project Monitoring Planning

Design Engineering

Design Concepts & Principles, Cohesion, Coupling, Design Methodology, Introduction to Unified Modeling Language (UML), Verification, Metrics

Unit V: (12 Hours)
Coding & Testing

B.Tech Computer Science and Engineering Fifth Semester Examinations(CS-501) to be held in the Year December 2020,2021, 2022, 2023

Programming principles, Coding Conventions, Coding process, Refactoring, Verification, Coding Metrics, Test Cases, Test Plan, White box & Black box testing, Unit Testing, Integration Testing, Validation Testing: Alpha & Beta Testing, System Testing, Debugging, Testing Metrics

Reliability, Quality & Maintenance

Software Reliability & Metrics, ISO 9000 Standard, Capability Maturity Model, CASE Tools, User Training, Software Maintenance

Reference Books:-

1. Software Engineering: A practitioner's Approach, Pressman, 6th Ed., McGraw Hill
2. System Analysis & Design, Elias M Awad
3. Fundamentals of Software Engineering, Ghezzi, C ,PHI
4. Managing the Software Process, W S Humphrey Addison–Wesley
5. Ed. Encyclopedia of Software Engineering, Vols 1&2 , J J Marciniak, John Wiley
6. Software Engineering, 5th Edition, Sommerville Ian Addison Wesley.
7. Software Engineering., Manmdrioli, Dino
8. Software Engineering: A programming Approach,3rd Edition, Bell, Douglas
9. An integrated Approach to Software Engineering. ,Jalote, P ,Narosa Pub House

NOTE: There shall be total ten questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	To understand the basic concepts of Software Engineering.
CO2	To learn about the skills that will enable to construct high quality software.
CO3	To understand the software process models.

CO4	To understand the fundamental concept of requirements engineering and Analysis Modelling.
CO5	To understand the different design techniques and their implementation.
CO6	To learn about software testing and maintenance measures.

B.Tech Computer Science and Engineering Fifth Semester Examinations(CS-502) to be held in the Year December 2020,2021, 2022, 2023

Semester V

CS-502

3L:1T:0P

Database Management Systems

Major	Minor	Credits
100	50	4

Objectives of the course :

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modeling, relational, hierarchical, and network models
- To understand and use data manipulation language to query, update, and manage a database
- To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing.
- To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

Unit 1

(08 Hours)

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: (12 Hours)

Relational query languages: Relational algebra, Tuple and domain relational calculus, DDL and DML constructs

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: (10 Hours)

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.

B.Tech Computer Science and Engineering Fifth Semester Examinations(CS-502) to be held in the Year December 2020,2021, 2022, 2023

Unit 4: (08 Hours)

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

Unit 5: (08 Hours)

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

NOTE: There shall be total ten questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	To provide introduction to relational model.
CO2	To learn about ER diagrams.
CO3	To understand about Query Processing and Transaction Processing.
CO4	To understand about the concept of functional dependencies.
CO5	To learn the concept of failure recovery.
CO6	To understand the concurrency control.

B.Tech Computer Science and Engineering Fifth Semester Examinations(CS-503) to be held in the Year December 2020,2021, 2022, 2023

Semester V

CS-503

3L:1T:0P

Formal Language and Automata Theory

Major	Minor	Credits
100	50	4

Objectives of the Course

- Develop a formal notation for strings, languages and machines.

- Design finite automata to accept a set of strings of a language.
- Prove that a given language is regular and apply the closure properties of languages.
- Design context free grammars to generate strings from a context free language and convert them into normal forms.
- Prove equivalence of languages accepted by Push Down Automata and languages generated by context free grammars
- Identify the hierarchy of formal languages, grammars and machines.
- Distinguish between computability and non-computability and Decidability and undecidability.

Unit 1 (08 Hours)

Introduction: Alphabet, languages and grammars, productions and derivation, Chomsky hierarchy of languages.

Unit 2 (10 Hours)

Regular languages and finite automata: Regular expressions and languages, deterministic finite automata (DFA) and equivalence with regular expressions, nondeterministic finite automata (NFA) and equivalence with DFA, regular grammars and equivalence with finite automata, properties of regular languages, pumping lemma for regular languages, minimization of finite automata.

Unit 3 (10 Hours)

Context-free languages and pushdown automata: Context-free grammars (CFG) and languages (CFL), Chomsky and Greibach normal forms, nondeterministic pushdown automata (PDA) and equivalence with CFG, parse trees, ambiguity in CFG, pumping lemma for context-free languages, deterministic pushdown automata, closure properties of CFLs.

B.Tech Computer Science and Engineering Fifth Semester Examinations(CS-503) to be held in the Year December 2020,2021, 2022, 2023

Unit 4 (10 Hours)

Context-sensitive languages: Context-sensitive grammars (CSG) and languages, linear bounded automata and equivalence with CSG.

Unit 5 (10 Hours)

Turing machines: The basic model for Turing machines (TM), Turingrecognizable (recursively enumerable) and Turing-decidable (recursive) languages and their closure properties, variants of Turing machines, nondeterministic TMs and equivalence with deterministic TMs, unrestricted grammars and equivalence with Turing machines, TMs as enumerators, Church-Turing thesis, universal Turing machine.

Suggested Books:

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education Asia.
2. Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory of Computation, Pearson Education Asia.
3. Michael Sipser, Introduction to the Theory of Computation, PWS Publishing.

NOTE: There shall be total ten questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	Students are able to explain and manipulate the different fundamental concepts in automata theory and formal languages.
CO2	Simplify automata and context-free grammars; Prove properties of languages, grammars and automata with rigorously formal mathematical methods, minimization.
CO3	Differentiate and manipulate formal descriptions of push down automata, its applications and transducer machines.
CO4	To understand basic properties of Turing machines and computing with Turing machine,the concepts of tractability and decidability.

B.Tech Computer Science and Engineering Fifth Semester Examinations(CS-504) to be held in the Year December 2020,2021, 2022, 2023
Semester V

IT Workshop (SCILAB / MATLAB)

Major	Minor	Credits
-	50	1

Unit 1 (02 Hours)

Introduction to MATLAB/SCILAB : Installing the software, Getting started with the general environment and console, Creating variables, managing workspace.

Unit 2 (04 Hours)

Functions and Plotting : Defining a function, Function Libraries, Managing output arguments, Creating simple plots, Adding titles, axis labels, and annotations, Multiple data sets in one plot, Specifying line styles and colors.

Unit 3 (03 Hours)

Arrays and Matrices: Vectors, Matrices, operations on matrices, solving linear equations

Unit 4 (03 Hours)

Control flow and operators : relational and logical operators, operator precedence, if...end structure, while...end loop, for...end loop, Other flow structures.

Unit 4 (04 Hours)

Introduction to programming: M-file or .sce file scripts, M-file functions, Input to a script file, output commands, debugging process.

COURSE OUTCOMES	
CO1	To make students familiar with computing environment like MATLAB/SCILAB.
CO2	To enable students to do programming in MATLAB/SCILAB.
CO3	To enable students to use M-file or .sce file scripts.

**B.Tech Computer Science and Engineering Fifth Semester Examinations(PECS-51(T1)) to
be held in the Year December 2020,2021, 2022, 2023
Semester V**

PECS-51

Elective I

3L:0T:0P

Information Theory and Coding (T1)

Major	Minor	Credits
100	50	3

Unit 1: **(12 Hours)**

Information Theory: Entropy, Information rate, source coding: Shannon-Fano and Huffman coding techniques, Mutual Information, Channel capacity of Discrete Channel, Shannon- Hartley law.

Unit 2: **(12 Hours)**

Error Control Codes: Examples of the use of error control codes, basic notations, coding gain, Characterization of Error control codes

Linear Block Codes: Linear block codes and their properties, standard arrays, syndromes, weight distribution. Error detection/correction properties.

Unit 3: **(12 Hours)**

Convolution Codes: Convolution encoders, structural properties of convolution codes.

Cyclic Codes: General theory, Shift Register Implementations, Shortened Cyclic codes, CRCs for Error Detection.

Suggested Books :

1. N. Abramson, Information and Coding, McGraw Hill, 1963.
2. M. Mansurpur, Introduction to Information Theory, McGraw Hill, 1987.
3. R.B. Ash, Information Theory, Prentice Hall, 1970
4. Andre Neabauer, "Coding Theory: Algorithms, Architectures & Applications", Wiley Publications, 2010.

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	Design the channel performance using Information theory.
CO2	Comprehend various error control code properties.
CO3	Apply linear block codes for error detection and correction.

B.Tech Computer Science and Engineering Fifth Semester Examinations(PECS-51(T2)) to be held in the Year December 2020,2021, 2022, 2023
Semester V

PECS-51

Elective I

3L:0T:0P

Advanced Algorithms (T2)

Major	Minor	Credits
100	50	3

Unit1

(10 Hours)

Sorting: Review of various sorting algorithms, topological sorting

Graph: Definitions and Elementary Algorithms: Shortest path by BFS, shortest path in edge-weighted case (Dijkstra's), depth-first search and computation of strongly connected components, emphasis on correctness proof of the algorithm and time/space analysis, example of amortized analysis.

Unit 2:

(06 Hours)

Matroids: Introduction to greedy paradigm, algorithm to compute a maximum weight maximal independent set. Application to MST.

Unit 3

(10 Hours)

Flow-Networks: Maxflow-mincut theorem, Ford-Fulkerson Method to compute maximum flow

Matrix Computations: Strassen's algorithm and introduction to divide and conquer paradigm, inverse of a triangular matrix, relation between the time complexities of basic matrix operations.

Unit 4**(10 Hours)**

Shortest Path in Graphs: Floyd-Warshall algorithm and introduction to dynamic programming paradigm.

Unit 5**(08 Hours)**

Linear Programming: Geometry of the feasibility region and Simplex algorithm

NP-completeness: Examples, proof of NP-hardness and NP-completeness.

Suggested Books:

1. "Introduction to Algorithms" by Cormen, Leiserson, Rivest, Stein.
2. "The Design and Analysis of Computer Algorithms" by Aho, Hopcroft, Ullman.
3. "Algorithm Design" by Kleinberg and Tardos

B.Tech Computer Science and Engineering Fifth Semester Examinations(PECS-51(T2)) to be held in the Year December 2020,2021, 2022, 2023

NOTE: There shall be total ten questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	Students should develop a sound theoretical understanding of advanced algorithms and practical problem solving skills using them.
CO2	Students should develop basic knowledge of a wide range of advanced algorithm design techniques including dynamic programming, linear programming, divide and conquer and greedy algorithms.
CO3	Students should gain a good understanding on a wide range of advanced algorithmic problems, their relations and variants, and application to real-world problems.

**B.Tech Computer Science and Engineering Fifth Semester Examinations(PECS-51(T3)) to
be held in the Year December 2020,2021, 2022, 2023
Semester V**

PECS-51

Elective I

3L:0T:0P

Parallel and Distributed Algorithms(T3)

Major	Minor	Credits
100	50	3

Unit 1

Fundamentals: Models of parallel and distributed computation, complexity measures; The PRAM Model: balancing, divide and conquer, parallel prefix computation, pointer jumping, symmetry breaking, list ranking, sorting and searching, graph algorithms, parallel complexity and complexity classes, lower bounds

Unit 2

Interconnection Networks: topologies (arrays and mesh networks, trees, systolic networks, hypercubes, butterfly) and fundamental algorithms, matrix algorithms, sorting, graph algorithms, routing, relationship with PRAM models;
Asynchronous Parallel Computation;

Unit 3

Distributed Algorithms: models and complexity measures, safety, liveness, termination, logical time and event ordering, global state and snapshot algorithms, mutual exclusion, clock synchronization, election, termination detection, routing, Distributed graph algorithms; Applications of Distributed algorithms.

Reference Books:-

1. Michael J Quinn, Parallel Computing, TMH
2. Joseph Jaja, An Introduction to Parallel Algorithms, Addison Wesley
3. Mukesh Singhal and Niranjana G. Shivaratri, Advanced Concepts in Operating Systems, TMH
4. Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, Introduction to Parallel Computing, Pearson

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	To understand a number of different models of parallel and distributed computing and understand the basic techniques for designing algorithms in these models.

B.Tech Computer Science and Engineering Fifth Semester Examinations(HSM-501) to be held in the Year December 2020,2021, 2022, 2023

Semester V

HSM-501

3L:0T:0P

Law and Engineering

Major	Minor	Credits
100	50	3

1. THE LEGAL SYSTEM: SOURCES OF LAW AND THE COURT STRUCTURE:

Enacted law -Acts of Parliament are of primary legislation, Common Law or Case law- Principles taken from decisions of judges constitute binding legal rules.

The Court System in India and Foreign Courtiers. (District Court, District Consumer Forum, Tribunals, High Courts, Supreme Court)

Arbitration: As an alternative to resolving disputes in the normal courts, parties who are in dispute can agree that this will instead be referred to arbitration.

2. BASIC PRINCIPLES OF CONTRACT LAW

3. SALE OF GOODS LAW

4. BUSINESS ORGANISATIONS:

SOLE TRADERS (Business has no separate identity from you, all business property belongs to you)

PARTNERSHIPS: There are three types of Partnerships: Limited Liability Partnership, General Partnership, Limited Partnerships

COMPANIES:The nature of companies, Classification of companies, Formation of companies, Features of a public company, Carrying on business, Directors–Their Powers and Responsibilities/Liabilities.

5. Laws Relating To Industrial Pollution, Accident, Environmental Protection, Health And Safety At Work, Patent Law, Information Technology Law And Cyber Crimes, Law And Society: Interdisciplinary Nature Of Law, Legal Ideologies/Philosophy/ Schools Of Jurisprudence, Constitutional Law: The Supreme Law Of The Land, Case Studies: Important Legal Disputes And Judicial Litigations.

NOTE: There shall be total ten questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	To make the students aware of the legal system of the country.
CO2	To understand legal system of the country pertaining to business.
CO3	To study laws relating to pollution, patents, information technology and society.

B.Tech Computer Science and Engineering Fifth Semester Examinations(CS-511) to be held in the Year December 2020,2021, 2022, 2023

Semester V

CS-511

0L:0T:2P

Database Management Systems Lab

Practical	Credits
50	1

COURSE OBJECTIVES

1. To understand basic DDL commands.
2. To learn about DML and DCL commands.
3. To understand the sql queries using SQL operators.
4. To understand the concept of relational algebra
5. To learn various queries using date and group functions
6. To understand the nested queries
7. To learn view, cursors and triggers.

List of Practical

1. Write the queries for Data Definition Language (DDL) in RDBMS.
2. Write the queries for Data Manipulation Language (DML) in RDBMS.
3. Write the queries for Data Control Language (DCL) in RDBMS.
4. Write SQL queries using logical operations (=, etc)
5. Write SQL queries using SQL operators
6. Write SQL query using character, number, date and group functions
7. Write SQL queries for relational algebra
8. Write SQL queries for extracting data from more than one table
9. Write SQL queries for sub queries, nested queries
10. Concepts for ROLL BACK, COMMIT & CHECK POINTS
11. Create VIEWS and CURSORS.
12. High level language extension with Cursors.

13. High level language extension with Triggers.

14. To study the concept of Procedures and Functions.

COURSE OUTCOMES	
CO1	To understand basic DDL commands.
CO2	To learn about DML and DCL commands.
CO3	To understand the sql queries using SQL operators.
CO4	To understand the concept of relational algebra.
CO5	To learn various queries using date and group functions.
CO6	To understand the nested queries.
CO7	To learn view, cursors and triggers.

B.Tech Computer Science and Engineering Fifth Semester Examinations(CS-512) to be held in the Year December 2020,2021, 2022, 2023

Semester V

CS-512

0L:0T:2P

IT Workshop Lab(SCILAB / MATLAB)

Practical	Credits
50	1

Students are required to implement all the topics covered in theory syllabus on either of the platform. A minimum of 20 practical are to be performed covering atleast 5 from each unit.

COURSE OUTCOMES	
CO1	To enable students to do programming in MATLAB/SCILAB.

**B.Tech Computer Science and Engineering Fifth Semester Examinations(SEM-513) to be
held in the Year December 2020,2021, 2022, 2023**

Semester V

SEM-513

1L:0T:0P

Seminar on Summer Internship

Major	Minor	Credits
-	50	1

Students are required to undertake 4 to 6 weeks Practical Training during the summer vacations in the field of Computer Science Engineering and applications in Govt./Semi-Govt./Private sector. Thereafter, each student shall be required to submit a report on the practical training to the concern HOD for evaluation.

Guidelines for evaluation of Practical Training:

Each student shall be evaluated individually by the departmental committee during the lecture allotted for this seminar, so that by the end of 5th semester each student has been evaluated. The committee shall have a convener and at least two members.

Distribution of Marks as per the University statutes:

Total Marks for Evaluation	= 50 marks	
i) Report	= 20	40 %
ii) Viva-Voce	= 15	30 %
iii) Miscellaneous Marks	= 15	30 %

Due weightage will be given to those who have opted for Industrial Training outside the State as well as keeping in view the profile of that Industry.

Award of the Marks:

Marks under (i), (ii) & (iii) will be awarded by the departmental committee constituted for the purpose.

**University Institute of Engineering and Technology
University of Jammu**

**B.Tech Computer Science and Engineering Sixth Semester Examinations to be held in the
Year June 2021, 2022, 2023, 2024**

Contract Hours:- 29

Bachelor of Technology (Computer Science & Engineering) Semester VI										
Credit-Based Scheme of Studies/Examination										
S.No.	Course Code	Subject	Hours Per Week			Credits	Marks Distribution			
			L	T	P		Major	Minor	Practical	Total
1.	CS-601	Compiler Design	3	1	-	4	100	50	-	150
2.	CS-602	Computer Networks	3	1	-	4	100	50	-	150
3.	PECS-61	Elective-II	3	-	-	3	100	50	-	150
4.	PECS-62	Elective-III	3	-	-	3	100	50	-	150
5.	OECS-6	Open Elective – I	3	-	-	3	100	50	-	150
6.	PRO-601	Project-1	-	-	6	3	-	-	100	100
7.	CS-611	Compiler Design Lab	-	-	2	1	-	-	50	50
8.	CS-612	Computer Networks Lab	-	-	2	1	-	-	50	50
9.	MOOC-03	MOOCs	-	-	2	1	-	50	-	50
Total			15	2	12	23	500	300	200	1000

PECS-62 Elective-III
Artificial Intelligence (D1)
Data Mining (D2)
Information Retrieval (D3)

PECS-61 Elective-II
Distributed Systems (S1)
Advanced Computer Architecture (S2)
Wireless Sensor Networks (S3)

**B.Tech Computer Science and Engineering Sixth Semester Examinations to be held in the
Year June 2021, 2022, 2023, 2024**

OECS-61 Open Elective-I
Microprocessor and Interfacing (a)
Embedded Systems (b)
Signals and Systems (c)

**B.Tech Computer Science and Engineering Sixth Semester Examinations(CS-601) to be
held in the Year June 2021, 2022, 2023, 2024**

Semester VI

CS-601

3L:1T:0P

Compiler Design

Major	Minor	Credits
100	50	4

Objectives of the Course:-

- To understand and list the different stages in the process of compilation.
- Identify different methods of lexical analysis.
- Design top-down and bottom-up parsers.
- Identify synthesized and inherited attributes.
- Develop syntax directed translation schemes.
- Develop algorithms to generate code for a target machine.

Unit 1

(10 Lectures)

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

(12 Lectures)

Syntax Analysis (Parser): Context-free languages and grammars, push-down automata, LL(1) grammars and top-down parsing, operator grammars, LR(O), SLR(1), LR(1), LALR(1) grammars and bottomup parsing, ambiguity and LR parsing, LALR(1) parser generator (yacc, bison)

Unit 3

(10 Lectures)

Semantic Analysis: Attribute grammars, syntax directed definition, evaluation and flow of attribute in a syntax tree.

Symbol Table: Its structure, symbol attributes and management. Run-time environment: Procedure activation, parameter passing, value return, memory allocation, and scope. Intermediate Code Generation: Translation of different language features, different types of intermediate forms.

Unit 4

(10 Lectures)

Code Improvement (optimization): Analysis: control-flow, data-flow dependence etc.; Code improvement local optimization, global optimization, loop optimization, peep-hole optimization etc. Architecture dependent code improvement: instruction scheduling (for pipeline), loop optimization (for cache memory) etc. Register allocation and target code generation.

B.Tech Computer Science and Engineering Sixth Semester Examinations(CS-601) to be held in the Year June 2021, 2022, 2023, 2024

Suggested Books:-

1. “Principles of compiler design”, by Alfred V.Aho, Jeffrey D Ullman.
2. “Principles of compiler design”, by Aho, Ullman and Sethi.
3. “Theory of parsing Translation & Compiling”, by Aho. , Ullman.

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	To understand, design and implement a lexical analyzer.

CO2	To understand, design and implement a parser.
CO3	To understand, design code generation schemes.
CO4	To understand optimization of codes and runtime environment

**B.Tech Computer Science and Engineering Sixth Semester Examinations(CS-602) to be
held in the Year June 2021, 2022, 2023, 2024
Semester VI**

CS-602

3L:1T:0P

Computer Networks

Major	Minor	Credits
100	50	4

Objectives of the Course:-

1. To develop an understanding of modern network architectures from a design and performance perspective.
2. To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs).
3. To provide an opportunity to do network programming.

Unit 1:-**(10 Hours)**

Data communication Components: Representation of data and its flow Networks , Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.

Unit 2:-**(10 Hours)**

Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD,CDMA/CA

Unit 3:-**(08 Hours)**

Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

Unit 4:-**(08 Hours)**

Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

B.Tech Computer Science and Engineering Sixth Semester Examinations(CS-602) to be held in the Year June 2021, 2022, 2023, 2024

Unit 5:-**(08 Hours)**

Application Layer: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography.

Suggested Books:-

1. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGrawHill.
2. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India.
3. Computer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.

NOTE: There shall be total ten questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	To understand the basic concept of networking, types, networking topologies and layered architecture.
CO2	To understand data link layer and MAC sub-layer.
CO3	To understand the network Layer functioning.
CO4	To understand the transport layer and application layer operation.

**B.Tech Computer Science and Engineering Sixth Semester Examinations(PECS-61(S1)) to
be held in the Year June 2021, 2022, 2023, 2024
Semester VI**

PECS-61

**Elective II
Distributed Systems(S1)**

3L:0T:0P

Major	Minor	Credits
100	50	3

Objectives of the Course:-

To introduce the fundamental concepts and issues of managing large volume of shared data in a parallel and distributed environment, and to provide insight into related research problems.

Unit 1

(08 Hours)

Introduction

Characterization of DS, Examples of distributed systems, Resource sharing and the World Wide Web, Challenges.

System Models

Architectural models, Fundamental models.

Unit 2

Interprocess Communication

(10 Hours)

The API for the Internet protocols, characteristics of interprocess communication, Sockets, UDP datagram communication, TCP stream communication, External data representation and marshalling, Client-server communication, Group communication, IP multicast.

Unit 3

(10 Hours)

Distributed Objects and remote Invocation

Indirect Communication, Operating System Support, Distributed File Systems, Name Services. Time and Global States Clocks, events and process states, physical time and clocks, logical time and clocks, global states, distributed debugging.

Unit 4

Coordination and Agreement

(10 Hours)

Distributed mutual exclusion, elections, multicast communication, coordination agreement, consensus and related problems.

B.Tech Computer Science and Engineering Sixth Semester Examinations(PECS-61(S1)) to be held in the Year June 2021, 2022, 2023, 2024

Reference Books:-

1. G. Coulouris, J. Dollimore, and T. Kindberg, “Distributed Systems: Concepts and Design”, Pearson Education.
2. Taunienbaum, “Distributed Systems: Principles and Paradigms”, PHI.
3. M. Singhal & N. Shivaratri, “Advanced Concepts in Operating Systems”, TMH.

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	Acquire Knowledge of basic elements and concepts related to distributed system technologies.
CO2	Understand the details of main underlying components of distributed systems.
CO3	The student will study distributed systems using various interprocess communication techniques, such as remote method invocation, remote events.

CO4	Analyze different algorithms and techniques for the design and development of distributed systems subject to specific design and performance constraints..
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**B.Tech Computer Science and Engineering Sixth Semester Examinations(PECS-61(S2)) to
be held in the Year June 2021, 2022, 2023, 2024
Semester VI**

PECS-61

Elective II

3L:0T:0P

Advanced Computer Architecture (S2)

Major	Minor	Credits
100	50	3

Objectives of this course:-

To familiarize students with the concepts of parallel processing, pipelining, array proceeding and multi processor systems.

Unit 1**(10 Hours)**

Introduction to Parallel Processing: Parallel Processing, Architectural classification schemes, Parallelism in Uniprocessor systems, Types of Parallelism

Pipelining Processing: Introduction to pipelining, Classification of Pipeline Processors, General pipelines and reservation tables, Principles of Designing pipeline processors, Pipeline hazards and conflicts.

Unit 2**(10 Hours)**

Vector and SIMD Array Processing: Introduction to Vector Processing, Classification of vector Processing, Vector computing process, Characteristics of vector Processing. Array Processors, Classification of Array Processors, Masking and Data Routing Mechanisms.

Unit 3**(08 Hours)**

Multiprocessor Systems: Introduction to multi processors, Classification of multi processors systems, Processor characteristics for multiprocessing, Multi-processor execution modes, Multi-processor operating system, Interconnected Networks for multiprocessors and Multi-computer, Performance evaluation methods.

Unit 4**(10 Hours)**

Parallel Memory Organization: Memory organization in multi-processor systems, Interleaved Memory Organization, Characterization and organization of cache memory, Multicache Problems, Virtual memory concepts and techniques, input- output organization, Characteristics of input-output systems, input- output processor.

B.Tech Computer Science and Engineering Sixth Semester Examinations(PECS-61(S2)) to be held in the Year June 2021, 2022, 2023, 2024

Unit 5**(06 Hours)**

Parallel computer models and Program Parallelism: Models of parallel computers, Introduction to Parallel Algorithms, Parallel Programming Paradigms, Issues in implementing algorithms on Parallel Computers.

Suggested Books:-

1. “Computer Architecture: A Qualitative Approach”, by Hennessey & D.A. Patterson.
2. “Advanced Computer Architecture”, by Kai Hwang & Briggs.
3. “Computer Architecture: Pipelined & Paralle Processor Design”, by Michael J. Flynn.

NOTE: There shall be total ten questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	Remember the Latest development in computer architecture.
CO2	Understand parallel processing/computing basic terminologies.
CO3	Apply and Acquire knowledge about the latest concepts & techniques in pipelining processing & hazards.
CO4	Analyze performance evaluation methods in multiprocessor & multicomputer.
CO5	Create virtual memory & memory interleaving in PC.

**B.Tech Computer Science and Engineering Sixth Semester Examinations(PECS-61(S3)) to
be held in the Year June 2021, 2022, 2023, 2024
Semester VI**

PECS-61

Elective II

3L:0T:0P

Wireless Sensor Networks (S3)

Major	Minor	Credits
100	50	3

Unit 1

(10 Hours)

Sensor networks overview: Introduction, applications, design issues, requirements.Sensor node architecture.

Unit 2

(10 Hours)

Network architecture: Optimization goals, evaluation metrics, network design principles. Sensor network operating systems and brief introduction to sensor network programming.

Unit 3

(05 Hours)

Network protocols: MAC protocols and energy efficiency.

Unit 4

(10 Hours)

Routing protocols: Data centric, hierarchical, location-based, energy efficient routing etc. Sensor deployment, scheduling and coverage issues, self configuration and topology control.Querying, data collection and processing, collaborative information processing and group connectivity.Target tracking, localization and identity management.Power management.Security and privacy.

Reference Books:-

1. Feng Zhao, Leonidas Guibas “Wireless Sensor Networks-An Information Processing Approach”. Morgan Kauffman

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	To understand the network architecture and application of sensor networks.
CO2	To analyze the protocol design issues of wireless sensor networks.
CO3	To understand the design of wireless sensor networks.

B.Tech Computer Science and Engineering Sixth Semester Examinations (PECS-62(D1)) to be held in the Year June 2021, 2022, 2023, 2024
Semester VI

PECS-62

Elective III

3L:0T:0P

Artificial Intelligence(D1)

Major	Minor	Credits
100	50	3

Objectives of the Course:-

- Present an overview of artificial intelligence (AI) principles and approaches.
- Develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents: Search, Knowledge representation, inference, logic, and learning.
- Students will implement a small AI system in a team environment. The knowledge of artificial intelligence plays a considerable role in some applications students develop for courses in the program.

Unit I:

(08 Hours)

Introduction

AI History and applications. Overview of AI application areas: game playing, automated reasoning and theorem proving, expert systems, natural language understanding, planning and robotics, machine learning and Alan Turing Test.

Unit II: (10 Hours)

The Propositional and Predicate Logic

Symbol and sentences, the semantics of the Propositional Calculus & Predicate Calculus. Inference Rules and Theorem Proving. Axioms, Literals, Horn clause & Clausal forms.

Reasoning

Inductive, Deductive, Abductive and Default reasoning. More examples on Resolution proof.

Unit III: (10 Hours)

Problem Solving as Search

Structures and strategies for state space search. Algorithms for Heuristic search, Heuristic evaluation functions.

Knowledge Representation

Knowledge representation Techniques; conceptual graphs; structured representations; frames, scripts; issues in knowledge representation: hierarchies, inheritance, exceptions

B.Tech Computer Science and Engineering Sixth Semester Examinations(PECS-62(D1)) to be held in the Year June 2021, 2022, 2023, 2024

Unit IV: (08 Hours)

Knowledge Elicitation and Knowledge Acquisition

An overview of the induction methods, types and tools. Stages in Knowledge acquisition with examples. Analyzing, coding, documenting and diagramming. Scope of knowledge.

Unit V: (08 Hours)

Expert Systems

Overview of expert system technology; rule-based expert systems; Construction of ES. Components of an ES, The explanation facility, Rule-based formation and forward and backward chaining techniques for problem solving.

Suggested Books:-

1. Elain Rich and Kevin Knight, “Artificial Intelligence”, Tata McGraw-Hill, New Delhi, 2008.

2. Artificial Intelligence - A New Synthesis by Nils J. Nilsson, Morgan Kaufmann Publishers.
3. Artificial Intelligence: Strategies and techniques for complex problems solving by George Luger, Addison-Wesley, 2003.
4. Artificial Intelligence - A Modern Approach by Stuart Russell & Peter Norvig, Prentice Hall.

NOTE: There shall be total ten questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	Remember and understand the concept and fundamental methods of AI.
CO2	Apply basic AI algorithms to solve the problems.
CO3	Analyses how uncertainty is being tackled in knowledge representation and reasoning process.
CO4	Evaluate the concept of structural representation of knowledge using rules.
CO5	Create fuzzy logic to implement expert systems.

**B.Tech Computer Science and Engineering Sixth Semester Examinations(PECS-62(D2)) to
be held in the Year June 2021, 2022, 2023, 2024
Semester VI**

PECS-62

**Elective III
Data Mining (D2)**

3L:0T:0P

Major	Minor	Credits
100	50	3

Objectives of the Course:-

- To learn data mining concepts in details.

- Expose the criteria for data generalization.
- To explore knowledge of mining associations, correlations and classification.
- To evaluate various types of data mining.

Unit I:

(10 Hours)

Data Mining and Data Preprocessing Introduction : Data Mining, Functionalities, Data Mining Systems classification, Integration with Data Warehouse System, Data summarization, data cleaning, data integration and transformation, data reduction. Data Warehouse: Need for Data Warehousing, Paradigm Shift, Business Problem Definition, Operational and Information Data Stores, Data Warehouse Definition and Characteristics, Data Warehouse Architecture and Implementation, OLAP.

Unit II:

(10 Hours)

Data Generalization: Data Mining Primitives, Query Language and System Architecture, Concept Description, Data generalization, Analysis of attribute relevance, Mining descriptive statistical measures in large databases, Data deduplication methodologies.

Unit III:

(10 Hours)

Mining Associations and Correlations: Mining association rules in large databases: Association rule mining, Mining single dimensional boolean association rules from transactional databases, mining multilevel association rules from transaction databases, Relational databases and data warehouses, correlation analysis, classification and prediction, Data redundancy detection and elimination techniques.

Unit IV:

(10 Hours)

Cluster Analysis and Mining: Introduction to cluster analysis, Mining complex type of data: Multidimensional analysis and descriptive mining of complex data objects, Spatial databases,

B.Tech Computer Science and Engineering Sixth Semester Examinations(PECS-62(D2)) to be held in the Year June 2021, 2022, 2023, 2024

Multimedia databases, Mining timeseries and sequence data, Mining text databases, Mining World Wide Web, Data Chunking Techniques.

Suggested Books:-

1. J.Han, M.Kamber, Data Mining: Concepts and Techniques, Academic Press, Morgan Kaufman Publishers, 2015.
2. Pieter Adrians, DolfZantinge, Data Mining, Addison Wesley 2013.
3. C.S.R. Prabhu, Data Ware housing: Concepts, Techniques, Products and Applications, Prentice Hall of India, 2014.

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	To learn data mining concepts in details.
CO2	Expose the criteria for data generalization.
CO3	To explore knowledge of mining associations, correlations and classification.
CO4	To evaluate various types of data mining.

B.Tech Computer Science and Engineering Sixth Semester Examinations(PECS-62(D3)) to be held in the Year June 2021, 2022, 2023, 2024

Semester VI

PECS-62

Elective III Information Retrieval (D3)

3L:0T:0P

Major	Minor	Credits
100	50	3

Course Objectives

- To understand basic concepts in information retrieval.
- To understand the underlined problems related to IR.

Unit 1

(07 Hours)

Introduction

Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses, organization, representation, and access to information, use of codes, formats, and standards, data structures for unstructured data; design and maintenance of such databases, indexing and indexes, retrieval and classification schemes

Unit 2

(08 Hours)

Information Retrieval System Capabilities

Search, Browse, Miscellaneous, Cataloging and Indexing: Objectives, Indexing Process, Automatic Indexing, Information Extraction. Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure.

Unit 3

(14 Hours)

Automatic Indexing

Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages, Document and Term Clustering: Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters

User Search Techniques

Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, Weighted searches of Boolean systems, Searching the Internet and hypertext, analysis, crowd sourcing search, construction and evaluation of search and navigation techniques; and search engines

Unit 4

(06 Hours)

B.Tech Computer Science and Engineering Sixth Semester Examinations(PECS-62(D3)) to be held in the Year June 2021, 2022, 2023, 2024

Information Visualization

Introduction, Cognition and perception, Information visualization technologies.

Text Search Algorithms

Introduction, Software text search algorithms, Hardware text search systems.

Unit 5

(10 Hours)

Information System Evaluation and Query Expansion

Introduction, Measures used in system evaluation, Measurement example – TREC results, Evaluation of Asian language text retrieval, question answering and text summarization, cross-language information retrieval

Query Expansion Thesauri, Semantic Networks, Integrating Structured Data and Text

Reference Books:-

1. Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press,
2. Ian Witten, Marco Gori, Teresa Numerico, “Web Dragons: Inside the Myths of Search Engine Technology”, Morgan Kauffman.
3. Christopher D. Manning, PrabhakarRaghavan and Hinrich Schütze, Introduction to Information Retrieval by Cambridge University Press.
4. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall,
5. Robert Korfhage, “Information Storage & Retrieval”, John Wiley & Sons.

NOTE: There shall be total ten questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	To gain an understanding of the basic concepts and techniques in Information
CO2	To acquire the necessary understanding to design, and implement real applications using

**B.Tech Computer Science and Engineering Sixth Semester Examinations(OECS-61(a)) to
be held in the Year June 2021, 2022, 2023, 2024
Semester VI**

OECS-61

**Open Elective-I
Microprocessor and Interfacing (a)**

3L:0T:0P

Major	Minor	Credits
100	50	3

COURSE OBJECTIVES

1. To introduce 8085 architecture and programming in assembly language.
2. To introduce basic concepts of interfacing memory and peripheral devices to a microprocessor.
3. To introduce serial and parallel bus standards.
4. To introduce 8051 microcontroller.
5. To introduce various advanced processor architectures such as 80X86, Pentium and Multicore processors.

Unit-I

8085 Architecture: 8085 Processor Architecture, Internal operations, Instructions and timings, Programming the 8085 – Introduction to 8085 instructions, addressing modes and Programming techniques with Additional instruction. **(10 hrs)**

Unit-II

Stacks and subroutines, interfacing peripherals - Basic interfacing concepts, interfacing output displays, interfacing input keyboards. Interrupts - 8085 Interrupts; **(8 hrs)**

Unit-III

Programmable peripheral interface (Intel 8255A), Programmable communication interface (Intel 8251), Programmable Interval timer (Intel 8253 and 8254), Programmable Keyboard / Display controller (Intel 8279); **(8 hrs)**

Unit-IV

Advanced Processor Architecture – Register structure, Instruction set, Addressing modes of 8086. Features of advanced microprocessors. 80386, 80486, Pentium and Multi-Core Processors. **(10 Hours)**

B.Tech Computer Science and Engineering Sixth Semester Examinations (OECS-61(a)) to be held in the Year June 2021, 2022, 2023, 2024

Suggested Books:-

1. “Microprocessor Architecture, Programming, and Applications with the 8085” by R Gaonkar
2. “The 8051 Microcontroller and Embedded Systems : Using Assembly and C” by Muhammad Ali Mazidi
3. “Introduction to Microprocessors and Microcontrollers” by Crisp John Crisp
4. “Microprocessors And Microcontrollers” by A Nagoor Kani Barry B. Brey, The Intel Microprocessor, 8086/8088, 8018/80188, 80286, 80386, 80486, Pentium and Pentium processors – architecture, Programming and interfacing, 4 Edition, Prentice Hall 1993.

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

**B.Tech Computer Science and Engineering Sixth Semester Examinations(OECS-61(b)) to
be held in the Year June 2021, 2022, 2023, 2024
Semester VI**

OECS-61

**Open Elective-I
Embedded Systems (b)**

3L:0T:0P

Major	Minor	Credits
100	50	3

Unit 1

(10 Hours)

Introduction to Embedded Systems

Architecture of Embedded Systems Hardware Architecture, Software Architecture, Communication Software, Development/Testing Tools

Unit 2

(10 Hours)

Programming for Embedded Systems

The Process of Embedded System Development Design Trade-offs, Hardware Software co-design, Implementation, Integration and Testing Hardware Platforms, Communication Interfaces

Unit 3

(10 Hours)

Embedded/Real-time Operating Systems Concepts Representative Embedded Systems, Programming in RT-Linux Embedded Database Application Mobile Java Applications Embedded Software Development on 8051 Micro-controller Platform

Unit 4

(10 Hours)

DSP-based Embedded Systems Implementation of Embedded Systems with VHDL, FPGA and CPLD Embedded Systems Applications using Strong ARM Platform

Reference Books

1. Embedded/Real-time Systems: Concepts, Design and Programming – Dr.K.V.K.K.Prasad, Dreamtech press.
2. Programming for Embedded Systems – Dreamtech Software team, Willey - dreamtech

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

B.Tech Computer Science and Engineering Sixth Semester Examinations(OECS-61(c)) to be held in the Year June 2021, 2022, 2023, 2024
Semester VI

OECS-61

Open Elective-I
Signals and Systems(c)

3L:0T:0P

Major	Minor	Credits
100	50	3

Unit I

Classification of Signals and Systems: Continuous time signals (CT signals), discrete time signals (DT signals) - Step, Ramp, Pulse, Impulse, Exponential, Classification of CT and DT signals - periodic & aperiodic, random & deterministic signals, Even & Odd Signals, Energy & Power Signals, Description of continuous time and discrete time systems.
(10hrs)

Unit II

Analysis of Continuous Time Signals: Fourier series analysis, Spectrum of C.T. signals, Fourier Transform and its properties in Signal Analysis, Power Spectral Density and Energy spectral density, Linear Time invariant Systems and their properties
(10hrs)

Unit III

Analysis of Discrete Time Signals: Sampling of CT signals and aliasing, DTFT and its properties, Z transform and properties of Z-transform.
(10hrs)

Unit IV Random Signal Theory:

Introduction to probabilities, Definition, probability of Random events, Joint and conditional probability, probability Mass function statistical averages Probability density functions and statistical averages. Examples of P.D. function, transformation of random variables random processes, stationary, True averages and Ergodic.
(10hrs)

B.Tech Computer Science and Engineering Sixth Semester Examinations (OECS-61(c)) to be held in the Year June 2021, 2022, 2023, 2024

Suggested Books:

- i. Signals and Systems by Allan V. Oppenheim, S. Willsky and S.H. Nawab, Pearson Education.
- ii. Fundamentals of Signals and Systems by Edward W Kamen & Bonnie's Heck, Pearson Education

- iii. Communication Signals & System by Simon Haykins, John Wiley & Sons.
- iv. Signals and Systems by H P Hsu, Rakesh Ranjan, Schaum's Outlines, Tata McGraw Hill.
- v. Digital Signal Processing by S Salivahanan, A. Vallavaraj, C. Gnanapriya, McGraw Hill International.
- vi. Signals and Systems by Simon Haykins and Barry Van Veen, John Wiley & sons, Inc. Signal, System & Transforms, Phillips, Pearson Education. Roberts,
- vii. Signals & Linear Systems, by Robert A. Gabel and Richard A., John Wiley
- viii. Signals & systems, by Rodger E. Ziemer, William H. Tranter, D. Ronald Fannin. Pearson Education.

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

**B.Tech Computer Science and Engineering Sixth Semester Examinations (PRO-601) to be
held in the Year June 2021, 2022, 2023, 2024
Semester VI**

PROJECT-I

Practical	Credits
100	3

The students will have to work on a project during 6th semester. The topic of the project shall have to be approved by the concerned teacher and should be relevant to the field of computer science and engineering. This may require complete literature survey, design, fabrication, simulation of some models and/or some preliminary laboratory experiments etc.

Distribution of Marks**Distribution of Marks as per University statutes:**

Total Marks for End semester Evaluation		= 100 marks	
1)	Presentation/ Demonstration	= 30 marks	30 %
2)	Viva-voce	= 30 marks	30 %
3)	Actual work done	= 40marks	40 %

Award of Marks

Marks under (1) and (2) will be awarded by the Departmental committee constituted, comprising of convener and at least two members.

Marks under (3) will be awarded by the Project Guide/supervisor concern.

**B.Tech Computer Science and Engineering Sixth Semester Examinations (CS-611) to be
held in the Year June 2021, 2022, 2023, 2024
Semester VI**

CS-611

0L:0T:2P

Compiler Design Lab

Practical	Credits
50	1

List of Practical

1. Write a C program to identify whether a given line is a comment or not.
2. Write a C program to test whether a given identifier is valid or not.
3. Design a lexical analyzer for a given language with suitable assumptions and simulate it in C language.
4. Implement the lexical analyzer using JLex, flex or other lexical analyzer generating tools.
5. Syntax tree expression generation using C.
6. Write a C program to implement the functionalities of a predictive parser.
7. Write a C program for constructing of LL (1) parsing.
8. Write a C program for constructing recursive descent parsing.
9. Write a C program to implement LALR parsing.
10. Write a C program to implement operator precedence parsing.

Note:- At least 08 practical have to be performed from the above list.

COURSE OUTCOMES	
CO1	To enable students to implement lexical analyzer.
CO2	To enable students to implement various types of parsers.

**B.Tech Computer Science and Engineering Sixth Semester Examinations(CS-612) to be
held in the Year June 2021, 2022, 2023, 2024
Semester VI**

CS-612

0L:0T:2P

Computer Networks Lab

Practical	Credits
50	1

List of Practical

1. Create a socket for HTTP for web page upload and download.
2. Write a code simulating ARP /RARP protocols.
3. Study of TCP/UDP performance.
4. Performance comparison of MAC protocols
5. Performance comparison of routing protocols.
6. Write a program:
 - a. To implement echo server and client in java using TCP sockets.
 - b. To implement date server and client in java using TCP sockets.
 - c. To implement a chat server and client in java using TCP sockets.
7. Write a program:
 2. To implement echo server and client in java using UDP sockets
 3. To implement a chat server and client in java using UDP sockets.
 4. To implement a DNS server and client in java using UDP sockets.

8. To flood the server from a spoofed source address leading to a DoS attack.
9. To sniff and parse packets that pass through using raw sockets.
10. To implement simple calculator and invoke arithmetic operations from a remote client.
11. To implement bubble sort and sort data using a remote client.
12. To simulate a sliding window protocol that uses Go Back N ARQ.

Note :- Implement at least 08 practical from the above list using JAVA.

COURSE OUTCOMES	
CO1	Do Problem Solving using algorithms.
CO2	Design and test simple programs to implement networking concepts using Java.
CO3	Document artifacts using applied addressing & quality standards.
CO4	Design simple data transmission using networking concepts and implement.

**University Institute of Engineering and Technology
University of Jammu**

**B.Tech Computer Science and Engineering Seventh Semester Examinations to be held in
the Year December 2021, 2022, 2023, 2024**

Contract Hours:- 18

Bachelor of Technology (Computer Science & Engineering) Semester VII										
Credit-Based Scheme of Studies/Examination										
S.No.	Course Code	Subject	Hours Per Week			Credits	Marks Distribution			
			L	T	P		Major	Minor	Practical	Total
1.	PECS-71	Elective-IV	3	-	-	3	100	50	-	150
2.	PECS-72	Elective-V	3	-	-	3	100	50	-	150
3.	OECS-71	Open Elective-II	3	-	-	3	100	50	-	150
4.	PRO-70	Project-II	-	-	08	4	-	-	100	100

5.	SEM-71 2	Seminar on Summer Internship	01	-	-	1	-	50	-	50
Total			10	-	08	14	300	150	150	600

PECS-71 Elective-IV
Cloud Computing (A1)
Web and Internet Technology (A2)
Cryptography and Network Security (A3)
PECS-72 Elective-V
Soft Computing (D4)
Machine Learning (D5)
Natural Language Processing (D6)
OECS-71 Open Elective-II
Industrial Management (a)
Fundamental of management (b)
Human Resource Management (c)

**B.Tech Computer Science and Engineering Seventh Semester Examinations(PECS-71(A1))
to be held in the Year December 2021, 2022, 2023, 2024
Semester VII**

PECS-71

Elective IV

3L:0T:0P

Cloud Computing (A1)

Major	Minor	Credits
100	50	3

Objectives of the course:-

1. To facilitate the basic usage and applicability of computing paradigm.
2. To explore various cloud service and deployment models to utilize different cloud services.
3. To get enabled for various data, scalability & cloud services in order to get efficient database for cloud storage.
4. To deal with various security threats and their controlling mechanism for accessing safe cloud services

Unit-1**(12 Hours)**

Overview of Computing Paradigm: Recent trends in Computing, Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing, evolution of cloud computing, Business driver for adopting cloud computing. Cloud Computing (NIST Model), History of Cloud Computing, Cloud service providers, Properties, Characteristics & Disadvantages, Pros and Cons of Cloud Computing, Benefits of Cloud Computing, Cloud computing vs. Cluster computing vs. Grid computing, Role of Open Standards.

Unit-2**(12 Hours)**

Cloud Computing Architecture: Cloud computing stack, Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services, Service Models (XaaS) - Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), Deployment Models- Public cloud, Private cloud, Hybrid cloud, Community cloud.

Unit-3**(10 Hours)**

Service Management in Cloud Computing: Service Level Agreements (SLAs), Billing & Accounting, comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling: Benefitting enormously, Managing Data- Looking at Data, Scalability & Cloud Services, Database & Data Stores in Cloud, Large Scale Data Processing. Case study: Eucalyptus, Microsoft Azure, Amazon EC2.

**B.Tech Computer Science and Engineering Seventh Semester Examinations(PECS-71(A1))
to be held in the Year December 2021, 2022, 2023, 2024**

Unit-4**(10 Hours)**

Cloud Security: Infrastructure Security, Network level security, Host level security, Application level security, Data security and Storage, Data privacy and security Issues, Jurisdictional issues raised by Data location, Identity & Access Management, Access Control, Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations.

Suggested Books :-

1. Books 1. Barrie Sosinsky, Cloud Computing Bible, Wiley-India, 2010.
2. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Cloud Computing: Principles and Paradigms, Wiley, 2011
3. Nikos Antonopoulos, Lee Gillam, Cloud Computing: Principles, Systems and Applications, Springer, 2012.
4. Ronald L. Krutz, Russell Dean Vines, Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Wiley-India, 2010.

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	Facilitate the basic usage and applicability of computing paradigm.
CO2	Explore various cloud service and deployment models to utilize different cloud
CO3	To get enabled for various data, scalability & cloud services in order to get efficient database for cloud storage.
CO4	To deal with various security threats and their controlling mechanism for accessing safe cloud services.

**B.Tech Computer Science and Engineering Seventh Semester Examinations(PECS-71(A2))
to be held in the Year December 2021, 2022, 2023, 2024
Semester VII**

PECS-71

Elective IV

3L:0T:0P

Web and Internet Technology(A2)

Major	Minor	Credits
100	50	3

Objectives of the course:-

1. To study various fundamental concepts of Internetworking techniques with their characteristics.
2. To study basics of HTML, XML and JavaScript.
3. Analyze the concepts of JavaScript and Java in designing web pages.

Unit 1

(10 Hours)

Introduction to Internet: History, Working of internet, Internet Applications, Intranet & Extranet, Internet Protocols. Modes of connecting to internet, Internet Service Provider (ISP), Internet Addresses, domain name, DNS, CGI, CGI applications, CGI methods, Interface specifications.

Introduction to World Wide Web (WWW), searching the www: Directories search engines and meta search engines, search fundamentals, search strategies, working of the search engines, Telnet and FTP, HTTP, SMTP, POP3, MIME, IMAP. Gopher Commands, TCP/IP.

Unit 2

(10 Hours)

Markup and Scripting Languages: Common tags-lists, tables, images, forms, frames; Cascading Style Sheets (CSS), Introduction to JavaScript, objects in JavaScript, Dynamic HTML with JavaScript, XML: Document type definition, XML schemas.

Unit 3

(08 Hours)

Multimedia

Audio and video speech synthesis and recognition, Electronic Commerce, E-Business Model, E-Marketing, Online Payments and Security, Web Servers, HTTP request types, System

Architecture, Client Side Scripting and Server side Scripting, Accessing Web servers, IIS, Apache web server.

Unit 4

(08 Hours)

Socket Programming: Networking classes and interfaces, InetAddress, TCP/IP Client sockets, URL Connection, HTTP URL Connection, Datagrams.

**B.Tech Computer Science and Engineering Seventh Semester Examinations(PECS-71(A2))
to be held in the Year December 2021, 2022, 2023, 2024**

Unit 5

(08 Hours)

Servlets and JSP: Introduction, Servlet Overview Architecture, Handling HTTP Requests, Get and post requests, redirecting request, multi-tier applications, JSP, Overview, Objects, scripting, Standard Actions, Directives.

Suggested Books:

1. Internet & World Wide Programming, Deitel, Deitel & Nieto, 2012, Pearson Education
2. Fundamentals of the Internet and the World Wide Web, Raymond Greenlaw and Ellen Hepp, TMH- 2012

NOTE: There shall be total ten questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	To study various fundamental concepts of Internetworking techniques with their characteristics.
CO2	To study and understand the requirements for world-wide-web formats and techniques.
CO3	Apply the important HTML tags for designing static pages and separate design from content using Cascading Style sheet.
CO4	Analyze the concepts of JavaScript and Java in designing web pages.

**B.Tech Computer Science and Engineering Seventh Semester Examinations(PECS-71(A3))
to be held in the Year December 2021, 2022, 2023, 2024
Semester VII**

PECS-71

Elective IV

3L:0T:0P

Cryptography and Network Security (A3)

Major	Minor	Credits
100	50	3

Course Objectives:-

- Extensive, detailed and critical understanding of the concepts, issues, principles and theories of computer network security
- Detailed and practical understanding of formalisms for specifying security related properties and validating them using model checking
- Critical theoretical and detailed practical knowledge of a range of computer network security technologies as well as network security tools and services

- Practical experience of analysing, designing, implementing and validating solutions to computer network security challenges using common network security tools and formal methods.

Unit I

(08 Hours)

Attacks on computers and computer security, need for security, approaches , principles, types of attacks ,operational model of network security, Cryptography concepts and techniques, substitution transposition, encryption and decryption, symmetric ,Asymmetric key cryptography, key range size, possible type of attacks

Unit II

(10 Hours)

Mathematics of cryptography and DES Block ciphers modes, feistel ciphers DES. working of DES ,cracking des ,problems on des., 2DES, 3DES, des design ,Side channel attacks, Differential cryptanalysis.

Unit III

(10 Hours)

Symmetric-Key Cryptography: Glosis field theory, AES , overview of Rijndael comparison with others. Symmetric ciphers ,Blowfish in practice ,RC4, RC5,RC6,IDEA, RSA

Asymmetric-Key Cryptography: RSA, Elliptic curve cryptography ECC,Digital certificates and PKI.

**B.Tech Computer Science and Engineering Seventh Semester Examinations(PECS-71(A3))
to be held in the Year December 2021, 2022, 2023, 2024**

Unit IV**(08 Hours)**

Cryptographic Hash Functions: Hashing schemes SHA- family, MAC, Digital Signature RSA El Gamel, DSS DSA, Authentication Protocols, applications Kerberos, X.509 Directory services

Unit V**(10 Hours)**

Network Security: Internet security protocols, SSL, TLS, TSP, WAP security, SET Hashing Authentication & Signature Schemes E-mail security, Email architecture SSL, PGP, MIME, S/MIME

Internet Protocol Security (IPSec) IPSec architecture, IPSec versus other layers security Mobile IPSec, VPN, Web security SSL, TLS, SET etc

System Security: Intruders, types of attacks, protecting against Intruders honeypots, scanning and analysis tools, Viruses and worms, types of viruses, protection, Firewall architecture implementing firewalls.

Reference Books:-

1. Cryptography and Network Security, Behrouz A. Forouzan, TMH
2. Cryptography And Network Security, Principles and Practices William Stallings, Prentice Hall
3. Cryptography and Network Security, Atul Kahate, Tata McGraw-Hill.

NOTE: There shall be total ten questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	To learn basics of network security and cryptography.
CO2	Exposing the knowledge about network authentication mechanism, with security algorithms.
CO3	To explore the knowledge of key exchange protocols.
CO4	To realize the effect on digitized security.

**B.Tech Computer Science and Engineering Seventh Semester Examinations(PECS-72(D4))
to be held in the Year December 2021, 2022, 2023, 2024
Semester VII**

PECS-72

**Elective V
Soft Computing(D4)**

3L:0T:0P

Major	Minor	Credits
100	50	3

Objectives of the Course:-

- To understand the fundamental theory and concepts of neural networks, neuro-modelling, several neural network paradigms and its applications.
- To understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic control and other machine intelligence applications of fuzzy logic.
- To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.

Unit I

(10 Hours)

Artificial Neural Network

Introduction – Fundamental concept – Evolution of Neural Networks – Basic Models of Artificial Neural Networks – Important Terminologies of ANNs – McCulloch-Pitts Neuron – Linear Separability – Hebb Network. Supervised Learning Network: Perceptron Networks – Adaline – Multiple Adaptive Linear Neurons – Back-Propagation Network – Radial Basis Function Network.

Unit II

(12 Hours)

Artificial Neural Network Associative Memory Networks: Training Algorithms for Pattern Association – Autoassociative Memory Network – Heteroassociative Memory Network – Bidirectional Associative Memory – Hopfield Networks – Iterative Autoassociative Memory

Networks – Temporal Associative Memory Network. Unsupervised Learning Networks: Fixed weight Competitive Nets – Kohonen Self-Organizing Feature Maps – Learning Vector Quantization – Counter propagation Networks – Adaptive Resonance Theory Networks – Special Networks.

Unit III

(10 Hours)

Fuzzy Set Theory Introduction to Classical Sets and Fuzzy sets

Classical Relations and Fuzzy Relations – Tolerance and Equivalence Relations – Noninteractive Fuzzy sets – Membership Functions: Fuzzification – Methods of Membership Value

**B.Tech Computer Science and Engineering Seventh Semester Examinations(PECS-72(D4))
to be held in the Year December 2021, 2022, 2023, 2024**

Assignments – Defuzzification – Lambda-Cuts for Fuzzy sets and Fuzzy Relations – Defuzzification Methods.

Fuzzy Arithmetic and Fuzzy Measures: Fuzzy Rule Base and Approximate Reasoning: Truth values and Tables in Fuzzy logic – Fuzzy Propositions – Formation of Rules – Decomposition and Aggregation of rules – Fuzzy Reasoning – Fuzzy Inference Systems (FIS) – Fuzzy Decision Making – Fuzzy Logic Control Systems.

Unit IV

(12 Hours)

(Genetic Algorithm) Introduction – Basic Operators and Terminologies in GAs – Traditional Algorithm vs. Genetic Algorithm – Simple GA – General Genetic Algorithm – The Scheme Theorem – Classification of Genetic Algorithm – Holland Classifier Systems – Genetic Programming. Applications of Soft Computing: A Fusion Approach of Multispectral Images with SAR Image for Flood Area Analysis – Optimization of Travelling Salesman Problem using Genetic Algorithm Approach – Genetic Algorithm based Internet Search Technique – Soft Computing based Hybrid Fuzzy Controllers – Soft Computing based Rocket Engine – Control.

Suggested Books:-

1. S.N. Sivanandan and S.N. Deepa, Principles of Soft Computing, Wiley India, 2007. ISBN: 10: 81-265-1075-7.
2. S. Rajasekaran and G.A.V.Pai, Neural Networks, Fuzzy Logic and Genetic Algorithms, PHI, 2003.

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	Identify and describe soft computing techniques and their roles in building intelligent machines.
CO2	Recognize the feasibility of applying a soft computing methodology for a particular problem.
CO3	Acquire the knowledge of evolutionary computation and genetic algorithm to tackle real world problems.

**B.Tech Computer Science and Engineering Seventh Semester Examinations(PECS-72(D5))
to be held in the Year December 2021, 2022, 2023, 2024
Semester VII**

PECS-72

**Elective V
Machine Learning (D5)**

3L:0T:0P

Major	Minor	Credits
100	50	3

Objectives of the course:

- Students have understanding of issues and challenges of Machine Learning.
- Should be able to select data, model selection, model complexity etc.
- Understanding of the strengths and weaknesses of many popular machine learning approaches.

Unit 1**(06 Hours)**

Brief Introduction to Machine Learning , Supervised Learning , Unsupervised Learning, Reinforcement Learning

Unit 2**(10 Hours)**

Probability Basics, Linear Algebra , Statistical Decision Theory – Regression & Classification, Bias – Variance, Linear Regression, Multivariate Regression

Unit 3**(10 Hours)**

Dimensionality Reduction, Subset Selection, Shrinkage Methods, Principle Components Regression, Linear Classification, Logistic Regression, Linear Discriminant Analysis Optimization, Classification-Separating Hyperplanes Classification

Unit 4**(10 Hours)**

Artificial Neural Networks (Early models, Back Propagation, Initialization, Training & Validation), Parameter Estimation (Maximum Likelihood Estimation, Bayesian Parameter Estimation), Decision Trees, Evaluation Measures, Hypothesis Testing , Ensemble Methods, Graphical Models

Unit 5**(08 Hours)**

Clustering, Gaussian Mixture Models, Spectral Clustering, Ensemble Methods , Learning Theory, Reinforcement Learning

**B.Tech Computer Science and Engineering Seventh Semester Examinations(PECS-72(D5))
to be held in the Year December 2021, 2022, 2023, 2024**

Suggested Books :-

1. T. Hastie, R. Tibshirani, J. Friedman. The Elements of Statistical Learning, 2e, 2008.
2. Christopher Bishop. Pattern Recognition and Machine Learning. 2e.

NOTE: There shall be total ten questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	Perform an analysis of a given machine learning problem.
CO2	Use machine learning techniques in different domains.

B.Tech Computer Science and Engineering Seventh Semester Examinations(PECS-72(D6))
to be held in the Year December 2021, 2022, 2023, 2024
Semester VII

PECS-72

Elective V

3L:0T:0P

Natural Language Processing (D6)

Major	Minor	Credits
100	50	3

Course Objectives

- Be familiar with syntax and semantics in NLP.
- To implement various concepts of knowledge representation using Prolog.
- To classify different parsing techniques and understand semantic networks.
- To identify/explain various applications of NLP.

Unit-1

(10 Hours)

Fundamental components of Natural Language Processing: Lexicography, syntax, semantics, prosody, phonology, pragmatic analysis, world knowledge. Knowledge Representation schemes: Semantic net, Frames, Conceptual Dependency, Scripts.

Unit-2

(10 Hours)

Representing knowledge using rules: Logic Programming, Introduction to LISP and Prolog, Rules based deduction systems, General concepts in knowledge acquisition. Syntax Analysis: Formal Languages and grammars, Chomsky Hierarchy, Left- Associative Grammars, ambiguous grammars, resolution of ambiguities.

Unit-3

(10 Hours)

Computation Linguistics: Recognition and parsing of natural language structures- ATN and RTN, General Techniques of parsing- CKY, Earley and Tomitas algorithm. Semantics: Knowledge representation, semantics networks logic and inference pragmatics, graph models and optimization.

Unit-4

(10 Hours)

Applications of NLP: Intelligent work processor, Machine translation, user interfaces, ManMachine interfaces, natural language querying, tutoring and authoring systems, speech recognition, commercial use of NLP.

**B.Tech Computer Science and Engineering Seventh Semester Examinations(PECS-72(D6))
to be held in the Year December 2021, 2022, 2023, 2024**

Reference Books:-

1. Daniel Jurafsky, James H. Martin, “Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition”, 2nd edition, Pearson Edu., 2013.
2. James Allen, “Natural Language Understanding”, Pearson Education, Second Edition, 2003.

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	Learn natural language processing with manual and automated approaches.
CO2	Learn computational frameworks for natural language processing.

B.Tech Computer Science and Engineering Seventh Semester Examinations(OECS-71(a))
to be held in the Year December 2021, 2022, 2023, 2024
Semester VII

OECS-71

Open Elective II
Industrial Management (a)

3L:0T:0P

Major	Minor	Credits
100	50	3

Unit 1:

(10 Hours)

Entrepreneurship: Definition and types, Difference Between Intrapreneur & Entrepreneur, Qualities of good Entrepreneurs-Role of Entrepreneurs in the economic development of a country, Functions of entrepreneur, Factors affecting entrepreneurship, Entrepreneurship as a career option for technocrats in India, Schemes and policies for entrepreneurship development. Women Entrepreneur: Classification of Women Entrepreneur in India, Problems of Women Entrepreneur, steps for promoting women entrepreneurship.

Legal Forms of Industrial Ownership: Sole Proprietorship. Partnership. Joint Stock Company

Unit 2:

(05 Hours)

Industrial Development in India after Independence: Industrial Policy of the Five-Year Plans, Industrial Policy (1956, 1977, 1991), Need for Economic Reforms and their Assessment, Multi-National Corporations (MNCs) - Concept, Merits & Demerits of MNCs

Unit 3:

(12 Hours)

Industrial Relations: Workers participation in management: Meaning, Objectives & Forms, Trade Union: Objectives, Functions, Present Position, and Weakness Industrial Conflict: Sources and managing conflict, Collective Bargaining: Meaning, Process, Essential conditions for effective bargaining

Management: Meaning, definition, Characteristics, Importance & Functions of Management, Management Theories – Taylor’s Scientific Management Theory & Henry Fayol’s Administrative Management Theory. MBO – Definition, Features, Process, Advantages & Limitations of MBO.

Unit 4:

(08 Hours)

Departmentation & Delegation of Authority: Meaning, Importance, Basis or pattern of Departmentation, Delegation of Authority: Meaning, Characteristics, Importance, Process, Obstacles/ Barriers to effective delegation of authority, Authority Relationships - Line Organization, Line & Staff **Organization, Functional Organization.**

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Unit 5:

(08 Hours)

Personnel Management & Decision Making: Meaning, Objectives, Characteristics, Principles & Functions of Personal department. Decision making- Meaning, Importance & Steps in Decision Making.

Wage Administration & Job Enrolment: Concept of Wages, Characteristics of good wage, Factors affecting wages, Methods of wage payments. Job Evaluation-Objectives, Principles & Methods of job evaluation.

Suggested Books:-

1. “Principles of Management”, by George Terry & Stephen G. Franklin.
2. “Essentials of Management”, by Harold Koontz & Heinz.

3. “Industrial Engineering & Production Management”, M. Mahajan.
4. “Business Organisation & Management”, Dr. B. P. Singh & Dr. T. N. Chhabra.

NOTE: There shall be total ten questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	Acquire qualities of a good entrepreneur and opt entrepreneurship as a career option.
CO2	Work as a sole proprietor as well as in partnership and in joint stock companies.
CO3	Analyze management problems and finding solutions to resolve conflicts emerging while working in groups within the organizations.
CO4	Work as a good manager in companies.
CO5	Become a rational decision maker.

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to be held in the Year December 2021, 2022, 2023, 2024
Semester VII**

OECS-71

**Open Elective II
Fundamentals of Management (b)**

3L:0T:0P

Major	Minor	Credits
100	50	3

Objectives of the Course:-

1. An overview about management as a discipline and its evolution.
2. Understand the concept and importance of planning and organizing in an organization.
3. Enabling the students to know about the importance of hiring and guiding the workforce by understanding the concept of leadership and communication in detail.
4. To understand the concept and techniques of controlling and new trends in management.

UNIT-1

Introduction to Management: Meaning, Definition, nature, importance & Functions, Management as Art, Science & Profession- Management as social System, Concepts of management-Administration Evolution of Management Thought: Development of Management Thought- Scientific management, Administrative Theory of Management, Bureaucratic Organization, Behavioral approach (Neo Classical Theory): Human Relations Movement; Behavioral Science approach; Modern approach to management – Systems approach and contingency approach.

UNIT-II

Planning: nature, purpose and functions, types of plans, planning process, Strategies and Policies: Concept of Corporate Strategy, formulation of strategy, Types of strategies, Management by objectives (MBO), SWOT analysis, Types of policies, principles of formulation of policies 4. Organizing: nature, importance, process, organization structure: Line and Staff organization, Delegation of Authority and responsibility, Centralization and Decentralization, Decision Making Process , Decision Making Models, Departmentalization: Concept and Types (Project and Matrix), formal & informal organizations

UNIT-III

Staffing: concept, process, features; manpower planning; Job Analysis: concept and process; Recruitment and selection: concept, process, sources of recruitment; performance appraisal, training and development Directing: Communication- nature, process, formal and informal,

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barriers to Effective Communication, Theories of motivation-Maslow, Herzberg, Mc Gregor ; Leadership – concept and theories, Managerial Grid, Situational Leadership. Transactional and Transformational Leadership

UNIT-IV

Controlling: concept, process, types, barriers to controlling, controlling Techniques: budgetary control, Return on investment, Management information system-MIS , TQM-Total Quality Management, Network Analysis- PERT and CPM. Recent Trends in Management: - Social Responsibility of Management–Management of Crisis, Total Quality Management, Stress Management, ., Concept of Corporate Social Responsibility (CSR) and business ethics. Functional aspects of business: Conceptual framework of functional areas of management- Finance; Marketing and Human Resources

Suggested Books:-

1. Management Concepts - Robbins, S.P; Pearson Education India
2. Principles of Management - Koontz & O'Donnel; (McGraw Hill)

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	The students will be able to apply management concepts and principles in daily life and thus, will be able to manage things efficiently and effectively.
CO2	The students will learn how to get work done easily by using management knowledge and functions.

**B.Tech Computer Science and Engineering Seventh Semester Examinations(OECS-71(c))
to be held in the Year December 2021, 2022, 2023, 2024
Semester VII**

OECS-71

Open Elective II

3L:0T:0P

Human Resource Management (c)

Major	Minor	Credits
100	50	3

Unit 1

(08 Hours)

INTRODUCTION TO HUMAN RESOURCE MANAGEMENT

HRM: Nature, Scope, Functions, HRM Practices and Problems in India with Case Studies

HUMAN RESOURCE PLANNING (HRP)

Concept and Process of HRP, Factors Affecting HRP

Unit 2

(10 Hours)

JOB ANALYSIS AND DESIGNING

Uses and Process of Job Analysis, Job Description and Job Specification: Features and Hypothetical Formulation, Job Designing: Job Enrichment, Job Enlargement

RECRUITMENT AND SELECTION

Recruitment: Sources and Methods

Selection: Selection Process, Selection Tests, Types and Nature of Interviews

Role Playing and Case Study on Selection Process, Tests and Interview

Unit 3

(10 Hours)

INDUCTION AND INTERNAL MOBILITY

Induction Programme, Need and Scope of Internal Mobility: Transfer, Promotion, Demotion

TRAINING AND DEVELOPMENT

Training: Need and Methods, Management Development: Need, Methods and Management Development Programme

HRM Games for Development of Employees

Unit 4

(10 Hours)

PERFORMANCE APPRAISAL AND COMPENSATION

Nature and Methods of Performance Appraisal, Hypothetical Performance Appraisal

Compensation: Financial and Non-Financial Benefits

EMPLOYEE HEALTH AND SAFETY

Concept, Issues related to Health and Safety, Workplace Health Hazards

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Reference Books:-

1. “Human Resource Management: Text and Cases”, Rao V.S.P., Pubs: Excel Books.
2. “Human Resource Management”, Dessler G. and Varkkey B., 12th Edition, Pubs: Pearson India.
3. “Human Resource Management: Text and Cases”, Aswathappa K., 7th Edition, Pubs: McGraw Hill Education (India).
4. “Human Resource Management: Text and Cases”, Gupta C.B., 14th Edition, Pubs: Sultan Chand and Sons.

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	The students will develop the ability to solve problems in area of HRM in
CO2	The students will become aware of latest developments in HRM practices which are essential for effective management in organization.

**B.Tech Computer Science and Engineering Seventh Semester Examinations(PRO-701) to
be held in the Year December 2021, 2022, 2023, 2024
Semester VII**

PRO -701

0L:0T:8P

PROJECT-II

Practical	Credits
100	4

The students will have to work on a project during 7th semester. The topic of the project shall have to be approved by the concerned teacher and should be relevant to the field of computer science and engineering. This may require complete literature survey, design, fabrication, simulation of some models and/or some preliminary laboratory experiments etc. The same project can be extended to 8th semester.

Distribution of Marks

Distribution of Marks as per University statutes:

Total Marks for End semester Evaluation		= 100 marks	
1)	Presentation/ Demonstration	= 30 marks	30 %
2)	Viva-voce	= 30 marks	30 %
3)	Actual work done	= 40marks	40 %

Award of Marks

Marks under (1) and (2) will be awarded by the Departmental committee constituted, comprising of convener and at least two members.

Marks under (3) will be awarded by the Project Guide/supervisor concern.

B.Tech Computer Science and Engineering Seventh Semester Examinations(SEM-712) to be held in the Year December 2021, 2022, 2023, 2024

Semester VII

SEM-712

1L:0T:0P

Seminar on Summer Internship

Major	Minor	Credits
-	50	1

Students are required to undertake 4 to 6 weeks Practical Training during the summer vacations in the field of Computer Science Engineering and applications in Govt./Semi-Govt./Private sector. Thereafter, each student shall be required to submit a report on the practical training to the concern HOD for evaluation.

Guidelines for evaluation of Practical Training:

Each student shall be evaluated individually by the departmental committee during the lecture allotted for this seminar, so that by the end of 5th semester each student has been evaluated. The committee shall have a convener and at least two members.

Distribution of Marks as per the University statutes:

Total Marks for Evaluation	= 50 marks	
i) Report	= 20	40 %
ii) Viva-Voce	= 15	30 %
iii) Miscellaneous Marks	= 15	30 %

Due weightage will be given to those who have opted for Industrial Training outside the State as well as keeping in view the profile of that Industry.

Award of the Marks:

Marks under (i), (ii) & (iii) will be awarded by the departmental committee constituted for the purpose.

University Institute of Engineering & Technology

University of Jammu

**B.Tech Computer Science and Engineering Eighth Semester Examinations to be held in the
Year May 2022, 2023, 2024, 2025**

Contract Hours:- 23

Bachelor of Technology (Computer Science & Engineering) Semester VIII
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Credit-Based Scheme of Studies/Examination										
S.No.	Course Code	Subject	Hours Per Week			Credits	Marks Distribution			
			L	T	P		Major	Minor	Practical	Total
1.	PECS-81	Elective-VI	3	-	-	3	100	50	-	150
2.	OECS-8	Open Elective-III	3	-	-	3	100	50	-	150
3.	OECS-8 2	Open Elective-IV	3	-	-	3	100	50	-	150
4.	PECS-82	Elective-VI Lab	-	-	2	1	-	-	50	50
5.	PRO-80	Project-III	-	-	12	6	-	-	200	200
Total			9	-	14	16	300	150	250	700

PECS-81 Elective-VI
Computer Graphics (A4)
Image Processing (A5)
Optimization Techniques (A6)
OECS-81 Open Elective-III
Cyber Security (a)
Big data and analytics (b)
Mobile Computing (c)
OECS-82 Open Elective-IV
Cyber Law and Ethics (a)
Enterprise Resource Planning (b)
Management Information System (c)

B.Tech Computer Science and Engineering Eighth Semester Examinations(PECS-81(A4))
to be held in the Year May 2022, 2023, 2024, 2025
Semester VIII

PECS-81

Elective VI

3L:0T:0P

Computer Graphics (A4)

Major	Minor	Credits
100	50	3

Objectives of the Course:-

1. To explore the background and standard line and circle drawing algorithms.
2. Explore the background and standard line and circle drawing algorithms.
3. Illustrate Projection and clipping with explore different techniques.
4. Apply design principles to create different curves and explore hidden lines and surface techniques.

Unit-1

(10 Hours)

Devices, Point & Positioning Devices, Plotting Techniques for point and Line, Line drawing algorithms: DDA, Bresenham's Circle drawing algorithms, Filled area algorithms: Scan line, Polygon filling algorithms, Boundary filled algorithms.

Unit-2

(10 Hours)

Window to view port transformation, Window to view port mapping, Two Dimensional transformation: translation, scaling, rotation, reflection and Shear, Homogeneous Coordinate system. 3-D transformation: Rotation, Shear, translation, Numerical Problems of transformation viewing pipeline.

Unit-3

(10 Hours)

Clipping: Point & Line clipping algorithm, 4-bit code algorithm, Cohen-Sutherland Line clipping algorithms, Liang-Barsky line clipping algorithms. Polygon clipping: Sutherland-Hodgeman Polygon clipping algorithm. Curve clipping, Text clipping. Projection: Parallel, Perspective, Vanishing Points.

Unit-4

(10 Hours)

Representation of 3-D Curves and Surfaces: interpolation and approximation alpires, parametric conditions, Geometric continuity conditions, Beizer curves and surfaces: properties of beizer

curves, bezier surfaces. Hidden Surfaces removal: Hidden surface elimination, depth buffer algorithm, scan line coherence and area coherence algorithm, priority algorithm

**B.Tech Computer Science and Engineering Eighth Semester Examinations(PECS-81(A4))
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Suggested Books :-

1. Donald Hearn & M. Pauline Baker, Computer Graphics, 2nd Edition, Pearson Education.
2. William M. Newman & Robert F. Sproull, Principles of Interactive Computer Graphics, Tata McGraw-Hill Second Edition, New Delhi, India.
3. Zhigang Xiang & Roy A. Plastock, Computer Graphics, Second Edition, Schaum's Outline, Tata McGraw Hill Education Private Limited, New Delhi, India.

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	Explore the background and standard line and circle drawing algorithms.
CO2	Exposure of various transformation approaches and its comparative analysis.
CO3	Illustrate Projection and clipping with explore different techniques.
CO4	Apply design principles to create different curves and explore hidden lines and surface techniques.

**B.Tech Computer Science and Engineering Eighth Semester Examinations(PECS-81(A5))
to be held in the Year May 2022, 2023, 2024, 2025
Semester VIII**

PECS-81

Elective VI

3L:0T:0P

Image Processing (A5)

Major	Minor	Credits
100	50	3

Objectives of the Course:-

1. To understand the fundamentals of digital image processing.
2. To understand frequency domain filters and spatial filters for image enhancement.
3. To study application of various filtering techniques to restore the image and analyze multi resolution view of wavelet transformation functions in 1D and 2D.
4. To evaluate image compression and segmentation techniques.

Unit 1

(08 Hours)

Introduction and Fundamentals to Digital Image Processing: What is Digital Image Processing, Origin of Digital Image processing, Examples that use Digital Image Processing, Fundamentals steps in Digital Image Processing, Components of Digital Image Processing System, Image sensing and acquisition, Image sampling and quantization and representation, Basic relationship between pixels

Unit 2

(08 Hours)

Image Enhancement in the Spatial Domain and Frequency Domain: Background, Basic Intensity transformation functions, Basic grey level transformation, Histogram processing, Basics of spatial filtering: Smoothing, sharpening filters (Convolution and Order Statistics). Introduction to Fourier transform, Frequency domain filters: Smoothing, Sharpening filters (Band pass and Homomorphic)

Unit 3

(08 Hours)

Image Restoration: Noise models, Image Restoration-Mean Filters (Arithmetic Mean, Contra Harmonic Mean, Geometric Mean, Harmonic Mean) Order statistics filters (Median, Maximum, Minimum, Midpoint, Alpha-Trimmed), Restoration techniques (Constrained method-Inverse filtering, Unconstrained method-Weiner filtering)

Unit 4

(08 Hours)

Color Image Processing: Color fundamentals, color models (RGB, CMY and CMYK, HSI and conversions), Pseudocolor image processing, Full color image processing, color transformations

**B.Tech Computer Science and Engineering Eighth Semester Examinations(PECS-81(A5))
to be held in the Year May 2022, 2023, 2024, 2025**

(Formulation, Intensity modification, Color negative, Color slicing, Smoothing, Sharpening, Segmentation)

Unit 5

(10 Hours)

Image Compression: Redundancies (Coding, Psychovisual, and Inter-Pixel), Encoding-Mapping, Quantizer, Coder, and Compression (Lossless compression: Variable length coding – Run Length coding, LZW coding, Arithmetic coding, Huffman encoding)
Lossy Compression (Lossy predictive, Bit allocation), JPEG, MPEG.

Image Segmentation & Representation: Erosion, Dilation, Opening and closing, Thickening, Thinning, Pruning, Detection of discontinuities, Edge detection operators, Region based segmentation, Signatures, Boundary segments, Skeleton of a region.

Suggested Books:-

1. “Digital Image Processing”, by Rafael C. Gonzalez And Richard E. Wood.
2. “Digital Image Processing”, by Pratt N.K.
3. “Digital Picture Processing”, by Rosenfeld And Kak.

NOTE: There shall be total ten questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	Review the fundamental concepts of a digital image processing system.
CO2	Analyze images in the frequency domain using various transforms.
CO3	Evaluate the techniques for image enhancement and image restoration.
CO4	Interpret image segmentation and representation techniques.

**B.Tech Computer Science and Engineering Eighth Semester Examinations(PECS-81(A6))
to be held in the Year May 2022, 2023, 2024, 2025
Semester VIII**

PECS-81

Elective VI

3L:0T:0P

Optimization Techniques (A6)

Major	Minor	Credits
100	50	3

Unit 1

(10 Hours)

Overview of optimization techniques, limitations and applications.

Linear Programming :Formulation of a linear programming problem with different types of constraints, requirements, assumptions, merits and demerits, applications of LP, Graphical analysis, graphical solution, multiple, unbounded solution and infeasible problems and its applications.

Simplex Method: solving LPP using simplex algorithm – Revised Simplex Method, Dual simplex problems, sensitivity and duality analysis in LP.

Unit 2

(10 Hours)

Transportation problems: Structure and formulation of TP, Methods for finding initial solution and optimality, unbalanced, maximization, degeneracy, transshipment in TP.

Assignment Problem: Approach, procedure and maximization, unbalanced and crew assignment problems.

Sequencing Problems: Processing n-jobs through two, three, M machines.

Unit 3

(10 Hours)

Integer Programming: Formulation Techniques, Unimodularity, cutting plane method, branch and bound method

Dynamic Programming: Methodology and its programming applications

Unit 4

(10 Hours)

Non Linear Programming: Solution of Non Linear Programming, convex and concave functions, quadratic and separable programming, Kuhn Tucker conditions for constraint optimization

Reference Books:-

1. Hamdy ATaha, “Operations Research –An Introduction”, Prentice Hall India, 2003.
2. V.K Kapoor, “Operations Research, Techniques for Management”, Sultan Chand & Sons.
3. Hillier and Lieberman “Introduction to Operations Research”, TMH, 2000.

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to be held in the Year May 2022, 2023, 2024, 2025**

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	Describe clearly a problem, identify its parts and analyze the individual functions.
CO2	Feasibility study for solving an optimization problem.
CO3	Discovery, study and solve optimization problems.

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be held in the Year May 2022, 2023, 2024, 2025
Semester VIII**

OECS-81

Open Elective III

3L:0T:0P

Cyber Security (a)

Major	Minor	Credits
100	50	3

Objectives of the course:-

1. To facilitate the basic knowledge of cyber security.
2. To explore and sort issues related to different types of activities in cyber crime.
3. To get enable to fix the various cyber attacks.
4. To deal with the digital forensics and related scenarios of cyber crimes.

Unit I

(10 Hours)

Introduction: Introduction and Overview of Cyber Crime, Nature and Scope of Cyber Crime, Types of Cyber Crime: crime against individual, Crime against property, Cyber extortion, Drug trafficking, cyber terrorism. Need for Information security, Threats to Information Systems, Information Assurance, Cyber Security, and Security Risk Analysis.

Unit 2

(10 Hours)

Cyber Crime Issues: Unauthorized Access to Computers, Computer Intrusions, Viruses and Malicious Code, Internet Hacking and Cracking, Virus and worms, Software Piracy, Intellectual Property, Mail Bombs, Exploitation, Stalking and Obscenity in Internet, Password Cracking, Steganography, Key loggers and Spyware, Trojan and backdoors, phishing, DOS and DDOS attack, SQL injection, Buffer Overflow.

Unit 3

(10 Hours)

Introduction to cyber attacks: passive attacks, active attacks. Cyber crime prevention methods, Application security (Database, E-mail and Internet), Data Security Considerations-Backups, Archival Storage and Disposal of Data, Security Technology Firewall and VPNs, Intrusion Detection, Access Control, Hardware protection mechanisms, OS Security

Unit 4

(10 Hours)

Digital Forensics: Introduction to Digital Forensics, historical background of digital forensics, Forensic Software and Hardware, need for computer forensics science, special tools and techniques digital forensic life cycle, challenges in digital forensic. Law Perspective: Introduction to the Legal Perspectives of Cybercrimes and Cyber security, Cybercrime and the Legal Landscape around the World, Why Do We Need Cyber laws, The Indian IT Act,

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be held in the Year May 2022, 2023, 2024, 2025**

Cybercrime Scenario in India, Digital Signatures and the Indian IT Act, Cybercrime and Punishment.

Suggested Books:-

1. Nelson Phillips and EnfingerSteuart, “Computer Forensics and Investigations”, Cengage Learning, New Delhi, 2009.
2. Robert M Slade,” Software Forensics”, Tata McGraw - Hill, New Delhi, 2005.
3. SunitBelapure and Nina Godbole, “Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives”, Wiley India Pvt. Ltd.

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	To facilitate the basic knowledge of cyber security.
CO2	To explore and sort issues related to different types of activities in cyber crime.
CO3	To get enable to fix the various cyber attacks.
CO4	To deal with the digital forensics and related scenarios of cyber crimes.

**B.Tech Computer Science and Engineering Eighth Semester Examinations(OECS-81(b)) to
be held in the Year May 2022, 2023, 2024, 2025
Semester VIII**

OECS-81

**Open Elective III
Big Data and Analytics (b)**

3L:0T:0P

Major	Minor	Credits
100	50	3

Objectives of the course:-

1. To learn in details the concepts of big data.
2. Expose the criteria of big data analytics and big data storage.
3. To explore knowledge of big data compression techniques.
4. To explore learning of big data tools and state-of-the-art knowledge with implementation for big data.

Unit 1

(10 Hours)

Big Data Background: Big data definition and features of big data, big data value, development of big data, challenges of big data, NoSQL databases, technologies related to big data including cloud computing, Internet of Things, data center, Hadoop, relationship between IoT and big data, relationship between hadoop and big data, big data generation and acquisition includes data collection, data transmission, data pre-processing, big data applications.

Unit 2

(10 Hours)

Big Data Analytics and Storage: Big data analysis, big data analytic methods and tools, Pig, Hive, Flume, Mahout, Big data storage, distributed storage system for massive data, storage mechanism for big data GFS, HDFS, HBase, MongoDB, Cassandra, big data storage deduplication techniques, fixed-size and variable-size blocks based deduplication, content defined chunking, frequency based chunking, byte and multibyte indexing techniques, Cloud storage.

Unit III

(10 Hours)

Big Data Compression: Big data delta compression, Xdelta implementation, Message Digest (MD5), Secure Hash Algorithm (SHA-1/SHA-256), Gear Hash, Tiger Hash, Rabin and Incremental Secure Fingerprint based deduplication, lossless duplicate and similar data elimination approaches, Parallel deduplication and compression using PCOMPRESS, Scalable Decentralized Deduplication Store (SDDS) using Cassandra.

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Unit IV

(10 Hours)

Big Data Processing: Installation procedure with system requirements for Apache Hadoop, Cassandra, Spark, Pig, Hive, HBase, MongoDB large scale distributed storage systems, Map Reduce programming model working, YARN architecture, Apache Pig and Hive architecture, Single node and Multi-nodes Hadoop Cluster Set up and running a Big Data example, NoSQL implementation.

Suggested Books:

1. "Big Data" by Viktor Mayer-Schönberger, Kenneth Cukier, ISBN:978-0544002692, Eamon Dolan/Houghton Mifflin Harcourt 2013.
2. "Big Data Now", by O'Reilly Media Inc., ASIN: B0097E4EBQ, O'Reilly 2012.
3. "Hadoop Operation", by Eric Sammer, ISBN: 978-1449327057, O'Reilly 2012.
4. "MapReduce Design Patterns: Building Effective Algorithms and Analytics for Hadoop and Other Systems", by Donald Miner, Adam Shook, ISBN:978-1449327170, O'Reilly 2012.

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	To learn in details the concepts of big data.
CO2	Expose the criteria of big data analytics and big data storage.
CO3	To explore knowledge of big data compression techniques.
CO4	To explore learning of big data tools and state-of-the-art knowledge with implementation for big data.

**B.Tech Computer Science and Engineering Eighth Semester Examinations(OECS-81(c)) to
be held in the Year May 2022, 2023, 2024, 2025
Semester VIII**

OECS-81

**Open Elective III
Mobile Computing (c)**

3L:0T:0P

Major	Minor	Credits
100	50	3

Objectives of the Course:-

- To describe the concepts of mobile computing and cellular networks.
- To learn the basic concepts of wireless networks.
- To study of various issues of mobile computing and basics of cloud computing.
- Description and applications of Ad hoc networks.

UNIT – I

(10 Hours)

Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, Mobile computing Architecture, Design considerations for mobile computing, Mobile Computing through Internet, Making existing applications mobile enabled. GSM: air-interface,

channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in Cellular systems, WCDMA, GPRS 3G, 4G.

UNIT – II

(10 Hours)

Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP : Architecture, Traditional TCP, Classical TCP, improvements in WAP, WAP applications.

UNIT – III

(10 Hours)

Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment. Cloud Architecture model, Types of Clouds: Public Private & Hybrid Clouds, Resource management and scheduling, Clustering, Data Processing in Cloud: Introduction to Map Reduce for Simplified data processing on Large clusters.

UNIT – IV

(10 Hours)

Ad hoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc

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on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.

Reference Books:-

1. Rajkamal, Mobile Computing, 2/E Oxford University Press,2011.
2. J. Schiller, Mobile Communications, Addison Wesley
3. Yi Bing Lin, Wireless and Mobile Networks Architecture , John Wiley.

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	Describe the concepts of mobile computing and cellular networks.
CO2	Learn the basic concepts of wireless networks. Description and applications of Ad hoc networks.
CO3	Study of various issues of mobile computing and basics of cloud computing.
CO4	Description and applications of Ad hoc networks.

B.Tech Computer Science and Engineering Eighth Semester Examinations(OECS-82(a)) to be held in the Year May 2022, 2023, 2024, 2025
Semester VIII

OECS-82

Open Elective IV
Cyber Law and Ethics (a)

3L:0T:0P

Major	Minor	Credits
100	50	3

Unit I: Introduction**(05 Hours)**

Overview of Computer and Web Technology, Need for Cyber Law Cyber Jurisprudence at International and Indian Level

Unit II: Jurisdictional Aspects in Cyber Law**(08 Hours)**

Issues of jurisdiction in cyberspace; Types of jurisdiction; The Test evolved : Minimum Contacts Theory , Sliding Scale Theory , Effects Test and International targeting; Jurisdiction under IT Act, 2000.

Unit 3: Cyber Crimes& Legal Framework**(10 Hours)**

Cyber Crimes against Individuals, Institution and State – Hacking, Digital Forgery, Cyber Stalking/Harassment, Cyber Pornography, Identity Theft & Fraud , Cyber Terrorism, Cyber Defamation, Right to Privacy and Data Protection on Internet (Concept of privacy , Threat to privacy on internet, Self-regulation approach to privacy, Ingredients to decide confidentiality of information, Breach of sensitive personal information and confidentiality under IT Act and penalties for the same.),Right of Interception under IT Act. Different offences under IT Act, 2000

Unit 4: Digital signature and Electronic Signature and Data Protection**(08 Hours)**

Concept of public key and private key, Certification authorities and their role , Creation and authentication of digital signature , Concept of electronic signature certificates
Electronic Governance : Concept of electronic records and electronic signatures, Rules for attribution, acknowledgement and dispatch of such records

Unit 5: E-Contracting**(10 Hours)**

Salient features of E-contract, Formation of E-contract and types, E-mail Contracting, Indian Approach on E-contracts

Intellectual Property Issues in Cyber Space

Interface with Copyright Law, Interface with Patent Law, Trademarks & Domain Names Related issues, Dispute Resolution in Cyberspace

**B.Tech Computer Science and Engineering Eighth Semester Examinations(OECS-82(a))
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Suggested Books:-

- i. Karnika Seth, Computers, Internet and New Technology Laws, Lexis NexisButterworthsWadhwa Nagpur.
- ii. Chris Reed & John Angel, Computer Law, OUP, New York, (2007).
- iii. Justice Yatindra Singh,Cyber Laws, Universal Law Publishing Co, New Delhi, (2012).
- iv. Verma S, K, Mittal Raman,Legal Dimensions of Cyber Space, Indian Law Institute, New Delhi, (2004)

NOTE: There shall be total ten questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	To understand the common legal issues related to privacy and intellectual properties rights.
CO2	To describe facts and terms on contracts and licenses.
CO3	To understand computer crime and frauds and describe professional behaviour and ethical issues in the information technology field.

B.Tech Computer Science and Engineering Eighth Semester Examinations(OECS-82(b))
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Semester VIII

OECS-82

Open Elective IV

3L:0T:0P

Enterprise Resource Planning (b)

Major	Minor	Credits
100	50	3

Objectives of the Course:-

1. Describe the concept of ERP and the ERP model; define key terms; explain the transition from MRP to ERP; identify the levels of E
2. RP maturity.
3. Explain how ERP is used to integrate business processes; define and analyze a process; create a process map and improve and/or simplify the process; apply the result to an ERP implementation.
4. Describe the elements of a value chain, and explain how core processes relate; identify how the organizational infrastructure supports core business processes; explain the effect of a new product launch on the three core business processes.

Unit 1 Introduction

(06 Hours)

ERP as Integrated Management Information System - Evolution of ERP - Benefits of ERP. ERP vs Traditional Information Systems.

Unit 2 Business Process Reengineering

(08 Hours)

Business Process Reengineering- need and challenges, - Management concerns about BPR. - BPR to build business Model for ERP. ERP & Competitive advantage, - Basic Constituents of ERP, Selection criteria for ERP Packages. Procurement process for ERP Package.

Unit III - ERP Packages

(08 Hours)

Overview of ERP packages – PEOPLE SOFT, SAP-R/3, BAAN IV, MFG/PRO, IFS/AVALON, ORACLE- FINANCIAL, Survey of Indian ERP Packages regarding their Coverage, performance & cost.

Unit IV - ERP Implementation

(08 Hours)

ERP Implementation- issues, Role of Consultants, Vendors, Users, - Need for training, customization. ERP implementation methodology and post implementation issues and options.

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Unit V - ERP Case Studies

(06 Hours)

ERP Case Studies In Hrm, Finance, Production, Product Database, Materials, Sales & Distribution.

Reference Books :-

1. Bret Wagner, Ellen Monk, “Concepts in Enterprise Resource Planning”, 2012.
2. Bret Wagner, Ellen Monk, “Enterprise Resource Planning”, Third Edition Cengage Learning, 2008.
3. Rahul V. Altekhar “Enterprise Resource Planning”, Tata McGraw Hill,
4. Vinod Kumar Garg and Venkitakrishnan N K, “Enterprise Resource Planning – A Concepts and Practice”, PHI
5. Mary Summer, “Enterprise Resource Planning”- Pearson Education

NOTE: There shall be total ten questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	Analyze the strategic options for ERP identification and adoption.
CO2	Design the ERP implementation strategies.

**B.Tech Computer Science and Engineering Eighth Semester Examinations(OECS-82(c))
to be held in the Year May 2022, 2023, 2024, 2025
Semester VIII**

OECS-82

Open Elective IV

3L:0T:0P

Management Information System (c)

Major	Minor	Credits
100	50	3

Unit 1

(08 Hours)

Information systems in the enterprise

Why information systems, perspectives on information systems, contemporary approaches to information systems, different types of systems in organizations

Systems from a functional perspective

The Digital Firm, Electronic Business and Electronic Commerce, Internet technology and the digital firm.

Unit 2

(08 Hours)

The wireless revolution

Business value of wireless networking, wireless transmission media and devices, cellular network standards and generations, wireless computer networks and internet access, M-commerce and Mobile computing, wireless technology in the enterprise.

Unit 3

(10 Hours)

Security and control

System vulnerability and abuse, business value of security and control, establishing a management framework for security and control, technologies and tools for security and control.

Enterprise applications and business process systems

What are enterprise systems, How an enterprise systems work, supply chain management systems, customer relationship management systems, enterprise integration trends.

Unit 4

(12 Hours)

Redesigning the organizations with information systems

Systems as planned organizational change, business process reengineering and process improvement, overview of system development, alternative systems building approaches traditional systems life cycle, prototyping, end-user development, application software package and outsourcing.

Managing change and international information systems

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The importance of change management in information systems success and failure, managing implementation, the growth of international systems, organizing international information systems, managing global systems, technology issues and opportunities for global value chain.

Reference Books:-

1. C. Laudon, Jane P. Laudon & VM Prasad Kenneth, "Management Information Systems", Pearson Education.
2. Effy Oz, Thomson, "Management Information Systems".
3. M Henry C. Lucas, Jr., "Information Technology-Strategic Decision Making for Managers", John Wiley & Sons, Inc.
4. James A. Brien, "Introduction to Information Systems", TMH.
5. Jessup & Velacich, "Information Systems Today", PHI.
6. Sadagopan, "Management Information Systems", PHI.

NOTE: There shall be total eight questions, two from each unit. Each question will carry 20 marks. Students have to attempt at least one question from each unit. Total five questions have to be attempted.

COURSE OUTCOMES	
CO1	Understand the leadership role of Management Information Systems in achieving business competitive advantage through informed decision making.
CO2	Analyze and synthesize business information and systems to facilitate evaluation of strategic alternatives.
CO3	Effectively communicate strategic alternatives to facilitate decision making.

**B.Tech Computer Science and Engineering Eighth Semester Examinations(PECS-82(a)) to
be held in the Year May 2022, 2023, 2024, 2025
Semester VIII**

PECS-82

**Elective VI Lab
Computer Graphics Lab (a)**

0L:0T:2P

Practical	Credits
50	1

Course Objectives :-

- To Implement basic algorithms related to Line & Circle Drawing.
- Implement various Line & Circle Drawing Algorithms.
- Hands on experiments on 2-D transformations.
- Conceptual implementation of Clipping and other drawing algorithms.

List of Practicals

1. Write a program to implement DDA line drawing algorithm.

2. Write a program to implement Bresenham's line drawing algorithm.
3. Implement the Bresenham's circle drawing algorithm.
4. Write a program to draw a decagon whose all vertices are connected with every other vertex using lines.
5. Write a program to move an object using the concepts of 2-D transformations.
6. Write a program to implement the midpoint circle drawing algorithm using any Object Oriented Programming Language like Python, C++, Java.
7. Implement the line clipping algorithm using any Object Oriented Programming Language like Python, C++, Java.
8. Implement boundary fill algorithm using any Object Oriented Programming Language like Python, C++, Java.
9. Implement the depth buffer algorithm using any Object oriented language like Python, C++, Java.
10. Perform the Polygon Clipping Algorithm using any Object oriented language like Python, C++, Java.
11. Draw a Rectangle using Bresenham's and DDA Algorithm using any Object oriented language like Python, C++, Java.

B.Tech Computer Science and Engineering Eighth Semester Examinations(PECS-82(a)) to be held in the Year May 2022, 2023, 2024, 2025

COURSE OUTCOMES	
CO1	To Implement basic algorithms related to Line & Circle Drawing. other drawing algorithms.
CO2	Implement various Line & Circle Drawing Algorithms.
CO3	Hands on experiments on 2-D transformations.
CO4	Conceptual implementation of Clipping and drawing algorithms.

**B.Tech Computer Science and Engineering Eighth Semester Examinations(PECS-82(b)) to
be held in the Year May 2022, 2023, 2024, 2025
Semester VIII**

PECS-82

**Elective VI Lab
Image Processing Lab (b)**

0L:0T:2P

Practical	Credits
50	1

Course Objectives :-

- To develop simple image processing applications.

List of Practical

1. Implement the basic commands/ functions of an image processing tool.
2. Take an input image and plot its histogram with various ways as imhist, bar, stem, plot and Prove that histogram processing can be used for image enhancement.
3. Filtering using MATLAB package.
4. Filtering for Blurring and Sharpening the image
5. Implement various Nonlinear Spatial Filters.
6. Implement various types of filters to remove the noise in an image.
7. Implement image compression algorithms.
8. Design problems related to image segmentation.
9. Design problems related to image recognition, pattern recognition.

Note:- All these practical can be implemented either on MATLAB or SCILAB.

COURSE OUTCOMES	
CO1	Implementation of various image processing concepts on MATLAB or SCILAB.

**B.Tech Computer Science and Engineering Eighth Semester Examinations(PECS-82(c)) to
be held in the Year May 2022, 2023, 2024, 2025
Semester VIII**

PECS-82

Elective VI Lab

0L:0T:2P

Optimization Techniques Lab (c)

Practical	Credits
50	1

Implement the following using any object oriented programming language like JAVA/C++

- Simplex Method
- Transportation Problem
- Assignment Problem
- Sequencing Problem

COURSE OUTCOMES	
CO1	To develop algorithms and programs to implement different optimization techniques.

**B.Tech Computer Science and Engineering Eighth Semester Examinations(PRO-801) to be
held in the Year May 2022, 2023, 2024, 2025
Semester VIII**

PRO -801

0L:0T:12P

PROJECT-III

Practical	Credits
200	06

The student will complete their assigned project work initiated in 7th semester under course No.PROJ-CS-701 and submit a detailed project report individually to the Head of the department.

Guidelines for evaluation of Project work in 8th semester:

There shall be a mid-semester evaluation, followed by an End Semester (Final) Evaluation

Sub-distribution of marks:

- For External Examiner : 100
- For Internal Examiner : 100

Sub-distribution of internal Marks:

- Mark distribution of internal Project work as per the University statues shall be based on:

a.	Viva-Voce	=	30	30%
b.	Presentation	=	30	30%
c.	Report	=	40	40%
			<hr/>	
	Total	=	100	

