B-Tech CSE
Second Year: Semester III

S. No.	Category	Paper Code	Subject	L	T	P	Credit
1.	BSM	BSM-202	Discrete Mathematics	3	1	0	4
2.	EF	BCS-201	Digital Logic and Design	3	0	2	4
3.	HSS	BHM-202	Cyber Ethics and IPR	2	0	0	2
4.	PC	BCS-202	Principles of Data Structures	3	1	2	5
5.	PC	BCS-203	Object Oriented Programming	3	1	2	5
6.	PLBSE	BCS-204	IT Tools and Workshop-2	0	0	4	2
			Total	**14**	**3**	**10**	**21**
7.	AC	AUC-01-AUC-15	Audit Course	1/2	-	-	0
8.	ECA-III			-	-	-	0

BSM-202: Discrete Mathematics

Course Category   : Basic Sciences & Maths (BSM)
Contact hours/Week   : Lecture: 3, Tutorial: 1, Practical: 0
Number of Credits   : 4

Topics Covered
UNIT-I
Set Theory and Function: Operations on sets, relations and functions, binary relations, partial ordering relations, equivalence relations, principles of mathematical induction. Finite and infinite sets, countable and uncountable sets, Cantor's diagonal argument and the power set theorem, Schroder-Bernstein theorem.
UNIT-II
Propositional Logic: Syntax, semantics, valid, satisfiable and unsatisfiable formulas, encoding and examining and examining the validity of some logical arguments.
Proof Techniques: Forward proof, proof by contradiction, contrapositive proofs, proof of necessity and sufficiency.
UNIT-III
Algebraic Structures: Algebraic structures with one binary operation – semigroups, monoids and groups, congruence relation and quotient structures. Free and cyclic monoids and groups, permutation groups, substructures, normal subgroups. Algebraic structures with two binary operations – rings, integral domains and fields. Boolean algebra and Boolean ring.
UNIT-IV
Combinatorics: Basic counting techniques: inclusion and exclusion, pigeon-hole principle, permutation, combination, summations. Introduction to recurrence relations and generating functions.

BCS-201: Digital Circuits and Logic Design

Course Category : Program Core (PC)
Contact hours/Week : Lecture: 3, Tutorial: 0, Practical: 2
Number of Credits : 4

Topics Covered
UNIT-I
Binary Codes - Weighted and Non-Weighted - Binary Arithmetic Conversion Algorithms - Error Detecting and Error Correcting Codes - Canonical and Standard Boolean Expressions - Truth Tables.
UNIT-II
K-Map Reduction - Don't Care Conditions - Adders / Subtractors- Carry Look-Ahead Adder - Code Conversion Algorithms - Design of Code Converters - Equivalence Functions.

Binary/Decimal Parallel Adder/Subtractor for Signed Numbers - Magnitude Comparator - Decoders / Encoders - Multiplexers / Demultiplexers- Boolean Function Implementation using Multiplexers.
UNIT-III
Sequential Logic - Basic Latch - Flip-Flops (SR, D, JK, T and Master-Slave) - Triggering of Flip-Flops - Counters - Design Procedure - Ripple Counters - BCD and Binary - Synchronous Counters.
UNIT-IV
Registers - Shift Registers - Registers with Parallel Load - Memory Unit - Examples of RAM, ROM, PROM, EPROM - Reduction of State and Flow Tables - Race-Free State Assignment - Hazards.

BHM-202: Cyber Ethics and IPR

Course Category : Humanities & Social Science (HSS)
Contact hours/Week : Lecture: 2, Tutorial: 0, Practical: 0
Number of Credits : 2

Topics Covered
UNIT-I
Information Technology Act, 2000 - Aims and Objects - Overview of the Act – Jurisdiction - Electronic Governance – Electronic Evidence
Introduction to Cyber Laws: Cyber Law – National and International Perspective Cyber Law - Legal Issues and Challenges in India, Cybercrime Definition, cybercrime and information security, cybercrimes with mobile and wireless devices.
UNIT-II
Cyber Ethics, Significance of cyber-Ethics, Need for Cyber regulations and Ethics. Ethics in Information society, Introduction to Artificial Intelligence Ethics: Ethical Issues in AI and core Principles, Introduction to Block chain Ethics.
UNIT-III
Intellectual Property Rights: Definition, objectives & scope, Cyber Law and IPRs
Copyright: Definition, objectives, scope, benefits, Main Provisions of Copyright Act, Issues in Cyberspace.
UNIT-IV
Indian Patent Act, definition, objectives, types, Copyrights Vs Patent
Trademarks – introduction, benefits for business, Trademarks in Internet - Domain name registration, Trademarks in Internet

BCS-203: Object Oriented Programming

Course Category   : Program Core (PC)
Contact hours/Week   : Lecture: 3, Tutorial: 1, Practical: 2
Number of Credits   : 5

Topics Covered
UNIT-I
Introduction to the principles of object-oriented programming, Core Java: Introduction, Operator, Data types, Variables, Control Statements, Arrays, Methods & Classes, Constructors, String Handling, Inheritance, Package and Interface.
UNIT-II
Exception Handling, Multithread programming, I/O, Java Applet, Networking, Event handling, Introduction to AWT, AWT controls, Layout managers.
UNIT-III
Java Swing: Creating a Swing Applet, Labels, Text fields, Buttons, Tabbed Panes, JDBC: Connectivity Model, JDBC/ODBC Bridge, JAVA SQL package, connectivity to Remote Database, Remote method invocation (RMI).
UNIT-IV
Java Beans: Application Builder tools, The Bean Developer Kit (BDK), JAR files, Introspection, developing a simple bean, using Bound properties, The Java Beans API, Session Beans, Entity Beans, Introduction to Java Servlet: Servlet Basics, Servlet API basic, Life cycle of a Servlet, Running Servlet.

EXPERIMENTS
1. Basic programs of simple statements, conditional statements, iterative statement, and arrays.
2. Programs having object-oriented concepts like Inheritance and Interface.
3. Programs for Exception Handling and Event Handling.
4. Programs of Threads and Multithreading.
5. Programs related to Applets and Swings.
6. Program including JAVA Beans and Servlets.

BCS-204: IT Tools and Workshop-2

Course Category   : PLBSE
Contact hours/Week   : Lecture: 0, Tutorial: 0, Practical: 4
Number of Credits   : 2

1. Installation of Linux operating system using virtualization technique.
2. Understanding and practice of various Linux commands.
3. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.
4. Illustrate by writing script that will print, message "Hello World", in Bold and Blink effect, and in different colours like red, brown etc using echo commands?
5. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
6. Illustrate by writing script using for loop to print the pyramid patterns?
7. Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.
8. Understanding and practice of Computer networking commands.
9. Write a python script to find factorial of a given number.
10. Write a python script to find factorial of a given number.
11. Write a Python program to count the occurrences of each word in a given string sentence.
12. Python program to create a dictionary with key as first character and value as words starting with that character.
13. Write a python program to create, append and remove lists in python.
14. Write a program to demonstrate working with tuples in python.
15. Write a python program to read excel file from xlrd module and perform processing on that file.
16. Write a program to demonstrate working with pandas module in python.
17. Write a program to demonstrate working with numpy module in python.
18. Write a program to demonstrate working with sklearn module in python.

BCS-202: Principles of Data Structures

Course Category   : Program Core (PC)
Contact hours/Week   : Lecture: 3, Tutorial: 1, Practical: 2
Number of Credits   : 5

Topics Covered

UNIT-I

Introduction: Basic Terminology, Elementary Data Organization, Structure Operations, Complexity and Time-Space Trade-off.

Arrays: Definition, Representation and Analysis, Single and Multi-Dimension Array, Address Calculation, Application of Arrays, Character, String in C, Character String Operation, Arrays Parameters, Ordered List, Sparse Matrices and Vectors

Stacks: Array Representation and Implementation of Stack

Operations on Stacks: Push &Pop, Array Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Application of Stack, Conversion of Infix to Prefix and Postfix Expressions, Evaluation of Postfix Expressions using Stack, Application of Recursion in Problem like Tower of Hanoi.

UNIT-II

Queues: Array and Linked Representation and Implementation of Queues

Operations on Queue: Create, Add, Delete, Full and Empty, Circular Queues, D-Queues and Priority Queues.

Linked List: Representation and Implementation of Singly Linked Lists, Two-Way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and Deletion to/from Linked Lists, Insertion and Deletion Algorithms, Doubly Linked List, Linked List in Array, Polynomial Representation and Addition, Generalized Linked List, Garbage Collection and Compaction.

UNIT-III

Trees: Basic Terminology, Binary Trees, Binary Tree Representation, Algebraic Expressions, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary Trees, Traversing Binary Trees, Threaded Binary Trees, Traversing Threaded Binary Trees, Huffman Algorithm.

Binary Search Trees: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees, B-Trees.

UNIT-IV

Searching and Hashing: Sequential Search, Binary Search, Comparison and Analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation.

Sorting: Insertion Sort, Bubble Sorting, Quick Sort, Two Way Merge Sort, Heap Sort, Sorting on Different Keys, Practical Consideration for Internal Sorting.

Graphs: Terminology & Representations, Graphs & Multi-Graphs, Directed Graphs, Sequential Representations of Graphs, Adjacency Matrices, Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees.

EXPERIMENTS

Write C/C++ Programs to illustrate the concept of the following:

1. Implementation of searching and sorting techniques.
2. Implementation of list using array and linked list.
3. Implementation of push and pop operation on stack.
4. Implementation of polish notation and its conversion.
5. Write a program to solve the problems using iteration/recursion.
6. Program for recursion removal using stack.
7. Program for insertion /deletion operation on various queue & Implementation of priority queue for process scheduling.
8. Program for storing data as tree structure and implementation of various traversal techniques.
9. Program for storing data as graph structure and implementation of various traversal techniques.
10. Program for finding shortest path in graph.