B.Tech. CSE (3rd SEM.)
TOTAL CONTACT HRS. = 25, TOTAL CREDITS = 23

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
BCSE1-302	Data Structures	3	1	0	40	60	100	4
BCSE1-303	Object Oriented Programming Using C++	3	0	0	40	60	100	3
BCSE1-304	Digital Circuits & Logical Design	3	0	0	40	60	100	3
BCSE1-305	Computer Architecture & Organization	3	0	0	40	60	100	3
BCSE1-306	Discrete Structures	3	1	0	40	60	100	4
BCSE1-307	Data Structures Laboratory	0	0	2	60	40	100	1
BCSE1-308	Object Oriented Programming Using C++ Laboratory	0	0	2	60	40	100	1
BCSE1-309	Digital Circuit & Logical Design Laboratory	0	0	2	60	40	100	1
BSOS0-F91	Soft Skills-I	0	0	2	60	40	100	1
BCSE1-310	Training-I	-	-	-	60	40	100	2
Total		**15**	**2**	**08**	**500**	**500**	**1000**	**23**

B.Tech. CSE (4th SEM.)
TOTAL CONTACT HRS. = 28, TOTAL CREDITS = 22

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
BCSE1-411	Operating System	3	0	0	40	60	100	3
BCSE1-412	Database Management Systems-I	3	0	0	40	60	100	3
BCSE1-413	Computer Networks-I	3	0	0	40	60	100	3
BCSE1-414	Design & Analysis Of Algorithms	3	1	0	40	60	100	4
BCSE1-415	Microprocessors & Assembly Languages	3	0	0	40	60	100	3
BCSE1-416	Database Management Systems-I Laboratory	0	0	4	60	40	100	2
BCSE1-417	Computer Networks-I Laboratory	0	0	2	60	40	100	1
BCSE1-418	Design & Analysis of Algorithms Laboratory	0	0	2	60	40	100	1
BCSE1-419	Microprocessors & Assembly Languages Laboratory	0	0	2	60	40	100	1
BSOS0-F92	Soft Skills- II	0	0	2	60	40	100	1
Total		**15**	**1**	**12**	**500**	**500**	**1000**	**22**

B.Tech. CSE (5th SEM.)
TOTAL CONTACT HRS. = 23, TOTAL CREDITS = 23

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
BCSE1-520	Computer Networks-II	3	0	0	40	60	100	3
BCSE1-521	Automata Theory	3	1	0	40	60	100	4
BCSE1-522	JAVA Programming	3	1	0	40	60	100	4
Departmental Elective-I		3	0	0	40	60	100	3
BCSE1-556	Enterprise Resource Planning							
BCSE1-557	Digital Marketing							
BCSE1-558	Computer Graphics							
Open Elective –I		3	0	0	60	40	100	3
BCSE1-523	Computer Networks-II Laboratory	0	0	2	60	40	100	1
BCSE1-524	JAVA Programming Laboratory	0	0	2	60	40	100	1
BSOS0-F93	Soft Skills-III	0	0	2	60	40	100	1
BCSE1-525	Training II	-	-	-	40	60	100	3
Total		**15**	**2**	**06**	**440**	**460**	**900**	**23**

B.Tech. CSE (6th SEM.)
TOTAL CONTACT HRS. = 24, TOTAL CREDITS = 22

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
BCSE1-626	Software Engineering	**3**	**1**	**0**	**40**	**60**	**100**	**4**
BCSE1-627	Compiler Design	**3**	**1**	**0**	**40**	**60**	**100**	**4**
Department Elective-II		**3**	**1**	**0**	**40**	**60**	**100**	**4**
BCSE1-659	Mobile app development							
BCSE1-660	Distributed Computing							
BCSE1-661	Multimedia & Virtual Reality							
Departmental Elective-III		**3**	**1**	**0**	**40**	**60**	**100**	**4**
BCSE1-662	Web Technologies							
BCSE1-663	Cryptography & Network Security							
BCSE1-664	Data Mining & Warehousing							
Open Elective-II		**3**	**0**	**0**	**40**	**60**	**100**	**3**
BCSE1-628	Software Engineering Laboratory	**0**	**0**	**2**	**60**	**40**	**100**	**1**
BCSE1-629	Web Engineering Laboratory	**0**	**0**	**2**	**60**	**40**	**100**	**1**
BSOS0-F93	Soft Skills-III	**0**	**0**	**2**	**40**	**60**	**100**	**1**
Total		**16**	**4**	**4**	**360**	**440**	**800**	**22**

B. Tech. CSE (7th SEM.)
TOTAL CONTACT HRS. = 27, TOTAL CREDITS = 25

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
BCSE1-730	Database Management Systems-II	3	1	0	40	60	100	4
BCSE1-731	Object Oriented Analysis And Design Using UML	3	1	0	40	60	100	4
Departmental Elective-IV		3	1	0	40	60	100	4
BCSE1-765	Linux & Unix Systems							
BCSE1-766	Artificial Intelligence							
BCSE1-767	Software Testing & Quality Assurance							
Open Elective-III		3	0	0	40	60	100	3
BCSE1-732	Database Management Systems-II Laboratory	0	0	2	60	40	100	1
BCSE1-733	Object Oriented Analysis And Design Using UML Laboratory	0	0	2	60	40	100	1
BCSE1-734	Training-III	-	-	-	40	60	100	4
BCSE1-735	Project-I	-	-	8	40	60	100	4
Total		12	3	12	360	440	800	25

B. Tech. CSE (8th SEM.)
TOTAL CONTACT HRS. = 22, TOTAL CREDITS = 15

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
BCSE1-836	Cloud Computing & Bigdata	3	1	0	40	60	100	4
Departmental Elective-V		3	1	0	40	60	100	4
BCSE1-868								
BCSE1-869	Software Project Management							
BCSE1-870	Wireless Sensor Network							
BCSE1-837	Cloud Computing & Bigdata Laboratory	0	0	2	60	40	100	1
BCSE1-838	Project-II	0	0	12	40	60	100	6
Total		6	2	14	180	220	400	15

Total Credits = 25 + 25 + 23 + 22 + 23 + 22 + 25 + 15 = 180

DATA STRUCTURES

Subject Code- BCSE1-302 **L T P C** **Duration – 45 Hrs.**
3 1 0 4

COURSE OBJECTIVES

To learn the concepts of data structure and algorithms and its implementation. The course has the main ingredients required for a computer science graduate and has all the necessary topics for assessment of data structures and algorithms.

COURSE OUTCOMES

CO1 Able to comprehend the basic concepts of memory management, data structure, Algorithms and Asymptotic notation.

CO2 Understand and implement linear data structures such as arrays, linked lists, stacks and Queues.

CO3 Understand the concepts of non-linear data structures such as graphs, trees and heaps.

CO4 Able to describe and implement hashing, Searching and Sorting Techniques

UNIT-I (11 Hrs.)

Introduction: Data Structures and data types, Efficient use of memory, Recursion, operations on data structures, time and space complexity of algorithms, Asymptotic Notations.

Arrays: Linear and multi-dimensional arrays and their representation in memory, operations on arrays, sparse matrices and their storage.

UNIT-II (12 Hrs.)

Linked Lists: Singly linked lists, operations on link list, linked stacks and queues, polynomial addition, sparse matrices, doubly linked lists and dynamic storage management, circular linked list,

Stacks and Queues: Concepts of stack and queues, memory representations, operations on stacks and queues, application of stacks such as parenthesis checker, evaluation of postfix expressions, conversion from infix to postfix representation, implementing recursive functions, deque, priority queue, applications of queues. Garbage collection,

UNIT-III (11 Hrs.)

Trees: Basic terminology, sequential and linked representations of trees, traversing a binary tree using recursive and non-recursive procedures, inserting a node, deleting a node, brief introduction to threaded binary trees, AVL trees and B-trees. Representing a heap in memory, operations on heaps, application of heap in implementing priority queue and heap sort algorithm.

Graphs: Basic terminologies, representation of graphs (adjacency matrix, adjacency list), traversal of a graph (breadth-first search and depth-first search), and applications of graphs. Dijkstra's algorithm for shortest path, Minimal Spanning tree.

UNIT-IV (11 Hrs.)

Hashing & Hash Tables: Comparing direct address tables with hash tables, hash functions, concept of collision and its resolution using open addressing and separate chaining, double hashing, rehashing

Searching & Sorting: Searching an element using linear search and binary search techniques, Sorting arrays using bubble sort, selection sort, insertion sort, quick sort, merge sort, heap sort, shell sort and radix sort, complexities of searching & sorting algorithms.

RECOMMENDED BOOKS:

1. Tenenbaum, Augenstein, & Langsam, 'Data Structures using C and C++', 2nd Edn., Prentice Hall of India, **2009**.
2. Seymour Lipschutz, 'Data Structures, Schaum's Outline Series', 1st Edn., Tata McGraw

Hill, **2005**.
3. R.S. Salaria, 'Data Structures & Algorithms Using C++', 3rd Edn., Khanna Book Publishing Co. (P) Ltd, **2012.**
4. Kruse, 'Data Structures & Program Design', 3rd Edn., Prentice Hall of India, **1994.**
5. Michael T. Goodrich, Roberto Tamassia, & David Mount, 'Data Structures and Algorithms in C++', 2nd Edn., Wiley India, **2016**.
6. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, 'Introduction to Algorithms', 3rd Edn., PHI COURSE Pvt. Ltd-New Delhi, **2009**.
7. Ellis Horowitz, Sartaj Sahni, & Dinesh Mehta, 'Fundamentals of Data Structures in C++', 2nd Edn., Orient Longman, **2008**.
8. Malik, 'Data Structures using C++', 2nd Edn., Cengage COURSE, **2012**.

OBJECT ORIENTED PROGRAMMING USING C++

Subject Code- BCSE1-303 **L T P C** **Duration: 36 Hrs.**
3 0 0 3

COURSE OBJECTIVES

To introduce the principles and paradigms of Object Oriented Programming Language for design and implement the Object Oriented System

COURSE OUTCOMES

CO1 To introduce the basic concepts of object oriented programming language and its representation
CO2 To allocate dynamic memory, access private members of class and the behavior of inheritance and its implementation.
CO3 To introduce polymorphism, interface design and overloading of operator.
CO4 To handle backup system using file, general purpose template and handling of raised exception during programming

UNIT-I

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

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

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

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.

RECOMMENDED BOOKS:

1. Robert Lafore, 'Object Oriented Programming in Turbo C++', 2nd Edn., The WAITE Group Press, **1994**.
2. Herbert Shield, 'The Complete Reference C ++', 4th Edn., Tata McGraw Hill, **2003**.
3. Shukla, 'Object Oriented Programming in C++', Wiley India, **2008**.
4. H.M. Deitel and P.J. Deitel, 'C++ How to Program', 2nd Edn., Prentice Hall, **1998**.
5. D. Ravichandran, 'Programming with C++', 3rd Ed., Tata McGraw Hill, **2003**.
6. Bjarne Stroustrup, 'The C++ Programming Language', 4th Edn., Addison Wesley, **2013**.
7. R.S. Salaria, 'Mastering Object-Oriented Programming with C++', Salaria Publishing House, **2016**.

DIGITAL CIRCUITS & LOGICAL DESIGN

Subject Code- BCSE1-304 **L T P C** **Duration: 36 Hrs.**
3 0 0 3

COURSE OBJECTIVES

To learn the basic methods for the design of digital circuits and provide the fundamental concepts used in the design of digital systems.

COURSE OUTCOMES

CO1 To represent numerical values and perform number conversions between different number systems. Also acquire knowledge of Boolean algebra and minimization methods for designing combinational Systems.

CO2 Study and analyze the basic logic gates and various logic families. To Analyze and Design digital combinational circuits.

CO3 Analyze and design flip-flops and latches and design sequential systems composed of standard sequential modules, such as counters and registers.

CO4 To acquire Knowledge of the nomenclature and technology in the area of memory devices and about various analog and digital signals with their conversion techniques.

UNIT-I

Number Systems: Binary, Octal, Decimal, Hexadecimal. Number base conversions, 1's, 2's, rth's complements, signed Binary numbers. Binary Arithmetic, Binary codes: Weighted BCD, Gray code, Excess 3 code, ASCII – conversion from one code to another.

Boolean Algebra: Boolean postulates and laws – De-Morgan's Theorem, Principle of Duality, Boolean expression Boolean function, Minimization of Boolean expressions – Sum of Products (SOP), Product of Sums (POS), Minterm, Maxterm, Canonical forms, Conversion between canonical forms, Karnaugh map Minimization, Quine-McCluskey method - Don't care conditions.

UNIT-II

Logic GATES: AND, OR, NOT, NAND, NOR, Exclusive-OR and Exclusive-NOR. Implementations of Logic Functions using gates, NAND-NOR implementations. Study of logic families like RTL, DTL, DCTL, TTL, MOS, CMOS, ECL and their characteristics.

Combinational Circuits: Design procedure – Adders, Subtractors, Serial adder/ Subtractor, Parallel adder/ Subtractor Carry look ahead adder, BCD adder, Magnitude Comparator, Multiplexer/ Demultiplexer, encoder/decoder, parity checker, code converters. Implementation of combinational logic using MUX.

UNIT-III

Sequential Circuits: Flip flops SR, JK, T, D and Master slave, Excitation table, Edge triggering, Level Triggering, Realization of one flip flop using other flip flops. Asynchronous/Ripple counters, Synchronous counters, Modulo-n counter, Ring Counters, Design of Synchronous counters: state diagram, Circuit implementation, Shift registers.

UNIT-IV

Memory Devices: Classification of memories, RAM organization, Write operation, Read operation, Memory cycle. Static RAM Cell-Bipolar, RAM cell, MOSFET RAM cell, Dynamic RAM cell. ROM organization, PROM, EPROM, EEPROM, Field Programmable Gate Arrays (FPGA)

Signal Conversions: Analog & Digital signals. A/D and D/A conversion techniques (Weighted type, R-2R Ladder type, Counter Type, Dual Slope type, Successive Approximation type).

RECOMMENDED BOOKS

1. Thomas L. Floyd, 'Digital Fundamentals', 11th Rev Edn., Pearson Education, Inc, New Delhi, **2014**.
2. Morris Mano, 'Digital Design', Prentice Hall of India Pvt. Ltd, **2001**.
3. Donald P. Leach and Albert Paul Malvino, 'Digital Principles and Applications', 5th Edn., Tata McGraw Hill Publishing Company Limited, New Delhi, **2003**.
4. R.P. Jain, 'Modern Digital Electronics', 3rd Edn., Tata McGraw–Hill Publishing Company Limited, New Delhi, **2003**.
5. Ronald J. Tocci, Neal S. Widmer, Gregory L. Moss, 'Digital System-Principles and Applications', 10th Edn., Pearson Education, **2009.**
6. Subrata Ghosal, 'Digital Electronics', 1st Edn., Cengage COURSE, **2012**.

COMPUTER ARCHITECTURE & ORGANISATION

Subject Code- BCSE1-305 **L T P C** **Duration: 36 Hrs.**

3 0 0 3

COURSE OBJECTIVES

To have a thorough understanding of the basic structure, operation of a digital computer and study the different ways of communicating with I/O devices and standard I/O interfaces, the hierarchical memory system including cache memories and virtual memory.

COURSE OUTCOMES

CO1 Ability to understand how computer hardware has evolved to meet the needs of multiprocessing systems, Instruction Set Architecture: Instruction format, types, various addressing modes, the basic components and design of the CPU: the ALU and control unit.

CO2 Understand the memory organization: SRAM, DRAM, concepts on cache memory, Memory Interleaving, Associative memory, Virtual memory organization.

CO3 Ability to understand the parallelism both in terms of a single processor and multiple processors.

CO4 Understand the I/O Organization: Basics of I/O, Memory-mapped I/O & I/O mapped I/O, types of I/O transfer: Program controlled I/O, Interrupt-driven I/O, DMA.

UNIT-I (11 Hrs.)

General System Architecture: Store program control concept, Flynn's classification of computers (SISD, MISD, MIMD); Multilevel viewpoint of a machine: digital logic, micro architecture, ISA, operating systems, high level language; structured organization; CPU, caches, main memory, secondary memory units & I/O; Performance metrics; MIPS, MFLOPS.

Instruction Set Architecture: Instruction set based classification of processors (RISC, CISC, and their comparison); addressing modes: register, immediate, direct, indirect, indexed; Operations in the instruction set; Arithmetic and Logical, Data Transfer, Machine Control Flow.

UNIT-II (12 Hrs.)

Basic non pipelined CPU Architecture: CPU Architecture types (accumulator, register, stack, memory/ register) detailed data path of a typical register based CPU, Fetch-Decode-Execute cycle (typically 3 to 5 stage); microinstruction sequencing, implementation of control unit, Enhancing performance with pipelining. Hardwired control design method, Micro programmed control unit.

UNIT-III (11 Hrs.)

Memory Hierarchy & I/O Techniques: The need for a memory hierarchy (Locality of reference principle, Memory hierarchy in practice: Cache, main memory and secondary memory, Memory parameters: access/ cycle time, cost per bit); Main memory (Semiconductor RAM & ROM organization, memory expansion, Static & dynamic memory types); Cache memory (Associative & direct mapped cache organizations. Allocation & replacement polices, segments, pages & file organization, virtual memory.

UNIT-IV (11 Hrs.)

Introduction to Parallelism: Goals of parallelism (Exploitation of concurrency, throughput enhancement); Amdahl's law; Instruction level parallelism (pipelining, super scaling –basic features); Processor level parallelism (Multiprocessor systems overview).

Computer Organization [80x86]: Instruction codes, computer register, computer instructions, timing and control, instruction cycle, type of instructions, memory reference, register reference. I/O reference, Basics of Logic Design, accumulator logic, Control memory, address sequencing, micro-instruction formats, micro-program sequencer, Stack Organization, Instruction Formats, Types of interrupts; Memory Hierarchy. Programmed I/O, DMA & Interrupts.

RECOMMENDED BOOKS

1. David A. Patterson and John L. Hennessy, 'Computer Organization and Design', 2nd Edn., Morgan Kauffmann Publishers, **1997**.
2. John P. Hayes, 'Computer Architecture and Organization', 3rd Edn., TMH, **1998**.
3. William Stallings, 'Operating Systems Internals and Design Principles', 4th Edn., Prentice-Hall Upper Saddle River, New Jersey, **2001**.
4. Carl Hamacher and Zvonko Vranesic, 'Computer Organization', 5th Edn., SafwatZaky, **2002**.
5. A.S. Tanenbaum, 'Structured Computer Organisation', 4th Edn., Prentice-Hall of India, Eastern Economic Edition, **1999**.
6. W. Stallings, 'Computer Organisation & Architecture: Designing for Performance', 4th Edn., Prentice-Hall International Edition, **1996**.
7. M. Mano, 'Computer Architecture & Organisation', Prentice-Hall, **1990**.
8. Nicholas Carter, 'Computer Architecture', T.M.H., **2002**.

DISCRETE STRUCTURES

Subject Code- BCSE1-306 **L T P C 3 1 0 4** **Duration: 45 Hrs.**

COURSE OBJECTIVES

To learn the ability to distinguish between the tractability and intractability of a given computational problem. To be able to devise fast and practical algorithms for real-life problems using the algorithm design techniques and principles learned in this course.

COURSE OUTCOME

CO1 To study various fundamental concepts of Set Theory and Logics.
CO2 To study the Functions and Combinatorics.
CO3 To study and understand the Relations, diagraphs and
CO4 To study the Algebraic Structures.

UNIT-I (11 Hrs.)

Sets, Relations and Functions: Introduction, Combination of Sets, ordered pairs, proofs of general identities of sets, relations, operations on relations, properties of relations and functions, Hashing Functions, equivalence relations, compatibility relations, partial order relations.

Basic Logic: Propositional logic, Logical connectives, Truth tables, Normal forms (conjunctive and disjunctive), Validity of well-formed formula, Propositional inference rules (concepts of modus ponens and modus tollens), Predicate logic, Universal and existential quantification, Limitations of propositional and predicate logic.

UNIT-II (10 Hrs.)

Combinatorial Mathematics: Basic counting principles Permutations and combinations Inclusion and Exclusion Principle Recurrence relations, Generating Function, Application.

UNIT-III (12 Hrs.)

Probability Distributions: Probability, Bayes theorem, Discrete & Continuous probability distributions, Moment generating function, Probability generating function, Properties and applications of Binomial, Poisson and normal distributions.

Graph Theory: Graph- Directed and undirected, Eulerian chains and cycles, Hamiltonian chains and cycles Trees, Chromatic number Connectivity, Graph coloring, Plane and connected graphs, Isomorphism and Homomorphism. Applications.

UNIT-IV (12 Hrs.)

Monoids and Groups: Groups Semigroups and monoids Cyclic semigraphs and submonoids, Subgroups and Cosets. Congruence relations on semigroups. Morphisms. Normal subgroups. Dihedral groups.

Rings and Boolean Algebra: Rings, Subrings, morphism of rings ideals and quotient rings. Euclidean domains Integral domains and fields Boolean Algebra direct product morphisms Boolean sub-algebra Boolean Rings Application of Boolean algebra (Logic Implications, Logic Gates, Karnaugh map)

RECOMMENDED BOOKS

1. Lipschutz, 'Discrete Mathematics (Schaum Series)', 3rd Edn., McGraw Hill, **2009**.
2. Alan Doerr and Kenneth Levarseur, 'Applied Discrete Structures for Computer Science', Galgotia Publications, **2009**.
3. N. Ch SN Iyengar, V.M. Chandrasekaran, 'Discrete Mathematics', 1st Edn., Vikas Publication House, **2003**.
4. S. Santha, 'Discrete Mathematics and Graph Theory', 1st Edn., Cengage COURSE.

5. Kenneth H. Rosen, 'Discrete Mathematics and its Applications', 7th Edn., McGraw Hill, **2008**.
6. C.L. Liu, 'Elements of Discrete Mathematics', 4th Edn., McGraw Hill, **2012**.
7. Satinder Bal Gupta, 'Discrete Mathematics and Structures', 4th Edn., Laxmi Publications, **2008**.

DATA STRUCTURES LAB.

Subject Code- BCSE1-307 **L T P C**
0 0 2 1

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 algorithms.

PRACTICALS

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

OBJECT ORIENTED PROGRAMMING USING C++ LAB.

Subject Code- BCSE1-308 **L T P C**
0 0 2 1

PRACTICALS

1. Classes and Objects- Write a program that uses a class where the member functions are defined inside a class.
2. Classes and Objects- Write a program that uses a class where the member functions are defined outside a class.
3. Classes and Objects- Write a program to demonstrate the use of static data members.
4. Classes and Objects- Write a program to demonstrate the use of const data members.
5. Constructors and Destructors- Write a program to demonstrate the use of zero argument and parameterized constructors.

6. Constructors and Destructors- Write a program to demonstrate the use of dynamic constructor.
7. Constructors and Destructors- Write a program to demonstrate the use of explicit constructor.
8. Initializer Lists- Write a program to demonstrate the use of initializer list.
9. Operator Overloading- Write a program to demonstrate the overloading of increment and decrement operators.
10. Operator Overloading- Write a program to demonstrate the overloading of binary arithmetic operators.
11. Operator Overloading- Write a program to demonstrate the overloading of memory management operators.
12. Typecasting- Write a program to demonstrate the typecasting of basic type to class type.
13. Typecasting- Write a program to demonstrate the typecasting of class type to basic type.
14. Typecasting- Write a program to demonstrate the typecasting of class type to class type.
15. Inheritance- Write a program to demonstrate the multilevel inheritance

DIGITAL CIRCUIT & LOGICAL DESIGN LAB.

Subject Code- BCSE1-309 **L T P C**
0 0 2 1

COURSE OUTCOMES

CO1 To Familiarization with Digital Trainer Kit and associated equipment.
CO2 To Study and design of TTL gates
CO3 To learn the formal procedures for the analysis and design of combinational circuits.
CO4 To learn the formal procedures for the analysis and design of sequential circuits
PRACTICALS: Implementation all experiments with help of Bread- Board.

1. Study of Logic Gates: Truth-table verification of OR, AND, NOT, XOR, NAND and NOR gates; Realization of OR, AND, NOT and XOR functions using universal gates.
2. Half Adder / Full Adder: Realization using basic and XOR gates. 13 13 Punjab Technical University B. Tech. Computer Science Engineering (CSE)
3. Half Subtractor / Full Subtractor: Realization using NAND gates.
4. 4-Bit Binary-to-Gray & Gray-to-Binary Code Converter: Realization using XOR gates.
5. 4-Bit and 8-Bit Comparator: Implementation using IC7485 magnitude comparator chips.
6. Multiplexer: Truth-table verification and realization of Half adder and Full adder using IC74153 chip.
7. Demultiplexer: Truth-table verification and realization of Half subtractor and Full subtractor using IC74139 chip.
8. Flip Flops: Truth-table verification of JK Master Slave FF, T-type and D-type FF using IC7476 chip.
9. Asynchronous Counter: Realization of 4-bit up counter and Mod-N counter using IC7490 & IC7493 chip.
10. Synchronous Counter: Realization of 4-bit up/down counter and Mod-N counter using IC74192 & IC74193 chip.
11. Shift Register: Study of shift right, SIPO, SISO, PIPO, PISO & Shift left operations using IC7495 chip.
12. DAC Operation: Study of 8-bit DAC (IC 08/0800 chip), obtain staircase waveform using IC7493 chip.
13. ADC Operations: Study of 8-bit ADC.

OPERATING SYSTEMS

Subject Code: BCSE1-411 **L T P C** **Duration: 38 Hrs.**
3 0 0 3

COURSE OBJECTIVES

To understand the services and design of Operating Systems. To understand the organization of file systems and process scheduling and memory management

COURSE OUTCOMES

CO1 Understanding operating system functions, Role of operating system, different structures and views of Operating system.

CO2 Process management CPU scheduling, Scheduling Algorithms, PCB, Process synchronization, Deadlocks, Prevention, Detection and Recovery.

CO3 Memory Management Overlays, Memory management policies, Fragmentation and its types, Portioned memory managements, Paging, Segmentation, Ned of Virtual memories, Page replacement Algorithms, Concept of Thrashing.

CO4 Device Management, I/O system and secondary storage structure, Device management policies, Role of I/O traffic controller File Management File System Architecture, Layered Architecture, Physical and Logical File Systems, Protection and Security. Brief study to multiprocessor and distributed operating systems.

UNIT-I

Introductory Concepts: Operating System functions and characteristics, historical evolution of operating systems, Real time systems, Distributed systems, Methodologies for implementation of O/S service, system calls, system programs, interrupt mechanisms.

Processes: Processes model, process states, process hierarchies, implementation of processes, data structures used such as process table, PCB creation of processes, context switching, exit of processes. Interprocess communication: Race conditions, critical sections, problems of mutual exclusion, Peterson's solution, producer-consumer problem, semaphores, counters, monitors, message passing.

UNIT-II

Process Scheduling: objective, preemptive vs non- preemptive scheduling, comparative assessment of different algorithms such as round robin, priority bases scheduling, FCFS, SJF, multiple queues with feedback.

Deadlocks: conditions, modeling, detection and recovery, deadlock avoidance, deadlock prevention.

Memory Management: Multiprogramming with fixed partition, variable partitions, virtual partitions, virtual memory, paging, demand paging design and implementation issues in paging such as page tables, inverted page tables, page replacement algorithms, page fault handling, working set model, local vs global allocation, page size, segmentation and paging.

UNIT-III

File Systems: File type, attributes, access and security, file operations, directory structures, path names, directory operations, implementation of file systems, implementation of file and file operations calls, implementation of directories, sharing of files, disk space management, block allocation, free space management, logical file system, physical file system.

Device Management: Techniques for device management, dedicated devices, shred devices, virtual devices, device characteristics -hardware considerations: input and output devices, storage devices, independent device operation, buffering, multiple paths, device allocation considerations.

UNIT-IV

Distributed Systems: Introduction to II/W and S/W concepts in distributed systems, Network operating systems and NFS, NFS architecture and protocol, client- server model, distributed file systems, RPC- Basic operations, parameter passing, RPC semantics in presence of failures threads and thread packages.

Case Studies: LINUX / UNIX Operating System and Windows based operating systems. Recent trends in operating system

RECOMMENDED BOOKS

1. J.L. Peterson & Silberschatz, 'Operating System Concepts', 4th Edn., Addison Wesley, **1994**.
2. Brinch, Hansen, 'Operating System Principles', PHI, **2001**.
3. A.S. Tenanbaum, 'Operating System', PHI.
4. Dhamdhere, 'Systems Programming & Operating Systems', Tata McGraw-Hill Education, **1999**.
5. Gary Nutt, 'Operating Systems Concepts', 3rd Edn., Pearson/Addison Wesley, **2004**.
6. William Stallings, 'Operating System', 5th Edn., Pearson Education India, **2005**.

DATABASE MANAGEMENT SYSTEMS-I

Subject Code- BCSE1-412 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

COURSE OBJECTIVES

To familiarize the students with Data Base Management system

COURSE OUTCOMES

CO1 To provide introduction to database systems and various models.
CO2 To provide introduction to relational model and SQL
CO3 To understand about Query Processing and Transaction Processing.
CO4 To learn the concept of failure recovery and concurrency control

UNIT-I (11 Hrs.)

Introduction to Database Systems: File Systems Versus a DBMS, Advantages of a DBMS, Describing and Storing Data in a DBMS, Database System Architecture, DBMS Layers, Data independence.

Data Models: Relational Model, Network Model, Hierarchical Model, ER Model: Entities, Attributes and Entity Sets, Relationships and Relationship Sets, Constraints, Weak Entities, Class Hierarchies, Aggregation, Conceptual Database Design with the ER Model, Comparison of Models.

UNIT-II (12 Hrs.)

The Relational Model: Introduction to the Relational Model, ER to Relational Model Conversion, Integrity Constraints over Relations, Enforcing Integrity Constraints, Relational Algebra, Relational Calculus, Querying Relational Data

Relational Query Languages: SQL: Basic SQL Query, Creating Table and Views, SQL as DML, DDL and DCL, SQL Algebraic Operations, Nested Queries, Aggregate Operations, Integrity Constraints in SQL.

UNIT-III (11 Hrs.)

Database Design: Functional Dependencies, Reasoning about Functional Dependencies, Normal Forms, Schema Refinement, 1NF, 2NF, 3NF, BCNF, 4NF, 5NF, Domain Key Normal Forms.

Transaction and Concurrency Management: ACID Properties, Serializability, Two-phase Commit Protocol, 2PL protocol, Lost Update Problem, Inconsistent Read Problem. Concurrency Control, Lock Management, Read-Write Locks, Deadlocks Handling.

UNIT-IV (11 Hrs.)

Physical Data Organization: File Organization and Indexing, Index Data Structures, Hashing, B-trees, Clustered Index, Sparse Index, Dense Index, Fixed length and Variable Length Records.

Database Protection: Threats, Access Control Mechanisms: Discretionary Access Control, Mandatory Access Control, Grant and Revoke, Role Based Security, Encryption and Digital Signatures.

RECOMMENDED BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, 'Database System Concepts', 6th Edn., Tata McGraw Hill, **2011**.
2. Ramez Elmasri, ShamkantNavathe, 'Fundamentals of Database Systems', 5th Edn., Pearson Education, **2010**.
3. C.J. Date, 'An Introduction to Database Systems', Pearson Education, 8th Edn., **2006**.
4. Alexis Leon, Mathews Leon, 'Database Management Systems', Leon Press, 1st Edn., **2008.**
5. S.K. Singh, 'Database Systems Concepts, Design and Applications', 2nd Edn., Pearson Education, **2011**.
6. Raghu Ramakrishnan, Johannes Gehrke, 'Database Management Systems', 3rd Edn., Tata McGraw Hill, **2014.**

COMPUTER NETWORKS-I

Subject Code- BCSE1-413 **L T P C** **Duration: 38 Hrs.**
3 0 0 3

COURSE OBJECTIVES

This course introduces students to computer networks and concentrates on building a firm foundation for understanding Data Communications and Computer Networks. It is based around the OSI Reference Model which deals with the major issues in the bottom four (Physical, Data Link, Network and Transport) layers of the model. They are also introduced to the areas of Network Security and Mobile Communications.

COURSE OUTCOMES

CO1 to provide knowledge about various types of networking, networks and network topologies. Also acquire knowledge about concepts of OSI reference model and real world protocol suite such as TCP/IP.

CO2 Outline the basic network configurations, various Multiplexing and Switching Techniques.

CO3 Analyse, specify and design the Addressing Schemes and routing strategies for an IP based networking infrastructure

CO4 Operations of TCP/UDP, FTP, HTTP, SMTP, SNMP and Security and protection issues etc.

UNIT-1

Introduction to Computer Networks: Data Communication System and its components, Data Flow, Computer network and its goals, Types of computer networks: LAN, MAN, WAN, Wireless and wired networks, broadcast and point to point networks, Network topologies, Network software: concept of layers, protocols, interfaces and services, ISO-OSI reference model, TCP/IP reference model.

UNIT-II

Physical Layer: Concept of Analog & Digital Signal, Bandwidth, Transmission Impairments: Attenuation, Distortion, Noise, Data rate limits: Nyquist formula, Shannon Formula, Multiplexing: Frequency Division, Time Division, Wavelength Division, Introduction to Transmission Media: Twisted pair, Coaxial cable, Fiber optics, Wireless transmission (radio, microwave, infrared), Switching: Circuit Switching, Message Switching, Packet Switching & their comparisons.

Data Link Layer: Framing, Error detection and correction codes: checksum, CRC, hamming code, Data link protocols for noisy and noiseless channels, Sliding Window Protocols: Stop & Wait ARQ, Go-back-N ARQ, Selective repeat ARQ, Data link protocols: HDLC and PPP.

UNIT-III

Medium Access Sub-Layer: Static and dynamic channel allocation, Random Access: ALOHA, CSMA protocols, Controlled Access: Polling, Token Passing, IEEE 802.3 frame format, Ethernet cabling, Manchester Encoding, collision detection in 802.3, Binary exponential back off algorithm.

Network Layer: Design issues, IPv4 classful and classless addressing, subnetting, IPv6, Routing algorithms: distance vector and link state routing, Congestion control: Principles of Congestion Control, Congestion prevention policies, Leaky bucket and token bucket algorithms

UNIT-IV

Transport Layer: Elements of transport protocols: addressing, connection establishment and release, flow control and buffering, multiplexing and de-multiplexing, crash recovery, introduction to TCP/UDP protocols and their comparison, Sockets.

Application Layer: World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), SMTP, POP, HTTP, Introduction to Network security

RECOMMENDED BOOKS:

1. Andrew S. Tanenbaum, 'Computer Networks', 4th Edn., Pearson Education, **2002**.
2. Behrouz A. Forouzan, 'Data Communication & Networking', 4th Edn., Tata McGraw Hill, **2006**.
3. James F. Kurose and Keith W. Ross, 'Computer Networking', 3rd Edn., Pearson Education, **2012**.
4. W. Stallings, 'Data & Computer Communications', 9th Edn., PHI, **2014**.
5. Douglas E. Comer, 'Internetworking with TCP/IP', Volume-I, 2nd Edn., Prentice Hall, India, **1996**.
6. Greg Tomsho, 'Guide to Networking Essentials', 6th Edn.., Cengage COURSE, **2011**.
7. Michael W. Graves, 'Handbook of Networking', Cengage COURSE.

DESIGN & ANALYSIS OF ALGORITHMS

Subject Code- BCSE1-414 **L T P C** **Duration: 45 Hrs.**

3 1 0 4

COURSE OBJECTIVES: To learn the ability to distinguish between the tractability and intractability of a given computational problem. To be able to devise fast and practical algorithms for real-life problems using the algorithm design techniques and principles learned in this course.

COURSE OUTCOMES

CO1 Basic ability to analyze algorithms and to determine algorithm correctness and time efficiency class.

CO2 Ability to apply and implement learned algorithm design techniques and data structures to solve problems.
CO3 Differentiate between various algorithms for sorting, searching, and selection and know the concepts of tractable and intractable problems and the classes P, NP and NP-complete problems.
CO4 Analysis of Geometric algorithms (range searching, convex hulls, segment intersections, closest pairs) Know various Text pattern matching, tries, KMP Algorithm.

Prerequisites: Data Structures

UNIT-I (11 Hrs.)

Introduction: Algorithms and its Properties, Time and space complexity of an algorithm. Comparing the performance of different algorithms for the same problem. Different orders of growth. Asymptotic notation. Polynomial vs. Exponential running time.

Basic Algorithm Design Techniques. Divide-and-conquer, greedy, Backtracking, Branch and Bound, dynamic programming and randomization. Overall technique with example, problems and algorithms illustrating the use of these techniques.

UNIT-II (12 Hrs.)

Graph Algorithms. Graph traversal: breadth-first search (BFS) and depth-first search (DFS). Applications of BFS and DFS. Topological sort. Shortest paths in graphs: Dijkstra and Bellman-Ford (Single source shortest path, And All pair shortest path (Floyd Warshal algorithm). Minimum spanning Trees: Prim's and Kruskal Algorithm.

UNIT-III (11 Hrs.)

Sorting and Searching. Binary search in an ordered array. Sorting algorithms such as Merge sort, Quick sort, Heap sort, Radix Sort, and Bubble sort with analysis of their running times. Lower bound on sorting, searching and Merging, Median and order statistics.

NP-Completeness. Definition of class P, NP. NP-hard and NP-complete problems. 3SAT is NP-complete. Proving a problem to be NP-complete using polynomial-time reductions. Examples of NP-complete problems. Approximation algorithms for various NP-complete problems: TSP, Hamiltonian Cycle, Knapsack.

UNIT-IV (11 Hrs.)

Advanced Topics. Pattern matching algorithms: Knuth-Morris-Pratt algorithm, Brute Force. Algorithms in Computational Geometry: Convex hulls: Jarvin March and Graham Scan. Integer and polynomial arithmetic. Matrix multiplication: Strassen's algorithm.

RECOMMENDED BOOKS:

1. J. Kleinberg and E. Tardos, 'Algorithm Design', 1st Edn., Pearson Publications, **2005**.
2. H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, Introduction to Algorithms, 3rd Edn., The MIT Press Ltd, **2009**.
3. S. Dasgupta, C.H. Papadimitriou, and U.V. Vazirani, 'Algorithms', McGraw Hill Education, **2006**.
4. Michael T. Goodrich and Roberto Tamassia, 'Algorithm Design: Foundations, Analysis, and Internet Examples', 1st Edn., Wiley India Pvt Ltd, **2006**.
5. V. Aho, J.E. Hopcroft, and J.D. Ullman, 'The Design and Analysis of Computer Algorithms', 1st Edn., Pearson India, **1974**.
6. Donald Knuth, 'The Art of Computer Programming', Volumes 1, 2 and 3, 2nd Edn., Addison-Wesley Professional, **1998**.

MICROPROCESSORS & ASSEMBLY LANGUAGES

Subject Code- BCSE1-415 **L T P C** **Duration: 37 Hrs.**
3 0 0 3

COURSE OBJECTIVES

The course is intended to give students good understanding of internal architectural details and functioning of microprocessors.

COURSE OUTCOMES

CO1 To study and differentiate microprocessors, microcomputers and microcontrollers.
CO2 To understand the detailed architecture of 8085 and learn assembly language programming using the instruction set of 8085.
CO3 To study the interfacing of microprocessors with memory and I/O devices.
CO4 To give an overview of higher order microprocessors and know about the various applications of microprocessors using the interfaces

UNIT-I

Introduction: Introduction to Microprocessors, Microcomputers, Microcontrollers, history and classification of microprocessors, recent microprocessors.

UNIT-II

Microprocessor Architecture: 8085 microprocessor Architecture. Bus structure, I/O, Memory & Instruction execution sequence & Data Flow, Instruction cycle. System buses, concept of address Bus, Data Bus & Control Bus, Synchronous & Asynchronous buses.
Instruction Set & Assembly Languages Programming: Introduction, instruction & data formats, addressing modes, status flags, 8085 instructions, Data transfer operations, Arithmetic operations, Logical operations, Branch operations.

UNIT-III

I/O and Memory Interfaces: Interfacing of memory chips, memory mapped and isolated I/O structure**,** Data transfer modes: Programmable, interrupt initiated and DMA, Interfacing of I/O devices, Serial & parallel interface, Detail study of 8251 I/O Processor & 8255 programmable peripheral interfaces.

UNIT-IV

Basic Architecture of Higher Order Microprocessors: Basic introduction to 8086 family, pin description and architecture of 8086.
Microprocessor Applications: Interfacing of keyboards and seven segment LED display, Microprocessor controlled temperature system (MCTS), Study of traffic light system, stepper motor controller, differentiate microprocessors, microcomputers and microcontrollers using their applications.

RECOMMENDED BOOKS

1. Ramesh Gaonkar, '8085 Microprocessor', 5th Edn., PHI Publications, **2002**.
2. Daniel Tabak, 'Advanced Microprocessors', 2nd Edn., McGraw Hill, Inc., **1995**.
3. Douglas V. Hall, 'Microprocessors and Interfacing: Programming and Hardware', Tata McGraw Hill, **1986**.
4. Charles M. Gilmore, 'Microprocessors: Principles and Applications', McGraw Hill, 2nd Edn., **1995**.
5. Ayala Kenneth, 'The 8086 Microprocessor Programming and Interfacing', 1st Edn., Cengage COURSE, **2007.**

DATABASE MANAGEMENT SYSTEMS-I LAB.

Subject Code- BCSE1-416 **L T P C**
0 0 4 2

COURSE OUTCOMES

CO1 To understand basic DDL, DML, DCL commands
CO2 To understand the SQL queries using SQL operators
CO3 To understand the concept of relational algebra, date and group functions
CO4 To learn view, cursors and triggers.

PRACTICALS

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. Case studies on normalization

COMPUTER NETWORKS-I LAB.

Subject Code- BCSE1-417 **L T P C**
0 0 2 1

PRACTICALS

1. Write specifications of latest desktops and laptops.
2. Familiarization with Networking Components and devices: LAN Adapters, Hubs, Switches, Routers etc.
3. Familiarization with Transmission media and Tools: Co-axial cable, UTP Cable, Crimping Tool, Connectors etc.
4. Preparing straight and cross cables.
5. Study of various LAN topologies and their creation using network devices, cables and computers.
6. Configuration of TCP/IP Protocols in Windows and Linux.
7. Implementation of file and printer sharing.
8. Designing and implementing Class A, B, C Networks
9. Subnet planning and its implementation
10. Installation of ftp server and client

DESIGN & ANALYSIS OF ALGORITHM LAB.

Subject Code- BCSE1-417 **L T P C**
0 0 2 1

COURSE OBJECTIVES

To get a first-hand experience of implementing well-known algorithms in a high-level language. To be able to compare the practical performance of different algorithms for the same problem.

PRACTICALS

1. Code and analyse to compute the greatest common divisor (GCD) of two numbers.
2. Code and analyse to find the median element in an array of integers.
3. Code and analyse to find the majority element in an array of integers.
4. Code and analyse to sort an array of integers using Heap sort.
5. Code and analyse to sort an array of integers using Merge sort.
6. Code and analyse to sort an array of integers using Quick sort.
7. Code and analyse Knapsack problem using dynamic programming
8. Code and analyse to find the shortest path for single source shortest path using dynamic programming.
9. Code and analyse to find the shortest path for All pair shortest path using dynamic programming.
10. Code and analyse to do a depth-first search (DFS) on an undirected graph. Implementing an application of DFS such as to find the topological sort of a directed acyclic graph.
11. Code and analyse to do a breadth-first search (BFS) on an undirected graph. Implementing an application of BFS such as (i) to find connected components of an undirected graph, OR (ii) to check whether a given graph is bipartite.
12. Code and analyse to find the minimum spanning tree in a weighted, undirected graph.
13. Code and analyse to find all occurrences of a pattern P in a given string S using KMP Method
14. Code and analyse to compute the convex hull of a set of points in the plane.

MICROPROCESSORS AND ASSEMBLY LANGUAGES LAB.

Subject Code- BCSE1-419 **L T P C**
0 0 2 1

COURSE OUTCOMES

CO1 Understanding different steps to develop program such as Problem definition, Analysis, Design of logic, Coding, Testing, Maintenance
CO2 To be able to apply different logics to solve given problem.
CO3 To be able to write program using different implementations for the same problem
CO4 Use of programming language constructs in program implementation

PRACTICALS

1. Introduction to 8085 kit.
2. Addition of two 8-bit numbers, sum 8-bit.
3. Subtraction of two 8-bit numbers.
4. Find 1's complement of 8-bit number.
5. Find 2's complement of 8-bit number.
6. Shift an 8-bit no. by one bit.
7. Find Largest of two 8-bit numbers.

8. Find Largest among an array of ten numbers (8-bit).
9. Sum of series of 8-bit numbers.
10. Introduction to 8086 kit.
11. Addition of two 16-bit numbers, sum 16-bit.
12. Subtraction of two 16-bit numbers.
13. Find 1's complement of 16-bit number.
14. Find 2's complement of 16-bit number.

COMPUTER NETWORKS-II

Subject Code: BCSE1- 520 **L T P C** **Duration: 39 Hrs.**
3 0 0 3

COURSE OBJECTIVES

The objective of this course is offer good understanding of the concepts of network security, IPv6, wireless communication systems, Ad-hoc / Cellular Networks and various emerging network technologies.

COURSE OUTCOME

CO1: Able to define the Fundamentals of network security, Characteristics of IPv6 and their addressing format and schemes.

CO2: Acquire the Knowledge about various concepts of IPSec and able to explain about various concepts of Ad-hoc and Cellular Networks.

CO3: Acquire the Knowledge about wireless communication systems and their generations with different Technologies.

CO4: Able to explain about Third Generation Networks, their Technologies, wireless System Design and their various strategies.

Prerequisites: Computer Networks -I

UNIT-I

Fundamental of Network Security: Introduction to Network Security, Security Attacks, Network Based Attacks, Security Services and Mechanisms, Network Security Model.

Basics of IPv6: Features in IPv6, Addressing Structure, Addressing Modes in IPv6 and their Schemes, Header Format of IPv6, Extension Header, IPv4 vs IPv6, Transition Strategies from IPv4 to IPv6.

UNIT-II

IPsec: overview of IPsec and their Modes, Authentication header (AH), Encapsulating Security Payload (ESP), Services provided by IPSec, Security Association, Internet Key Exchange (IKE): History, Photuris, Simple Key-management for Internet protocols (SKIP), IKE phases, IKE encoding.

Adhoc Networks: Features, advantages and applications, Cellular Networks, Adhoc versus Cellular networks, Network architecture, Challenges and Issues in MANETS, Protocols: MAC protocols, Routing protocols, Technologies.

UNIT-III

Wireless Communication Systems: Evolution, Examples of Wireless Communication Systems, Wireless Communication System Generations and their Comparison, different Generation Standard Technologies, 2G Cellular networks, Evolution for 2.5G TDMA Standards, An approach to Fourth Generation Systems.

UNIT-IV

3G Wireless Networks: 3G Standards and Networks, 3G Cellular System- UMTS, Wireless local loop (WLL), Local Multipoint Distribution Service (LMDS), Multichannel Multipoint

Distributed Service(MMDS), Wireless local Area Networks (WLANs), Bluetooth and Personal Area Networks.

Wireless System Design: Introduction, Frequency reuse, Co- Channel Interference, Channel assignment strategies, handoff strategies, interference and system capacity, improving coverage and capacity in cellular systems.

RECOMMENDED BOOKS:

1. Sunil kumar S. Manvi, Mahabaleshwar S. Kakkasageri, 'Wireless and Mobile Networks: Concepts and Protocols', 2nd Edn., Wiley, **2016.**
2. Mayank Dave, 'Computer Networks', 1st Edn., Cengage COURSE, **2012**.
3. Theodore S. Rappaport, 'Wireless Communication: Principles and Practices', 2nd Edn., Pearson Education, **2001**.
4. Charlie Kaufman, Radio Perlman, Mike Speciner, 'Network Security', 2nd Edn., PHI, **2002**.
5. Michael A. Gallo & William M. Hancock, 'Computer Communications and Networking Technologies', 2nd Edn., Cengage COURSE / Thomson Brooks / Cole, **2002**.
6. S. Keshav, 'An Engineering Approach to Computer Networking', 1st Edn., Pearson Education, **2002**.

AUTOMATA THEORY

Subject Code BCSE1-521 **L T P C** **Duration: 45 Hrs.**

3 1 0 4

COURSE OBJECTIVES

The student should be made to understand various computing models like Finite State Machine, Pushdown Automata, and Turing Machine, learn types of Grammar, develop abstract models of computing machines and reasoning about what they can and cannot compute efficiently.

COURSE OUTCOMES

After COURSE the course, the students should be able to:

CO1 Design Finite State Machine.

CO2 Explain Regular Expressions and Construct Grammar and Languages.

CO3 Define the CFLs and can design Pushdown Automata.

CO4 Define and Design the Turing Machine. Also explain the decidability and Un-decidability of various problems.

UNIT-I (11 Hrs.)

Basics of Strings and Alphabets.

Finite Automata, DFA, NDFA, Transition System, Equivalence of DFA and NDFA, Design of DFA. Minimization, Limitations and Applications of FA. Automata with Output, Mealy and Moore Machine. Equivalence of Mealy and Moore Machine.

UNIT-II (12 Hrs.)

Regular Expressions, Formal Definition, Operators used in RE, Precedence of operators in RE and Building RE. Arden's Theorem, Identities for RE. Equivalence of RE and FA. Equivalence of Two RE's. Equivalence of Two FA's. Pumping Lemma for Regular sets.

Grammar, Formal Definition. Construction of Grammar and languages. Chomsky classification.

UNIT-III (11 Hrs.)

Context Free Languages, Definition, Derivation Tress, Ambiguity in CFGs and Simplification of CFG. Normal Forms, CNF, GNF. Pumping Lemma for CFL.

Pushdown Automata, Formal Definition, NDPDA, DPDA, Design of PDA, and Equivalence of CFL and PDA. LR(k) Grammars and its properties.

UNIT-IV (11 Hrs.)

Turing Machines, Formal Definition and Design. Variations of TM, Halting problem, PCP. Decidability and Recursively Enumerable Languages.

RECOMMENDED BOOKS:

1. K.L.P. Mishra and N. Chandrasekaran, 'Theory of Computer Science', 3rd Edn., PHI COURSE Private Limited, **2011**.
2. Peter Linz, 'An Introduction to Formal Languages and Automata', 3rd Edn., Narosa Publishers, **1998**.
3. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, 'Introduction to Automata Theory, Languages and Computation', 3rd Edn., Pearson Education, **2008**.
4. M. Sipser, 'Introduction to the Theory of Computation', 3rd Edn., Cengage COURSE, **2012.**
5. K.V.N. Sunitha, N. Kalyani, 'Formal Languages and Automata Theory', 1st Edn., McGraw-Hill, **2010**.
6. G.E. Revesz, 'Introduction to Formal Languages', Dover Publications, **2016.**
7. M.A. Harrison, 'Introduction to Formal Language Theory', Addison-Wesley, **1978**.
8. R.K. Shukla, 'Theory of Computation', 1st Edn., Cengage COURSE, **2009.**

JAVA PROGRAMMING

Subject Code BCSE1-522 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

COURSE OBJECTIVES

To learn the basic and advanced concepts of Java Programming language. The course enables student to experience the working environment required for programming in Java language and enhances their programming skills.

COURSE OUTCOMES

CO1: To learn the basics of Java and to understand the implementation of Classes and Inheritance with respect to Java.

C02: To describe the concept of handling of exceptions and multithreading.

C03: To understand how to implement I/O, Applets and Graphics in Java

C04: To comprehend the advanced topics of Java Programming

UNIT-I (11 Hrs.)

Introduction to Java: Features of Java, difference between Java and C++, JVM, Bytecode, data types, variables, arrays, Type Conversion and Casting.

Classes and Inheritance: Class Fundamentals, methods, constructors, garbage collection, this keyword, Overloading constructors, Nested and Inner classes. Basics and types of inheritance, Method Overriding, Abstract Classes, final keyword, packages and interfaces.

UNIT-II (12 Hrs.)

Exception Handling: Basics, Exception Types, uncaught exceptions, try and catch, throwing exceptions.

Introduction to Multithreading: Java thread model, thread priorities, synchronization, interthread communication, creating, suspending, resuming and stopping threads.

UNIT-III (11 Hrs.)

I/O: Input/Output, stream classes, reading and writing files.

Applets and Graphics: Applet basics, Applet class, Applet initialization and termination, event handling, keyboard and mouse events, AWT class, Layout managers, panels, canvases, Frame windows, drawing lines, rectangles, ellipses.

UNIT-IV (11 Hrs.)

Advance Concepts: JDBC Connectivity, Introduction to Java Beans, Java Swings, Java Server Pages.

RECOMMENDED BOOKS:

1. Patrick Naughton & Herbert Schildt, 'The Complete Reference Java 2', 5th Edn., Tata McGraw Hill, **2002**.
2. Balagurusamy, 'Programming in JAVA', BPB Publications, **2006**.
3. Deitel and Deitel, 'Java: How to Program', 10th Edn., Pearson Education, **2014**

ENTERPRISE RESOURCE PLANNING

Subject Code: BCSE1-556 **L T P C** **Duration: 37 Hrs.**

3 0 0 3

COURSE OBJECTIVES

To learn the concepts of Enterprise resource Planning. The course has all the required contents that are necessary for a graduate to understand the different strategies of an organization.

COURSE OUTCOMES

CO1: To understand the concepts of ERP and its related technologies.
CO2: To understand the implementation of ERP in an organization.
CO3: To have a deep understanding of different business modules of an organization.
CO4: To have a basic understanding of applications of ERP and various ERP software's.

UNIT I

ERP AND TECHNOLOGY: Introduction, Related Technologies, Business Intelligence, E-Commerce and E-Business, Business Process Reengineering, Data Warehousing, Data Mining, OLAP, Product life Cycle management, SCM, CRM

UNIT II

ERP IMPLEMENTATION: Implementation Challenges, Strategies, Life Cycle, Methodologies Package selection, Project Teams, Vendors and Consultants, Data Migration, Project management

UNIT III

ERP IN ACTION & BUSINESS MODULES: Operation and Maintenance, Business Modules, Finance, Manufacturing, Human Resources, Plant maintenance, Materials Management, Quality management, Marketing, Sales, Distribution and service.

UNIT IV

ERP Application: Enterprise Application Integration, ERP II, Total quality management
ERP CASE STUDY: SAP AG, JD Edwards.

Recommended Books

1. Alexis Leon, 'ERP DEMYSTIFIED', 2nd Edn., Tata McGraw Hill, **2008**.
2. Mary Sumner, 'Enterprise Resource Planning', Pearson Education, **2007**.
3. Jim Mazzullo, 'SAP R/3 for Everyone', 2nd Edn., Pearson, **2007**.
4. Jose Antonio Fernandz, 'The SAP R /3 Handbook', Tata McGraw Hill, **2000**.
5. Biao Fu, 'SAP BW: A Step-by-Step Guide', 1st Edn., Pearson Education, **2003**.

DIGITAL MARKETING

Subject Code BCSE1-557 **L T P C** **Duration: 39 Hrs.**
3 0 0 3

COURSE OBJECTIVES

To truly harness the potential of digital marketing and effectively leverage its impact on consumers, we need to have strong foundations in Digital Marketing.

COURSE OUTCOMES

CO1: To appreciate and understand Digital Marketing Concept.
CO2: To apply SEO, Web Analytics and Social Media Marketing.
CO3: To Understand Email Marketing and Display Marketing.
CO4: Knowledge of Mobile Marketing, Wordpress, online Reputation Management.

UNIT-I

Business, Marketing & e-marketing: What is digital marketing? Advantages of digital medium over other media, Digital medium in today's marketing plan.

Search marketing: Basics of search marketing: organic & paid search results, Overview of Google AdWords, Keyword research and analysis, Tracking the success of SEM, Search Engine Optimization techniques, Keyword density, On-page & Off-page optimization, Word Stemming, Ranking & Ranking Factors, Google penguin.

UNIT-II

Web Analytics: Digital measurement landscape, Introduction to Google Analytics, Interpreting the data in Google Analytics.

Social Media Marketing: Different social media channels, Social media for various businesses: B2C & B2B, Measuring social media ROI, Content marketing: Storytelling in social media, Facebook Marketing, LinkedIn Marketing, Twitter Marketing. Google Plus,

UNIT-III

Email Marketing: The basics of email marketing, The concept of A/B testing & its use in email marketing.

Display Marketing: Different kinds of display marketing, The display marketing ecosystem, Retargeting & dynamic retargeting

UNIT IV

Mobile Marketing: Different kinds of mobile marketing, The mobile marketing ecosystem, Mobile App Marketing, Wordpress, Online Reputation Management, Reports and Managements, Website Monetization.

Recommended Books:

1. James T. McClave, P. George Benson and Terry Sincich, 'Statistics for Business and Economics', 12th Edn., Pearson, **2012**.
2. Mark Jeffery, 'Data-Driven Marketing: The 15 Metrics Everyone in Marketing Should Know', 1st Edn., Wiley, **2010**.
3. Weblinks: SEOMoz.org , mashable.com, http://www.convinceandconvert.com, ClickZ.com, eMarketer, forrester.com, contentmarketinginstitute.com, adage.com, adweek.com.

COMPUTER GRAPHICS

Subject Code BCSE1-558 **L T P C** **Duration: 38 Hrs.**
3 0 0 3

COURSE OBJECTIVES

Understanding the fundamental graphical operations and the implementation on computer, get a glimpse of recent advances in computer graphics, understanding user interface issues that make the computer easy for the novice to use.

COURSE OUTCOMES

After COURSE the course, the students should be able to:

CO1: Able to learn about the basics of graphics, its applications, uses and Knowledge to draw different shapes in graphics on computer.

CO2: Ability to apply different 2-D and 3-D transformations on an object.

CO3: Learn clipping operations and various object filling techniques, different projections techniques. Various hidden surface removal.

CO4: Knowledge of Rendering techniques, Fractals and different colour models.

UNIT-I

Introduction: Computer Graphics and its applications, Elements of a Graphics, Graphics Systems: Video Display Devices, Raster Scan Systems, Random Scan Systems, Input devices.

Basic Raster Graphics: Scan conversion- Point plot technique, Line drawing, Circle generating and Ellipse generating algorithms.

UNIT II

Two-dimensional Geometric Transformations: Basic Transformations-Translation, Rotation and Scaling, Matrix Representation and Homogeneous Coordinates, Composite Transformations, Reflection and Shearing transformations.

Elementary 3D Graphics: Matrix Representation of 3D transformations, Plane projections and its types, Vanishing points, Specification of a 3D view.

UNIT III

Clipping: Window to viewport transformation, Clipping Operations- Point Clipping, Line Clipping, Polygon Clipping and Text Clipping.

Filling Techniques: Scan line algorithms, Boundary-fill algorithm, Flood-fill algorithm.

Visibility: Image and object precision, Hidden edge/surface removal or visible edge/surface determination techniques; z buffer algorithms, Depth sort algorithm, Scan line algorithm and Floating horizon technique.

UNIT IV

Color Models: Properties of Light, Intuitive Color Concepts, RGB Color Model, CMY Color Model, HLS and HSV Color Models, Conversion between RGB and CMY color Models, Conversion between HSV and RGB color models, Color Selection and Applications.

Advance Topics: Introduction of Rendering, Fractals, Gourard and Phong shading.

RECOMMENDED BOOKS:

1. Donald Hearn and M. Pauline Baker, 'Computer Graphics', 4th Edn.**,** PHI/Pearson Education, **2010**.
2. Zhigand Xiang, Roy Plastock, Schaum's Outlines, **'**Computer Graphics**',** 2nd Edn., Tata Mc-Graw Hill, **2001**.
3. C. Foley, Van Dam, Feiner and Hughes, 'Computer Graphics Principles & Practice', 3rd Edn., Pearson Education**, 2013.**

4. Roy A. Plastock, Gordon Kalley, 'Computer Graphics', 1st Edn., Schaum's Outline Series, **1986**.

COMPUTER NETWORKS –II LAB.

Subject Code BCSE1-523 **L T P C**
0 0 2 1

PRACTICALS

1. To detect and remove spyware, malware, viruses, worms etc. from the computer and implementing proper measures to secure it.
2. To use utilities like Ping, tracert, Nslookup, Netstat, Nmap, Cain & Abel, Sqlmap, etc.
3. To use any one open source packet capture software like Wireshark to capture, filter, inspect packets and capture passwords.
4. To implement IPSec using CISCO Packet Tracer.
5. To configure Adhoc networks.
6. To install and use a PTT application on Smartphones.
7. To Simulate a Wireless Local Area Network using CISCO Packet Tracer
8. To install and configure wireless access points.
9. To connect multiple devices using Bluetooth and PAN.
10. To Configure VoIP in CISCO Packet Tracer.

JAVA PROGRAMMING LAB.

Subject Code: BCSE1-524 **L T P C**
0 0 2 1

PRACTICALS

1. Write a Java Program to define a class, describe its constructor, overload the Constructors and instantiate its object
2. Write a Java Program to define a class, define instance methods for setting and Retrieving values of instance variables and instantiate its object
3. Write a Java Program to define a class, define instance methods and overload them and use them for dynamic method invocation
4. Write a Java Program to demonstrate use of sub class
5. Write a Java Program to demonstrate use of nested class
6. Write a Java Program to implement array of objects.
7. Write a Java program to practice using String class and its methods
8. Write a Java Program to implement inheritance and demonstrate use of method overriding
9. Write a Java Program to implement multilevel inheritance by applying various access controls to its data members and methods.
10. Write a program to demonstrate use of implementing interfaces.
11. Write a program to demonstrate use of extending interfaces
12. Write a Java program to implement the concept of importing classes from user defined package and creating packages.
13. Write a program to implement the concept of threading by extending Thread Class
14. Write a program to implement the concept of threading by implementing Runnable Interface
15. Write a program to implement the concept of Exception Handling using predefined exception.

16. Write a program to implement the concept of Exception Handling by creating user defined exceptions.
17. Write a program using Applet to display a message in the Applet.
18. Write a program using Applet for configuring Applets by passing parameters
19. Write a Java Program to demonstrate Keyboard event
20. Write a Java Program to demonstrate Mouse events
21. Write programs for using Graphics class i) to display basic shapes and fill them ii) draw different items using basic shapes iii) set background and foreground colors.

SOFTWARE ENGINEERING

Subject Code: BCSE1-626 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

COURSE OBJECTIVES

To enable the students to learn the principles and methodologies followed to develop a good software.

COURSE OUTCOMES

CO1: To study how software engineering principles evolve and to analyze the various software models that can be followed to develop a software.
CO2: To understand the software analysis and design step of software development.
CO3: To study coding, testing and reliability of a software.
CO4: To highlight the various management activities and related terms of a software.

UNIT-I (11 Hrs.)

Introduction: Evolution and impact of Software engineering, Software crisis, Principles of Software Engineering, Feasibility study
Software Life Cycle Models: Waterfall, prototyping, Evolutionary, and Spiral models, Comparison of software models.

UNIT-II (12 Hrs.)

Scheduling and Planning: Management Activities, Project planning and control, cost estimation, project scheduling using PERT and GANTT charts.
Requirement Analysis: Functional and Non-functional requirements, Requirements gathering, Requirements analysis and specification.

UNIT-III (11 Hrs.)

Software Design: Basic principles of software design, modularity, cohesion, coupling and layering, function-oriented software design: DFD and Structure chart, object modeling using UML, Object-oriented software development, Design specifications, Design metrics, Verification and validation, User Interface design.
Coding: Coding standards and Code review techniques, Coding styles, Coding metrics.
Software Testing: Fundamentals of testing, Types of software testing, White-box, and black-box testing, test case design techniques, mutation testing, Testing metrics.

UNIT-IV (11 Hrs.)

Reliability: Software reliability metrics, reliability growth modeling.
Software Quality Management: Risk Management, Quality management, ISO and SEI CMMI, Six Sigma, Computer aided software engineering, Software maintenance, Software Configuration Management, Component-based software developments

RECOMMENDED BOOKS:

1. Pressman, 'Software Engineering: A Practitioner's Approach', 3rd Edn., TMH, **2004**
2. Flecher and Hunt, 'Software Engineering and CASE: Bridging and Culture Gap', **2000**.
3. Shepperd, 'Software Engineering, Metrics', Vol.-1 (EN), McMillan, **1999.**

4. Robert S. Arnold, 'Software Re–engineering', IEEE Computer Society, **1994**.
5. Pankaj Jalote, 'An Integrated Approach to Software Engineering', 3rd Edn., Narosa Publishers, **2006**.
6. Ghezzi, Cario, 'Fundamentals of Software Engineering', 2nd Edn., PHI, **2002**.
7. Sommerville, Ian, 'Software Engineering', 7th Edn., Pearson Education, **2004**.
8. Watts Humphrey, 'Managing Software Process', 2nd Edn., Pearson Education, **2003**.
9. James F. Peters and Witold Pedrycz, 'Software Engineering – An Engineering Approach', 1st Edn., Wiley, **2010**.
10. Mouratidis and Giorgini, 'Integrating Security and Software Engineering–Advances and Future', IGP.

COMPILER DESIGN

Subject Code: BCSE1-627 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

COURSE OBJECTIVES

To make the student to understand the process involved in a compiler, create an overall view of various types of translators, linkers, loaders, and phases of a compiler, understand what is syntax analysis, various types of parsers especially the top down approach, awareness among students the various types of bottom up parsers, understand the syntax analysis and, intermediate code generation, type checking, the role of symbol table and its organization, Code generation, machine independent code optimization and instruction scheduling.

COURSE OUTCOMES

CO1: To introduce the major concept areas of language translation and compiler design.
CO2: To develop an awareness of the function and complexity of compilers.
CO3: To provide practical, hands on experience in compiler design
CO4: Identify the similarities and differences among various parsing techniques and grammar transformation techniques

UNIT-I (11 Hrs.)

Compiler Structure: analysis-synthesis model of compilation, various phases of a compiler, tool based approach to compiler construction.
Lexical analysis: interface with input, parser and symbol table, token, lexeme and patterns. Difficulties in lexical analysis. Error reporting. Implementation. Regular definition, Transition diagrams, LEX.

UNIT-II (12 Hrs.)

Syntax Analysis: CFGs, ambiguity, associativity, precedence, top down parsing, recursive descent parsing, transformation on the grammars, predictive parsing, bottom up parsing, operator precedence grammars, LR parsers (SLR, LALR, LR), YACC.
Syntax directed definitions: inherited and synthesized attributes, dependency graph, evaluation order, bottom up and top down evaluation of attributes, L- and S-attributed definitions.

UNIT-III (11 Hrs.)

Type Checking: type system, type expressions, structural and name equivalence of types, type conversion, overloaded functions and operators, polymorphic functions.
Run Time System: storage organization, activation tree, activation record, parameter passing, symbol table, dynamic storage allocation.

UNIT-IV (11 Hrs.)

Intermediate Code Generation: Intermediate representations, translation of declarations, assignments, control flow, boolean expressions and procedure calls. Implementation issues.

Code Generation and Instruction Selection: issues, basic blocks and flow graphs, register allocation, code generation, dag representation of programs, code generation from dags, peep hole optimization, code generator generators, specifications of machine.

RECOMMENDED BOOKS

1. V. Aho, R. Sethi, and J. Softec, D. Ullman, 'Compilers: Principles, Techniques and Tools', 2nd Edn., Addison-Wesley, **2006**.
2. Fischer and R. LeBlanc, 'Crafting a Compiler', Benjamin Cummings, **2009.**
3. C. Fischer and R. LeBlanc, 'Crafting a Compiler in C', Benjamin Cummings, **1991**.
4. C. Holub, 'Compiler Design in C', Prentice-Hall Inc., **1993**.
5. 'Modern Compiler Implementation in C: Basic Design', Cambridge Press, **2004**.
6. 'Modern Compiler Implementation in Java: Basic Design', 2nd Edn., Cambridge Press, **2002**.
7. Fraser and Hanson. A Retargetable C, 'Compiler: Design and Implementation', Addison-Wesley, **1995**.

MOBILE APP DEVELOPMENT

Subject Code: BCSE1-659 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

COURSE OBJECTIVES

This course teaches students how to build mobile apps for Android, iOS, and Windows 8, the trinity that is today's mobile operating platforms.

COURSE OUTCOMES

CO1: To be familiar with the Architecture of various Mobile Application Platform.
CO2: Ability to work on Android using various forms and menus.
CO3: Knowledge to publish your developed Mobile Application.
CO4: Using SQLite for connection to database type facilities.

UNIT-I (11 Hrs.)

Characteristics of mobile applications. Architecture and working of Android, iOS and Windows phone8 operating system. User-interface design for mobile applications and managing application data. Integrating cloud services, networking, OS and hardware into mobile-applications. Addressing enterprise requirements in mobile applications: performance, scalability, modifiability, availability and security.

UNIT-II (12 Hrs.)

Introduction to Android Development Environment, What Is Android? Advantages and Future of Android, Frameworks, Tools and Android SDK. Installing Java, Android Studio, SDK Manager Components and updating its platforms, AVD Manager, Understanding Java SE and the Dalvik Virtual Machine. The Directory Structure of an Android Project, Common Default Resources Folders, The Values Folder, Leveraging Android XML.

User Interface Widgets: Text controls, Button controls, Toggle buttons, Images. Notification and Toast: Parameters on Intents, Pending intents, Status bar notifications, Toast notifications. Menus & Dialogs: Localization, Options menu, Context menu; Alert dialog, Custom dialog,
Dialog as Activity.

Lists: Using string arrays, Creating lists, Custom lists. Location and Maps: Google maps, Using GPS to find current location

UNIT-III (11 Hrs.)

Application Development in Android: App Components (Intents and Intent Filters, activities, services, Content Providers, App Widgets, Processes and Threads), App resources,

App Manifest and User interface, Action Bar, Content Sharing, Multi-Platform Designs, Animation and graphics, computation, Media and Camera, Location and sensors, Connectivity, Text and Input, Data Storage, Administration and Web Apps.

Publishing Your App: Preparing for publishing, Signing and preparing the graphics, publishing to the Android Market.

UNIT-IV (11 Hrs.)

Introducing SQLite: SQLite Open Helper and creating a database, Opening and closing a database Cursors and its types, Working with cursors Inserts, updates, and deletes.

Database Connectivity: SQLite Data Types, Content Values, Adding, Updating and Deleting Content, Content provider: introduction, Query providers.

Recommended Books

1. Jeffmcwherter, Scott Go Well, 'Professional Mobile Application Development', 1st Edn., Wiley, **2012**.
2. Belen Cruz, Zapata, 'Android Studio Application Development', 2nd Edn., Packt Publishing, **2016**.
3. Reto Meier, 'Professional Android 4 Application Development', Wrox Publication, **2012**.
4. Onur Cinar, 'Beginning Android 4', 1st Ed., Apress Publication, **2012.**
5. David Mark, 'Beginning iPhone Development with Swift', Apress Publication, **2014**.
6. Android Developer Site: http://developer.android.com/index.html

DISTRIBUTED COMPUTING

Subject Code: BCSE1-660 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

COURSE OBJECTIVES

To provide knowledge on principles and practice underlying in the design of distributed systems.

COURSE OUTCOMES

CO1: To understand the basic concepts of distributed computing.
CO2: To have a deep understanding of remote method invocation.
CO3: To understand the peer to peer services and file systems.
CO4: To understand the concept of synchronization and replication.

UNIT-I (11 Hrs.)

INTRODUCTION: Introduction, Examples of Distributed Systems, Trends in Distributed Systems, Focus on resource sharing, Challenges. Case study: World Wide Web.

COMMUNICATION IN DISTRIBUTED SYSTEM: System Model, Inter process Communication, the API for internet protocols, External data representation and Multicast communication.

Network virtualization: Overlay networks. Case study: MPI.

UNIT-I2 (11 Hrs.)

REMOTE METHOD INVOCATION AND OBJECTS- Remote Invocation, Introduction, Request reply protocols, Remote procedure call, Remote method invocation.

Case study: Java RMI - Group communication, Publish-subscribe systems, Message queues, shared memory approaches, Distributed objects, CORBA- from objects to components

UNIT-III (11 Hrs.)

PEER TO PEER SERVICES AND FILE SYSTEM- Peer-to-peer Systems, Introduction, Napster and its legacy, Peer-to-peer, Middleware, Routing overlays. Overlay case studies: Pastry, Tapestry, Distributed File Systems, Introduction - File service architecture, Andrew File system. 192 CS-Engg&Tech-SRM-2013

UNIT-IV (11 Hrs.)

SYNCHRONIZATION AND REPLICATION- Introduction, Clocks, events and process states, synchronizing physical clocks, Logical time and logical clocks, Global states, Coordination and Agreement, Introduction, distributed mutual exclusion, Elections, Transactions and Concurrency Control, Transactions -Nested transactions, Locks, Optimistic concurrency control, Timestamp ordering -Distributed deadlocks, Replication, Case study - Coda

Recommended Books

1. George Coulouris, Jean Dollimore, Tim Kindberg, 'Distributed Systems Concepts and Design',5th Ed., Addison Wesley, **2011**.
2. Tanenbaum A.S., Van Steen M., 'Distributed Systems: Principles and Paradigms', 2nd Edn., Pearson Education, **2016**.
3. Liu M.L., 'Distributed Computing, Principles and Applications', 1st Edn., Pearson Education, **2004**.

MULTIMEDIA & VIRTUAL REALITY

Subject Code: BCSE1-661 **L T P C** **Duration: 45 Hrs.**

3 1 0 4

COURSE OBJECTIVES

Multimedia is the combined use of text, graphics, sound, animation, and video. A primary objective is to teach how to develop multimedia programs. Another objective is to demonstrate how still images, sound, and video can be digitized on the computer.

COURSE E OUTCOMES

CO1: Able to learn about different types of media, its applications, uses and Knowledge of authoring system.
CO2: Ability to learn different compression techniques.
CO3: Knowledge of multimedia information management.
CO4: Knowledge of Virtual reality systems.

UNIT-I (11 Hrs.)

INTRODUCTION: Concept of Non-Temporal and Temporal Media. Basic Characteristics of Non-Temporal Media; Images, Graphics, Text. Basic Characteristics of Temporal Media: Video, Audio, and Animation. Hypertext and Hypermedia. Presentations: Synchronization, Events, Scripts and Interactivity, Introduction to Authoring Systems.

UNIT II (12 Hrs.)

COMPRESSION TECHNIQUES: Sampling, quantization, pixel, resolution**,** Basic concepts of Compression, Run length Coding, Huffman Coding, JPEG, JPEG Compression, Introduction to MP3-Audio Compression Standard.

UNIT III (10 Hrs.)

MULTIMEDIA INFORMATION MANAGEMENT: Introduction to Multimedia storage devices, Data organization on Hard Disk, CD, CD-DVD, optical disks, USB drives, Architecture of multimedia system, Introduction to Content Based Information Retrieval.

UNIT IV (12 Hrs.)

VIRTUAL REALITY: Introduction to Virtual Reality and Virtual Reality Systems, Related Technologies: Teleoperation and Augmented Reality Systems Interface to the Virtual World-Input; Head and hand trackers, data globes, hap tic input devices. Interface to the Virtual World- Output, Stereo display, head-mounted display, auto-stereoscopic displays, holographic displays, hap tic and force feedback. VRML Programming; Modeling objects

and virtual environments Domain Dependent applications: Medical, Visualization, Entertainment, etc.

Recommended Books

1. Andleigh and Thakarar, 'Multimedia System Design', PHI, **2010.**
2. David Hillman, 'Multimedia Technology & Application', Galgotia Publications, **1998**.
3. Steinmetz, 'Multimedia Computing Communication and Application', 1st Edn., Pearson Edn, **2002**.
4. John Vince, 'Virtual Reality Systems', 1st Edn., Pearson Education, **2007**.
5. D.P. Mukherjee, 'Fundamentals of Computer Graphics and Multimedia', 1st Edn., PHI, **2009.**

WEB TECHNOLOGIES

Subject Code: BCSE1-662 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

COURSE OBJECTIVES

On completion of this course, a student will be familiar with client server architecture and able to develop a web application using java technologies. Students will gain the skills and project-based experience needed for entry into web application and development careers.

COURSE OUTCOMES

CO1: To understand the tools and description of java scripts
CO2: To XML and the study of Java beans and introduction to EJB'S
CO3: To understand Java servelet HTTP package and security issues.
CO4: To understand JSP Application Development and database programming using JDBC

UNIT-I (11 Hrs.)

HTML Common Tags- List, Tables, images, forms, Frames; Cascading Style sheets; Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script

UNIT-II (12 Hrs.)

Web Servers and Servlets: Tomcat web server, Introduction to Servelets: Lifecycle of a Serverlet, JSDK, The Servelet API, The javax.servelet Package, Reading Servelet parameters, Reading Initialization parameters. The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues,

UNIT-III (11 Hrs.)

Introduction to JSP: The Problem with Servelet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat

JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods

UNIT-IV (11 Hrs.)

Error Handling: Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing Session

Database Access: Database Programming using JDBC, Studying Javax.sql.* package, Accessing a Database from a JSP Page, Application – Specific Database Actions.

RECOMMENDED BOOKS

1. Chris Bates, 'Web Programming, Building Internet Applications', 3rd Edn., WILEY, **2006.**
2. Patrick Naughton, Herbert Schildt, 'The complete Reference Java 2', 5th Edn., TMH, **2002.**

3. Hans Bergsten, 'Java Server Pages', 3rd Ed., SPD O'Reilly, **2003.**
4. Sebesta, 'Programming World Wide Web', 4th Edn., Pearson, **2008**.
5. Marty Hall, Larry Brown, 'Core Servlets and Java Server Pages Vol. 1: Core Technologies', 2nd Edn., Pearson, **2003.**
6. Dietel, Niet, 'Internet and World Wide Web – How to Program', 5th Edn., PHI/Pearson Education, **2011.**
7. Murach, 'Murach's Beginning JAVA JDK 5', SPD, **2005.**
8. Wang, 'An Introduction to web Design and Programming', 1st Edn., Cengage COURSE, **2003.**
9. Craig D. Knuckles, 'Web Applications Technologies Concepts-Knuckles', 2nd Edn., John Wiley, **2006**.
10. Jon Duckett, 'Beginning Web Programming', 1st Edn., WROX, **2007.**

CRYPTOGRAPHY & NETWORK SECURITY

Subject Code: BCSE1-663 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

COURSE OBJECTIVES

The main objective of this course is to make student able to understand the basic concepts, services, threats and principles in network security, various security services and mechanisms in the network protocol stack.

COURSE OUTCOMES

CO1 To understand security trends.
CO2 To implement various cryptographic algorithms.
CO3 To explain the hash function.
CO4 To understand the network security and system level security used.

UNIT-I (10 Hrs.)

Security trends, Attacks and services, Classical crypto systems, Different types of ciphers, LFSR sequences, Basic Number theory, Congruence, Chinese Remainder theorem, Modular exponentiation, Fermat and Euler's theorem, Legendre and Jacobi symbols, Finite fields, continued fractions.

UNIT-II (12 Hrs.)

Simple DES, Differential crypto analysis, DES – Modes of operation, Triple DES, AES, RC4, RSA, Attacks – Primality test – factoring.

UNIT-III (11 Hrs.)

Discrete Logarithms, Computing discrete logs, Diffie-Hellman key exchange, ElGamal Public key cryptosystems, Hash functions, Secure Hash, Birthday attacks, MD5, Digital signatures, RSA, ElGamal DSA.

UNIT-IV (12 Hrs.)

Authentication applications – Kerberos, X.509, PKI – Electronic Mail security – PGP, S/MIME – IP security – Web Security – SSL, TLS, SET. Intruders, Malicious software, viruses and related threats, Firewalls, Security Standards.

RECOMMENDED BOOKS

1. Wade Trappe, Lawrence C Washington, 'Introduction to Cryptography with Coding Theory', 2nd Edn., Pearson, **2007**.
2. William Stallings, 'Cryptography and Network Security Principles and Practices', 4th Edn., Pearson/PHI, **2006**.
3. W. Mao, 'Modern Cryptography – Theory and Practice', 2nd Edn., Pearson Education, **2007**.

4. Charles P. Pfleeger, Shari Lawrence Pfleeger, 'Security in Computing', 3rd Edn., Prentice Hall of India, **2006**.
5. Behrouz Forouzan, 'Cryptography & Network Security', 2nd Edn., McGraw-Hill, **2011.**

DATA MINING AND WARE HOUSING

Subject Code: BCSE1-664 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

COURSE OBJECTIVES

Data warehousing and data mining are two major areas of exploration for knowledge discovery in databases. The course aims to cover powerful data mining techniques including clustering, association rules, and classification. It then teaches high volume data processing mechanisms by building warehouse schemas such as snowflake, and star. OLAP query retrieval techniques are also introduced.

COURSE OUTCOMES

CO1: To introduce the basic concepts of Data Warehouse and Data Mining techniques.
CO2: To process raw data to make it suitable for various data mining algorithms.
CO3: To discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms
CO4: Apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data

UNIT-I (11 Hrs.)

Data Warehousing: Introduction, ETL, Data warehouses– design guidelines for data warehouse implementation, Multidimensional Models; OLAP- introduction, Characteristics, Architecture, Multidimensional view and data cube, Data cube operations, data cube computation.
Review of the Basic Data Analytic Methods using R: Introduction to R –look at the data, Analyzing and Exploring the Data, Statistics for Model Building and Evaluation.

UNIT-II (12 Hrs.)

Data Mining: Introduction, association rules mining, Naive algorithm, Apriori algorithm, direct hashing and pruning (DHP), Dynamic Item set counting (DIC), Mining frequent pattern without candidate generation (FP, growth), performance evaluation of algorithms,

UNIT-III (11 Hrs.)

Classification: Introduction, decision tree, tree induction algorithms – split algorithm based on information theory, split algorithm based on Gini index; naïve Bayes method; estimating predictive accuracy of classification method;

UNIT-IV (11 Hrs.)

Cluster Analysis: Introduction, partitional methods, hierarchical methods, density based methods, dealing with large databases, cluster software; Search engines: Characteristics of Search engines, Search Engine Functionality, Search Engine Architecture, Ranking of web pages, The search engine history, Enterprise Search, Enterprise Search Engine Software.
Web Data Mining: Web Terminology and Characteristics, Locality and Hierarchy in the web, Web Content Mining, Web Usage Mining, Web Structure Mining, Web mining Software.

Recommended Books:

1. Carlo Vercellis, 'Business Intelligence: Data Mining and Optimization for Decision Making', 1st Edn., WILEY, **2009**.
2. J. Han, M. Kamber and J. Pei, 'Data Mining Concepts and Techniques', 3rd Edn., Morgan Kaufmann Publishers, **2011**.

3. V. Pudi, P.R. Krishana, 'Data Mining', 1st Edn., Oxford University Press, **2009**.
4. P. Adriaans, D. Zantinge, 'Data Mining', 1st Edn., Pearson Education Press, **1996**.
5. P. Pooniah, 'Data Warehousing Fundamentals', 1st Edn., Willey Interscience Publication, **2001**.

SOFTWARE ENGINEERING LAB.

Subject Code: BCSE1-628 **L T P C**
0 0 2 1

Perform the following on any project discussed with subject teacher:

1. Study and usage of OpenProj or similar software to plan, schedule and track the progress of a project.
2. Preparation of Software Requirement Specification Document.
3. Study and usage of any Design phase CASE tool.
4. To draw DFDs, ER Diagrams
5. Prepare Structure charts.
6. Prepare UML Diagrams.
7. Design Test cases for black box and White Box testing.
8. Testing of a web site

Suggested Tools - Visual Paradigm, Rational Software Architect. Visio, Argo UML, Rational Application Developer etc. platforms.

WEB ENGINEERING LAB.

Subject Code: BCSE1-629 **L T P C**
0 0 2 1

PRACTICALS

1. Write a program in JSP which take student enrolment number as input and displays the following details:
   a) Name and Address of the student
   b) Course and Branch of the Student
   c) College to which student is enrolled
2. Write a program that maintains a counter for the number of the times it has accessed since it loads.
3. Write a program to display the grade of the student by inputting the marks of five students.
4. Write a JSP program to create a webpage to display your personal details such as name, address, area of interest. This page should also display a background image, current date and time. Also provide a link JSP. After clicking on this link any JSP tutorial available on Internet should be opened.
5. Create a user details page. The page should have First Name, Last Name, and Email address fields. On clicking the submit button, a new Web page should display the details entered by the user. Hint: Use getAttribute to display the user details.
6. Make a JSP page that makes a bulleted list with a random number of entries in the list, each of which is a random int.
7. Make a JSP page that always displays the same page content, but uses a background color of green, red, blue, or yellow, randomly chosen for each request. Make sure your page does not use the JSP-Styles style sheet, since that style sheet overrides the background color.

8. Develop any GUI that performs the SQL operations like insert, delete, update and retrieval.

DATABASE MANAGEMENT SYSTEMS-II

Subject Code: BCSE1-730 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

COURSE OBJECTIVES

This course offers a good understanding of advanced database concepts and technologies. It prepares the student to be in a position to use and design databases for a variety of applications.

COURSE OUTCOMES

CO1: To understand database system concept and architecture and implement PL/SQL
CO2: To understand query processing and transaction control
CO3: To understand object oriented, relational, distributed databases.
CO4: To understand backup and recovery concepts.

Prerequisites: Data Management Systems-I

UNIT-I (11 Hrs.)

Introduction to Database Systems: Database System Concepts and Architecture, Data Independence.

Introduction to PLSQL: Basics of PL/SQL, control structures, sequences, functions, stored procedures, cursors, triggers.

UNIT-II (12 Hrs.)

Query Processing and Optimization: Query Processing, Syntax Analyzer, Query Decomposition, Query Optimization, Heuristic Query Optimization, Cost Estimation, Cost Functions for Select, Join, Query Evaluation Plans.

Transaction Processing and Concurrency Control: Transaction Processing Concepts, Concurrency Control Techniques: Two-phase Locking, Timestamp Ordering, Multiversion, Validation, Multiple Granularity Locking.

UNIT-III (11 Hrs.)

Object Oriented and Object Relational Databases: Object Oriented Concepts, Object Oriented Data Model, Object Definition Language, Object Query Language, Object Relational Systems, SQL3, ORDBMS Design.

Distributed Databases: Distributed Database Concepts, Advantages and Disadvantages, Types of Distributed Database Systems, Data Fragmentation, Replication and Allocation Techniques for Distributed Database Design, Five Level Schema Architecture, Query Processing, Concurrency Control and Recovery in Distributed Databases.

UNIT-IV (11 Hrs.)

Backup and Recovery: Types of Database Failures, Types of Database Recovery, Recovery Techniques: Deferred Update, Immediate Update, Shadow Paging, Checkpoints, Buffer Management.

Enterprise Database Products: Enterprise Database Products, Familiarity with IBM DB2 Universal Database, Oracle, Microsoft SQL Server, MySQL, their features.

RECOMMENDED BOOKS

1. Ramez Elmasri, Shamkant Navathe, 'Fundamentals of Database Systems', 6th Edn., Pearson, **2010**
2. Raghu Ramakrishnan, Johannes Gehrke, 'Database Management Systems', 5th Edn., Tata McGraw Hill, **2006**
3. C.J. Date, 'An Introduction to Database Systems', 8th Edn., Pearson Education, **2003**.

4. Alexis Leon, Mathews Leon, 'Database Management Systems',1st Edn., Leon Press, **2008**.
5. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, 'Database System Concepts', 6th Edn., Tata McGraw Hill, **2011**.
6. S.K. Singh, 'Database Systems Concepts, Design and Applications', Pearson Education, **2009.**
7. Chris Eaton, Paul Zikopoulos, 'Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data', McGraw Hill Osborne, **2012**

OBJECT ORIENTED ANALYSIS AND DESIGN USING UML

Subject Code: BCSE1-731 **L T P C** **Duration 45 Hrs.**
3 1 0 4

COURSE OBJECTIVES

This course delves into the processes of both object-oriented analysis and object-oriented design using UML as the notation language.

COURSE OUTCOMES

CO1: Understanding the history and goals of UML.
CO2: Use of functional, non-functional requirements along with Use Case Modeling.
CO3: Knowledge of Modeling Classes and Dependencies.
CO4: Ability to know interfaces, components and Sequence Diagrams.

UNIT–I (11 Hrs.)

UML: History of UML, Goals of UML, nature & purpose of models, UML views & diagrams – static, design, use case, state machine, activity, interaction deployment, model management, profile; relationships in UML – association, dependency, generalization, realization; UML extensibility mechanisms – constraints, stereotypes, tagged values. Unified Process (UP): UP structure, phases of UP

UNIT–II (12 Hrs.)

Requirements: Meta Model, Workflow, Functional and Non-functional Requirements; Requirement Attributes, Finding Requirements.

Use Case Modeling: Finding Actors and Use Cases, Use Case Scenario – main flow, branching within a flow, repletion within a flow, modeling alternative flows; relationships among actors and use cases; use case diagrams

UNIT–III (11 Hrs.)

Analysis: Meta Model, Workflows, Finding Analysis Classes – using noun/verb analysis, CRC analysis, using RUP stereotypes - entity, boundary and control; Modeling Classes – Association (role name, multiplicity, navigability, association classes, qualified association) dependencies (usage, abstraction, permission), class generalization, generalization sets, power types.

Use Case Realization – Class diagrams, interaction diagram, sequence diagrams, collaboration diagrams, Activity Diagrams.

UNIT–IV (11 Hrs.)

Design: Meta Model, Workflow, design classes – well-formed design classes, inheritance, nested classes, aggregation and composition, designing with interfaces and components; state machine – state chart diagrams.

Implementation: Deployment diagrams.

Recommended Books

1. Jim Arlow, Ila Neustadt, 'UML 2 and the Unified Process – Practical Object Oriented Analysis and Design', Pearson Education, Addison Wesley, 2nd Edn., **2005**.

2. Bernd Bruegge, Allen H. Dutoit, 'Object Oriented Software Engineering using UML', Pearson Education, 3rd Edn., **2009**.
3. M. Blaha, J. Rumbaugh, 'Object-Oriented Modeling and Design with UML', Pearson Education, 2nd Edn., **2005.**
4. Timothy C. Lethbridge, Robert Laganiere, 'Object Oriented Software Engineering', Tata McGraw Hill, 1st Edn., **2008**
5. G. Booch, J. Rumbaugh, I. Jacobson, 'The Unified Modeling Language User Guide', Addison Wesley, 2nd Edn., **2005**
6. Satzinger, Jackson, Burd, 'Object-Oriented Analysis & Design with the Unified Process', Cengage COURSE, 1st Edn., **2005**

LINUX & UNIX SYSTEMS

Subject Code: BCSE1-765 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

COURSE OBJECTIVES

This course will prepare students to develop software in and for Linux/UNIX environments. Topics to be covered include basic operating system concepts, effective command line usage.

COURSE OUTCOMES

CO1: Understanding the basic set of commands and utilities in Linux/UNIX systems.
CO2: To learn the important Linux/UNIX library functions and system calls.
CO3: To install and use different services in UNIX/LINUX like operating systems.
CO4: To obtain a foundation for different applications in Unix/Linux type of operating system.

UNIT-I (11 Hrs.)

Linux Startup: User accounts, accessing Linux - starting and shutting processes, logging in and Logging out, Command line, simple commands
Shell Programming: Unix file system: Linux/Unix files, i-nodes and structure and file system related commands, Shell as command processor, shell variables, creating command substitution, scripts, functions, conditionals, loops, customizing environment

UNIT-II (11 Hrs.)

Regular Expressions and Filters: Introducing regular expressions patterns, syntax, character classes, quantifiers, introduction to egrep, sed, programming with awk and perl.
Domain Name Server (DNS): Host name resolution; domain name hierarchy; DNS zones; configuration of master, slave and caching DNS servers with BIND 9

UNIT-III (11 Hrs.)

Networking: Basic concepts of networking: Network packets, TCP/IP protocol suit, Address resolution protocol (ARP); IP addresses and network mask; subnets and routing; IPV4 and Network classes; ports. Configuring Linux machine on the network; arp, ipconfig and netstat commands. Network services and tools; telnet, rsh, ftp, rcp, ssh, rsync, inetd.conf; opening and closing ports.
Network File System (NFS): File system sharing or the network; remote procedure calls (R P C) services; NFS server and client sides; NFS installation & configuration; and statistic mount and auto mount configuration; when trouble shooting NFS; security and optimization Network information service (NIS) Centralized authentication systems; sharing user and host information or the network; NIS server and client sides and configuration; compatibility mode; net group; security issues.

UNIT-IV (11 Hrs.)

Integrating Linux and Windows: Elements of windows networking; Net BIOS SMB, CIFS protocols; domain controller; Samba server on Linux for centralized window logon; file sharing and printing, samba client; samba installation and configuration; Unix and windows password. Dual Boot: running windows and Linux on the same PC; GRUB and NT Boot loaders; accessing windows files systems from Linux and vice versa.

Light Weight Directory Access Protocol (LDAP)

Overview of Unix authentication and naming service; introduction to LDAP: Domain component (DC); organizational Unit (OU); common names (CN); Schemas; IDIF format; services; polls and commands; server and client sides; Open LDAP installation and configuration; LDAP applications. Shell scripting, syntax of brash; looping; case statement; function; command substitution; awk, grep, sed. Startup and Run Levels. Scheduled jobs. Boot up and login process sequence; run levels; startup scripts; scheduling jobs with at and cron

Recommended Books

1. John Goerzen, 'Linux Programming Bible', 1st Edn., Wiley, **2000**.
2. Sumitabha Das, 'Your Unix - The Ultimate Guide', 2nd Edn., TMH, **2004**.
3. Mathew, 'Professional Linux Programming', Vol. l & 2, Wrox-Shroff, **2001**.
4. Welsh & Kaufmann, 'Running Linux', 4th Edn., O'Reiley & Associates, **2000**.
5. Richard L. Peterson, 'Red Hat Linux 9 – Bell & Duff', Pearson Complete Reference Red Hat Linux', TMH.
6. Tery Dawson, Gregor N. Purdy, Tony Bautts, 'Linux N/W Administration Guide', 3rd Edn., OREILLY, **2007**
7. Christopher Negus, 'Red Hat Linux 9 Bible', Pap//cdr ed., WILEY Publishing, **2003.**
8. Patrick Volker Ding, Kevin Richard, Eric Foster, 'Linux Configuration & Installation', 4th Edn., Johnson BPB Publication.

ARTIFICIAL INTELLIGENCE

Subject Code: BCSE1-766 **L T P C** **Duration: 45 Hrs.**

3 1 0 4

COURSE OBJECTIVES

This course will introduce the basic principles in artificial intelligence research. It will cover simple representation schemes, problem solving paradigms, constraint propagation, and search strategies. Areas of application such as knowledge representation, natural language processing, expert systems, vision and robotics will be explored

COURSE OUTCOMES

CO1: Understand the concept of Artificial intelligence, problem solving and various types of search strategies.

CO2: Understand the concept of Knowledge base, knowledge representation, AI languages & tools and various planning techniques.

CO3: Identify uncertainty and understand fuzzy logic concept to handle uncertainty.

CO4: Understand the COURSE of AI agents and various COURSE methods it also includes neural network and includes the communication of AI agents and natural language processing.

UNIT-I (11 Hrs.)

Introduction: History of AI - Intelligent agents – AI and Applications - Problem spaces and search - Heuristic Search techniques – Best-first search – Informal search strategies-A*

algorithm, Iterative deepening A*(IDA), small memory A*(SMA). Game Playing: Minimax search procedure - Adding alpha-beta cutoffs

UNIT-II (12 Hrs.)

Knowledge Representation: Approaches and issues in knowledge representation Knowledge - Based Agent- Propositional Logic – Predicate logic –Reasoning, AI languages Prolog, Lisp.

UNIT-III (11 Hrs.)

Reasoning under uncertainty: Implementation- Basic probability notation - Bayes rule – Certainty factors and rule based systems - Bayesian networks, Fuzzy Logic.

UNIT IV (11 Hrs.)

Planning and COURSE: Basic representation of plans - conditional planning - Multi-Agent planning. Forms of COURSE - inductive COURSE - Reinforcement COURSE - COURSE decision trees - Neural Networks. Communication: Natural language processing, Formal Grammar, Parsing

RECOMMENDED BOOKS

1. Elaine Rich, Kevin Knight and Shivashankar B.Nair, 'Artificial Intelligence', 3rd Edn., Tata McGraw-Hill, **2009**.
2. Stuart J. Russell and Peter Norvig, 'Artificial Intelligence: A Modern Approach', Pearson Education Asia, 2nd Edn., **2003**.
3. N.P. Padhy, 'Artificial Intelligence and Intelligent System', Oxford University Press, 2nd Edn., **2005**.
4. Rajendra Akerkar, 'Introduction to Artificial Intelligence', Prentice-Hall of India, **2005**.
5. Patrick Henry Winston, 'Artificial Intelligence', Pearson Education Inc., 3rd Edn., **2001**.
6. Eugene Charniak and Drew Mc Dermott, 'Introduction to Artificial Intelligence', Addison-Wesley, ISE Reprint, **1998**.
7. Nils J. Nilsson, 'Artificial Intelligence - A New Synthesis', Harcourt Asia Pvt. Ltd., Morgan Kaufmann, **1988**.

SOFTWARE TESTING & QUALITY ASSURANCE

Subject Code: BCSE1-767 **L T P C** **Duration: 45 Hrs.**

3 1 0 4

COURSE OBJECTIVES

This courses discusses the general topic of defining software quality attributes and deploying techniques to ensure that these quality attributes are met.

Special focus is placed on functional quality attributes, such as correctness, reliability, safety, security, etc.

COURSE OUTCOMES

After COURSE the course, the students should be able to:

CO1 To understand the basics of software quality and learn various metrics of software quality.

CO2 Describe different approaches to testing software applications.

CO3 To introduce concepts behind designing of test cases

CO4 To learn the procedure of debugging a given software

Prerequisites: Software Engineering

UNIT-I (11 Hrs.)

Software Quality: Quality Concepts, Quality Movement, Software Quality Assurance, Software Reviews, Formal Technical Reviews, Formal Approaches to SQA, Statistical Software Quality Assurance, Software Reliability, Reliability metrics, Reliability Growth Modelling, The SQA Plan.

UNIT II (12 Hrs.)

Software Quality Management: Quality Metrics, Risk Management, Quality management, The ISO 9000 Quality Standards and SEI CMMI, Six Sigma, Computer aided software engineering, Software maintenance, Software Configuration Management, Component-based software development.

UNIT III (11 Hrs.)

Testing Fundamentals: Testing Fundamentals, Unit Testing, Test cases design Techniques, White Box Testing and Black Box Testing, Integration Testing, System and acceptance testing, Testing of Object Oriented Systems, Usability and Accessibility Testing.

UNIT IV (11 Hrs.)

Test Planning, Management, Execution and Reporting.
Software Test Automation, Testing Metrics and Measurements.

Recommended Books

1. Roger S Pressman, 'Software Engineering Concepts and Practices', 7th Edn., TMG, **2009.**
2. Srinivasan Desikan, Gopalaswamy Ramesh, 'Software Testing', Pearson Education, **2006**.
3. Louis Tamres, 'Introducing Software Testing', 1st Edn., Addison Wesley Publications,
4. Ron Patten, 'Software Testing', SAMS Techmedia, Indian Edition, **2001**.
5. Mordechai Ben-Menachem, Gary S Marliss, 'Software Quality-Producing Practical, Consistent Software', Thomson COURSE, **2003**.
6. Kshirsager Naik and Priyadarshini Tripathi, 'Software Testing and Quality Assurance', Wiley, **2008.**
7. Nageswara Rao Pusuluri, 'Software Testing Concepts and Tools', Dream Tech. Press, **2006.**
8. M.G. Limaye, 'Software Testing Principles, Techniques and tools', 1st Edn., McGraw Hills, **2009.**
9. Aditya P. Mathur, 'Foundations of Software Testing', 2nd Edn., Pearson Education, **2013.**
10. William E Perry, 'Effective Methods for Software Testing', 3rd Edbn., Wiley, **2006**.
11. K.V.K.K. Prasad, 'Software Testing Tools', Dream Tech, **2004.**
12. M G Limaye, "Software Testing – Principles, Techniques and Tools", McGraw Hill, **2011**.
13. Kshirasagar Naik, Priyadarshi Tripathy, 'Software Testing and Quality Assurance Theory and Practice', John Wiley & Sons, Inc., Publication, **2009.**
14. G. Gordon Schulmeyer, 'Handbook of Software Quality Assurance', 4th Edn., Artech House, **2008**.
15. William E. Lewis, 'Software Testing and Continuous Quality Improvement', 2nd Edn. AUERBACH PUBLICATIONS, **2005.**

DATABASE MANAGEMENT –II LAB.

Subject Code: BCSE1-732 **L T P C**
0 0 2 1

PRACTICALS

1. Write pl/sql blocks using different control structures
2. Create simple and complex views
3. Study and Implement stored procedures
4. Study and Implement functions
5. Create sequences
6. Create cursors

7. implement different types of triggers
8. Server administration of any database management software
9. Study and usage of open source data mining tool: Weka

OBJECT ORIENTED ANALYSIS AND DESIGN USING UML LAB.

Subject Code BCSE1-733 **L T P C**
0 0 2 1

PRACTICALS

1. To develop a problem statement.
2. Develop an IEEE standard SRS document.
3. Identify Use Cases and develop the Use Case model.
4. Identify the business activities and develop an UML Activity diagram.
5. Identity the conceptual classes and develop a domain model with UML Class diagram.
6. Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.
7. Draw the Sequence Diagram.
8. Draw the Collaboration Diagram.
9. Draw the State Chart diagram.
10. Draw Component and Deployment diagrams.

CLOUD COMPUTING & BIG DATA

Subject Code: BCSE1-836 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

COURSE OBJECTIVES

This course will help you in COURSE Big data with Cloud technology to understand what is cloud storage, Big data in the cloud, characteristics of cloud computing, cloud computing services and cloud hosting, cloud data storage and deployment models, cloud computing companies and cloud service providers, cloud infrastructure, advantages of cloud computing and issues with cloud computing.

COURSE OUTCOMES

CO1: Ability to learn basics of Big data, Hadoop and Map Reduce
CO2: Able to learn the basics of Hive, HQL, HBase schema design, PIG and NoSQL.
CO3: Understand various basic concepts related to cloud computing technologies, architecture and concept of different cloud models: IaaS, PaaS, SaaS. Cloud virtualization, cloud storage, data management and data visualization.
CO4: Understand different cloud programming platforms & tools and familiar with application development and deployment using cloud platforms.

UNIT-I (11 Hrs.)

Big Data – Introduction, its importance, 5v's, Security Challenges, need for Big data analytics and its applications.
Hadoop - Apache Hadoop Architecture, Hadoop YARN, Comparison of Traditional system & Hadoop Ecosystem, Installation steps of Hadoop (1.x), Moving Data in and out of Hadoop, need for Record Reader and Record writer, understanding inputs and outputs file format of Map Reduce.

UNIT-II (12 Hrs.)

Hive - Introduction to Hive, Hive Architecture and Installation, HQL vs SQL, Introduction to PIG, NoSQL.

UNIT-III (11 Hrs.)

Cloud Computing Fundamentals: Introduction to Cloud Computing, private, public and hybrid cloud. Cloud types: IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public vs private clouds, Role of virtualization in enabling the cloud; Benefits and challenges to Cloud architecture.

UNIT-IV (11 Hrs.)

Cloud Applications, Cloud Services Management: Reliability, availability and security of services deployed from the cloud. Performance and scalability of services, tools and technologies used to manage cloud services deployment, computing infrastructures available for implementing cloud based services.

RECOMMENDED BOOKS

1. Chris Eaton, Dirk deroos et al., 'Understanding Big data', 1st Edn., McGraw Hill, **2015**.
2. Tom White, 'HADOOP: The definitive Guide', 4th Edn., O Reilly, **2015**.
3. Gautam Shroff, 'Enterprise Cloud Computing Technology Architecture Applications', 1st Edn., Cambridge University Press, **2010**.
4. Toby Velte, Anthony Velte, Robert Elsenpeter, 'Cloud Computing, A Practical Approach', 1st Edn., McGraw Hill Education, **2009**.
5. Thomas Erl, ' Big Data Fundamentals', 1st Edn., Pearson Education, **2016**
6. Srinivasan, ' Cloud Computing', 1st Edn,, Pearson Education, **2016.**

SCRIPTING LANGUAGES

Subject Code: BCSE1-868 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

COURSE OBJECTIVES

This course will make student learn about various scripting languages which are required web and software development

COURSE OUTCOMES

CO1: Ability to understand the different scripting languages.
CO2: Understand the basic and advanced concepts of perl programming.
CO3: Understanding of python especially the object oriented concepts.
CO4: Working knowledge of Python UI and its connectivity to database.

UNIT-I (11 Hrs.)

Introduction to PERL and Scripting: Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT –II (12 Hrs.)

Advanced Perl: Finer points of looping, pack and unpack, file system, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

UNIT-III (11 Hrs.)

Python: Introduction to Python language, Datatypes, Numbers, Sequences, None, Boolean Variable, Reference Expression, Numeric and Sequence Operators, List Print Statement, Basic flow statements like if statement, for and while loops with continue, break and pass statement, and Classes, Strings and Regular expressions, Built-in-functions and Methods, Modules in python, Exception Handling, File and Text operations

UNIT-IV (11 Hrs.)

Tkinter and Events: Introduction Widget: Introduction Commonly used Simple Widgets: Button, Check button, Entry, Label, List box, Radio button, Scrollbar Container Widgets: Frame, Menus Text Widget Event Object Binding Callbacks to Events, Events names: Keyboard events, Mouse events Event-Related Methods Other Callback-related methods
Working with Database: Database API 2.0: Introduction Exception classes, Thread Safety, and Parameter Style Factory Functions Type Description Attributes Connection: Function and Objects Cursor Objects DBAPI-Compliant Modules

RECOMMENDED BOOKS

1. David Barron, 'The World of Scripting Languages', Wiley Publications, **2000**.
2. Steve Holden and David Beazley, 'Python Web Programming', New Riders Publications.
3. Deitel & Deitel, 'Perl How to Program', Pearson, Pap/Cdr Edn., **2001**
4. M. Lutz, 'Programming Python', 4th Edn., SPD.
5. Randal L. Schwartz, Tom Phoenix, brian d foyCOURSE Perl, 5th Ed., O'Reilly Media
6. David Till, 'Teach Yourself Perl 5 in 21 Days'.
7. James Tisdall, 'Beginning Perl for Bioinformatics', O Reilly Publications.
8. Rex A. Dawyer, 'Genomic Perl', 1875 7th Edn., Cambridge University Press, **2002.**
9. Chun, 'Core Python Programming', 2nd Edn., Prentice Hall, **2006.**
10. M. Dawson, 'Guide to Programming with Python',1st Edn., Cengage COURSE, **2007**.
11. Larry Wall, T. Christiansen and J. Orwant, 'Programming Perl', 5th Edn., O'Reilly, SPD, **2000**.
12. J.R. Flynt, 'Perl Power', Cengage COURSE.
13. V. Vaswani, 'PHP Programming Solutions', 1st Edn., TMH, **2007.**
14. Vernon L. Ceder, 'The Quick Python Book', 2nd Edn., Manning Publications, **2010**.
15. Alex Martelli, 'Python in a Nutshell', o'reilly Publications, 3rd Edn., **2010**.

SOFTWARE PROJECT MANAGEMENT

Subject Code: BCSE1-869 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

COURSE OBJECTIVES

It gives an in depth knowledge of software project management and project planning. It also covers the Step Wise framework in project planning

COURSE OUTCOMES (COs)

CO1 Apply the basics of Software Project Management in order to manage and deliver qualified product and plan the activities within time schedules with CPM and PERT Analysis.
CO2 For managing the quality of product and managing the risk involved
CO3 Managing team and measuring and tracking the planning
CO4 Configuration management and project monitoring and control

UNIT-I (11 Hrs.)

Project Planning: Characteristics of a software project, Software scope and feasibility, resources, the SPM plan.

Software Project Estimation: Size/scope estimation, Decomposition techniques, WBS. Effort estimation: Sizing, Function point, LOC, FP vs LOC. Schedule estimation: GANTT Charts, Activity networks, PERT/CPM networks. Cost estimation: Models: COCOMO-I, COCOMO-II.

UNIT-II (12 Hrs.)

Quality Planning: Quality control, Quality assurance, Formal Technical Reviews, The SQA Plan, ISO and CMM standards.

Risk Management: Reactive vs proactive Risk strategies, Risk projection, Risk Refinement, Risk Monitoring, Monitoring and management, RMMM plan.

UNIT-III (11 Hrs.)

Measurement and Tracking Planning: Earned Value Analysis.

Team Management: Team structures: hierarchical, Egoless, chief programmer, mixed; Team software Process; Resource levelling, Building a team: Skill sets.

UNIT-IV (11 Hrs.)

Configuration Management: Baselines, Configurable items, SCM repository, SCM process, version control change control, configuration audit**.**

Project Monitoring and Control: Audits and Reviews.

Recommended Books

1. Bob Hughes and Mike Cotterell, 'Software Project Management', 5th Edn., Tata McGraw Hill, **2009.**
2. Roger Pressman, 'A Practitioner's Guide to Software Engineering', 8th Edn., Tata McGraw Hill, **2014.**
3. 'Head First PMP: A Brain Friendly Guide to Passing the Project Management Professional Exam', **2013.**

WIRELESS SENSOR NETWORKS

Subject Code: BCSE1-870 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

COURSE OBJECTIVES

The objective of this course is to make the students to Understand the basic WSN technology and supporting protocols, with emphasis placed on standardization basic sensor systems and provide a survey of sensor technology

COURSE OUTCOMES

CO1: Able to explain about basic concepts of wireless sensor networks. Also acquire knowledge about architecture of sensor networks.

CO2: Acquire knowledge about MAC Protocols for Wireless Sensor Networks, and various routing protocols for networking sensors.

CO3: Able to explain about Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.

CO4: Acquire knowledge about Security challenges.

UNIT-I (11 Hrs.)

Overview of wireless sensor networks: Challenges for Wireless Sensor Networks, Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes- Radio Energy Consumption Model, Operating Systems and Execution Environments, Applications of WSN, Computational models, Performance metrics

UNIT II (12 Hrs.)

Networking sensors: Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC, The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols- Energy-Efficient Routing, Geographic Routing.

UNIT-III (11 Hrs.)

Infrastructure establishment: Sensor deployment mechanisms- uniform random deployment, grid deployment, Time Synchronization- Introduction, Protocol based on sender- receiver synchronization, Issues of coverage, Node discovery protocols, Localization Schemes, Network clustering, Topology Control.

UNIT IV (11 Hrs.)

Security challenges, Threat and attack models, Quality of service provisioning, Supporting fault tolerant operation

RECOMMENDED BOOKS

1. Holger Karl & Andreas Willig, 'Protocols and Architectures for Wireless Sensor Networks' , John Wiley, **2005.**
2. Feng Zhao & Leonidas J. Guibas, 'Wireless Sensor Networks- An Information Processing Approach', Elsevier, **2007**.
3. Kazem Sohraby, Daniel Minoli, & Taieb Znati, 'Wireless Sensor Networks- Technology, Protocols, And Applications', John Wiley, **2007**.
4. Anna Hac, 'Wireless Sensor Network Designs', John Wiley, **2003**.

CLOUD COMPUTING & BIGDATA LAB.

Subject Code: BCSE1-837 **L T P C**
0 0 2 1

PRACTICALS

1. (i) Perform setting up and Installing Hadoop in its three operating modes: • Standalone, • Pseudo distributed, • Fully distributed.
   (ii) Use web based tools to monitor your Hadoop setup.
2. Implement the following file management tasks in Hadoop:
   a. Adding files and directories
   b. Retrieving files
   c. Deleting files
   Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.
4. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.
5. ***Use Eucalyptus or Open Nebula or equivalent to set up the cloud and demonstrate:***
   a) Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular time.

Find procedure to attach virtual block to the virtual machine and check whether it holds the data even after the