



# **University of Madras**

**Chepauk, Chennai 600 005**

[Est. 1857, State University, NAAC 'A' Grade, CGPA 3.32, NIRF 2019 Rank: 20]

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## **Undergraduate Programme in Computer Science**

**Syllabus for  
B.Sc Computer Science  
(With effect from the Academic Year 2020-21)**

**February 2020**

**Learning Outcome Based Curriculum Framework**

**Note: The Board of Studies is designed Learning Outcomes Based Curriculum Framework of Under Graduate Computer Application Programme prescribed by UGC**

# **Syllabus for B.Sc Computer Science**

(With effect from the Academic Year 2020-21)

## **I Preamble**

Bachelor of Computer Science is a 3 – Year Under Graduate Programme spread over six semesters. The course is designed to achieve high degree of technical skills in Problem solving and application development. The course develops requisite professional skills and problem solving abilities for pursuing a successful career in software industry and forms the required basics for pursuing higher studies in Computer Science.

## **II Course Objectives**

- Acquisition of Knowledge and understanding of system, various programming languages and tools required for effective computation based problem solving.
- Utilize emerging technological tools learn, adapt and successfully rite effective procedural coding meeting the needs of technical and societal challenges
- Attain sufficient knowledge related to computer domains, possesses technical, soft and hard skills and apply them effectively in team work
- Empower the students with competencies in creative thinking and problem solving, inter-personal communication and managerial skills.

## **III Graduate Attributes**

- Computational Knowledge
- Problem analysis & Solving
- Design & Development of Solutions
- Modern tool usage
- Communication skills
- Innovation & Entrepreneurship
- Societal & environmental concern

## **IV Course Outcomes**

After Completion of the course, the students are expected to

- Understand the basic principles and concepts of Computer Science and integrate the knowledge gained in Computer Science domain with practical needs of the society and be an ethically and socially responsible Computer Science Professional
- Explore emerging technologies in diverse areas of Computer Science and inculcate skills for successful career, entrepreneurship and higher studies
- Apply the concepts of Computer and practices via emerging technologies and Software development tools

**COURSE STRUCTURE:**

<b>I SEMESTER</b>					
<b>COURSE CONTENT</b>	<b>COURSE NAME</b>	<b>CREDITS</b>	<b>MAX. MARKS</b>		
			<b>Ext.</b>	<b>Int.</b>	<b>Total</b>
PART I	Tamil/ Other languages – I	3	75	25	100
PART II	English - I	3	75	25	100
PART III	BCE-CSC01 - Problem Solving using Python@	4	75	25	100
	BCE-CSC02 - Core Practical-I - Problem Solving using Python Lab@	3	60	40	100
	Allied I: Mathematics-I@	5	75	25	100
PART IV	Basic Tamil/Advanced Tamil/NME I*	2	75	25	100
	Soft Skill I	3	50	50	100
<b>Total Credits</b>		<b>23</b>			
<b>II SEMESTER</b>					
PART I	Tamil/ Other languages – II	3	75	25	100
PART II	English – II	3	75	25	100
PART III	BCE-CSC03 - Computer Organization@	4	75	25	100
	BCE-DSC04 - Core Practical-II - Computer Organization Lab	3	60	40	100
	Allied II: Mathematics II@	5	75	25	100
PART IV	Basic Tamil/Advanced Tamil/N M E II*	2	75	25	100
	Soft Skill II	3	50	50	100
<b>Total Credits</b>		<b>23</b>			
<b>III SEMESTER</b>					
PART I	Tamil/ Other languages – III	3	75	25	100
PART II	English - III	3	75	25	100
PART III	BCE-CSC05 - Java and Data Structures@	4	75	25	100
	BCE-CSC06 - Core Practical-III - Data Structures using Java Lab@	3	60	40	100
	Allied III: Physics I / Statistics I@	5	75	25	100
PART IV	Soft Skill III	3	50	50	100
	Environmental Studies	Examination will be held in Semester IV			
<b>Total Credits</b>		<b>21</b>			
<b>IV SEMESTER</b>					
PART I	Tamil/ Other languages – IV	3	75	25	100
PART II	English - IV	3	75	25	100
PART III	BCE-CSC07 - Web Technology@	4	75	25	100
	BCE-CSC08 - Core Practical-IV - Web Technology Lab@	3	60	40	100
	Allied IV: Physics II / Statistics II@	5	75	25	100
PART IV	Soft Skill IV	3	50	50	100
	Environmental Studies	2	75	25	100
<b>Total Credits</b>		<b>23</b>			

<b>V SEMESTER</b>					
<b>COURSE CONTENT</b>	<b>COURSE NAME</b>	<b>CREDITS</b>	<b>MAX. MARKS</b>		
			<b>Ext.</b>	<b>Int.</b>	<b>Total</b>
PART III	BCE-CSC09 - Computer Network@	4	75	25	100
	BCE-CSC10 - Operating System@	5	75	25	100
	BCE-CSC11 - Relational Database Management System@	4	75	25	100
	BCE-CSC12 - Core Practical-V - Operating System Lab@	3	60	40	100
	BCE-CSC13 - Core Practical-VI - PL/SQL Lab@	3	60	40	100
	Elective I-Choose any one from the list	5	75	25	100
PART IV	Value Education	2	75	25	100
	<b>Total Credits</b>	<b>26</b>			
<b>VI SEMESTER</b>					
PART III	BCE-CSC14 - Software Engineering@	4	75	25	100
	BCE-CSC15 - Introduction to Data Science@	5	75	25	100
	BCE-DSC16 - Introduction to Cloud Computing	4	75	25	100
	BCE-DSC17 - Core Practical-VII - CASE Tools and Testing tools Lab	3	60	40	100
	Elective II- Choose any one from the list	5	75	25	100
	BCE-CSC18 - Core Practical-VIII - Mini Project@	5	60	40	100
PART V	Extension Activities	1			
	<b>Total Credits</b>	<b>27</b>			
	<b>Total credits ( Core, Elective, SBS)</b>	<b>143</b>			

**\*NME: Choose Any one From the Other Department**

	<b>Elective I</b>
BCE-DSE1A	Artificial Intelligence and Expert System
BCE-DSE1B	Graphics and Visualization
BCE-DSE1C	Network Security
	<b>Elective II</b>
BCE-DSE2A	Mobile Computing
BCE-CSE2B	IOT and its Applications@
BCE-DSE2C	Block Chain Technology

@ - Common subject to other course/s.

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**SYLLABUS WITH EFFECT FROM 2020-2021**

**BCE-CSC01**

**CORE-I: PROBLEM SOLVING USING PYTHON**  
(Common paper to B.Sc.Software Applications & B.C.A.)

**I YEAR / I SEM**

**OBJECTIVES:**

- Describe the core syntax and semantics of Python programming language.
- Discover the need for working with the strings and functions.
- Illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
- Understand the usage of packages and Dictionaries.

**OUTCOMES:**

- To Understand the principles of Python and acquire skills in programming in python
- To develop the emerging applications of relevant field using Python
- Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.
- Able to develop simple turtle graphics programs in Python

**UNIT – I**

Introduction: The essence of computational problem solving – Limits of computational problem solving-Computer algorithms-Computer Hardware-Computer Software-The process of computational problem solving-Python programming language - Literals - Variables and Identifiers - Operators - Expressions and Data types.

**UNIT - II**

Control Structures: Boolean Expressions - Selection Control - If Statement- Indentation in Python- Multi-Way Selection -- Iterative Control- While Statement- Infinite loops- Definite vs. Indefinite Loops- Boolean Flags and Indefinite Loops. Lists: List Structures - Lists in Python - Iterating over lists in Python.

**UNIT - III**

Functions: Program Routines- Defining Functions- More on Functions: Calling Value-Returning Functions- Calling Non-Value-Returning Functions- Parameter Passing - Keyword Arguments in Python - Default Arguments in Python-Variable Scope.

**UNIT - V**

Objects and their use: Software Objects - Turtle Graphics – Turtle attributes-Modular Design: Modules - Top-Down Design - Python Modules - Text Files: Opening, reading and writing text files - String Processing - Exception Handling.

**UNIT - V**

Dictionaries and Sets: Dictionary type in Python - Set Data type. Object Oriented Programming using Python: Encapsulation - Inheritance – Polymorphism. Recursion: Recursive Functions.

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**TEXT BOOK:**

1. Charles Dierbach, “Introduction to Computer Science using Python - A computational Problem solving Focus”, Wiley India Edition, 2015.

**REFERENCE BOOKS:**

1. Mark Lutz, “*Learning Python Powerful Object Oriented Programming*”, O’reilly Media 2018, 5<sup>th</sup> Edition.
2. Timothy A. Budd, “*Exploring Python*”, Tata MCGraw Hill Education Private Limited 2011, 1<sup>st</sup> Edition.
3. Allen Downey, Jeffrey Elkner, Chris Meyers, “*How to think like a computer scientist: learning with Python*”, 2012.
4. Sheetal Taneja & Naveen kumar, “*Python Programming a Modular approach – A Modular approach with Graphics, Database, Mobile and Web applications*”, Pearson, 2017.
5. Ch Satyanarayana M Radhika Mani, B N Jagadesh, “*Python programming*”, Universities Press 2018.

**WEB REFERENCES**

- <http://interactivepython.org/courselib/static/pythonds>
- <http://www.ibiblio.org/g2swap/byteofpython/read/>
- <http://www.diveintopython3.net/>
- <http://greenteapress.com/wp/think-python-2e/>
- NPTEL & MOOC courses titled Python programming
- [http://spoken-tutorial.org/tutorial-search/?search\\_foss=Python&search\\_language=English](http://spoken-tutorial.org/tutorial-search/?search_foss=Python&search_language=English)
- <http://docs.python.org/3/tutorial/index.html>

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**WITH EFFECT FROM 2020-2021**

**BCE-CSC02**

**CORE II :PRACTICAL – I PROBLEM SOLVING USING PYTHON**  
**LAB(Common paper to B.Sc.Software Applications & B.C.A.)**

**I YEAR / I SEM**

**OBJECTIVES:**

- To implement the python programming features in practical applications.
- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, dictionaries , turtles, Files and modules.

**OUTCOMES:**

- Understand the numeric or real life application problems and solve them.
- Apply a solution clearly and accurately in a program using Python.
- Apply the best features available in Python to solve the situational problems.

**LIST OF EXERCISES:**

1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the five subjects are to be input by user. Assign grades according to the following criteria:

Grade A: Percentage $\geq 80$	Grade B: Percentage $\geq 70$ and $< 80$
Grade C: Percentage $\geq 60$ and $< 70$	Grade D: Percentage $\geq 40$ and $< 60$
Grade E: Percentage $< 40$	
3. Program, to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
4. Program to display the first n terms of Fibonacci series.
5. Program to find factorial of the given number using recursive function.
6. Write a Python program to count the number of even and odd numbers from array of N numbers.
7. Python function that accepts a string and calculate the number of upper case letters and lower case letters.
8. Python program to reverse a given string and check whether the give string is palindrome or not.
9. Write a program to find sum of all items in a dictionary.

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10. Write a Python program to construct the following pattern, using a nested loop

```
1
22
333
4444
55555
666666
7777777
88888888
999999999
```

11. Read a file content and copy only the contents at odd lines into a new file.

12. Create a Turtle graphics window with specific size.

13. Write a Python program for Towers of Hanoi using recursion

14. Create a menu driven Python program with a dictionary for words and their meanings.

15. Devise a Python program to implement the Hangman Game.

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**BCE-CSC03**

**CORE-III: COMPUTER ORGANIZATION**

(Common paper to B.C.A.-III Sem.)

**I YEAR / II SEM**

**OBJECTIVES:**

- To understand the basic organization of computers and the working of each component and CPU
- To bring the programming features of 8085 Microprocessor and know the features of latest microprocessors.
- To understand the principles of Interfacing I/O devices and Direct Memory accesses

**OUTCOMES:**

- Describe the major components of a computer system and state their function and purpose
- Describe the microstructure of a processor
- Demonstrate the ability to program a microprocessor in assembly language.
- Classify and describe the operation DMA and peripheral Interfaces.

**UNIT - I**

Data representation: Data types – Complements- fixed point and floating point representation other binary codes. Register Transfer and Microoperations: Register transfer language- Register transfer- Bus and Memory transfers – Arithmetic, logic and shift micro operations.

**UNIT - II**

Central processing unit: General register and stack organizations- instruction formats - Addressing modes- Data transfer and manipulation - program control- RISC - Pipelining - Arithmetic and instruction- RISC pipeline - Vector processing and Array processors.

**UNIT - III**

Microprocessor Architecture and its Operations - 8085 MPU - 8085 Instruction Set and Classifications. Programming in 8085: Code conversion - BCD to Binary and Binary to BCD conversions - ASCII to BCD and BCD to ASCII conversions - Binary to ASCII and ASCII to Binary conversions.

**UNIT - IV**

Programming in 8085:BCD Arithmetic - BCD addition and Subtraction - Multibyte Addition and Subtraction - Multiplication and Division. Interrupts: The 8085 Interrupt – 8085 Vectored Interrupts –

**UNIT - V**

Direct Memory Access(DMA)and 8257 DMA controller - 8255A Programmable Peripheral Interface. Basic features of Advanced Microprocessors - Pentium - I3 , I5 and I7

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**TEXT BOOKS:**

1. M.M. Mano, "Computer System architecture". Pearson, Third Edition, 2007
2. R. S. Gaonkar- "Microprocessor Architecture- Programming and Applications with 8085"- 5<sup>th</sup> Edition- Penram- 2009.
3. Tripti Dodiya & Zakiya Malek, "Computer Organization and Advanced Microprocessors", Cengage Learning, 2012.

**REFERENCE BOOKS:**

1. Mathur- "Introduction to Microprocessor"- 3<sup>rd</sup> Edition- Tata McGraw-Hill-1993.
2. P. K. Ghosh and P. R. Sridhar- "0000 to 8085: Introduction to Microprocessors for Engineers and Scientists"- 2<sup>nd</sup> Edition- PHI- 1995.
3. NagoorKani- "Microprocessor (8085) and its Applications"- 2<sup>nd</sup> Edition- RBA Publications- 2006.
4. V. Vijayendran- "Fundamentals of Microprocessors – 8085"- S. Viswanathan Pvt. Ltd.- 2008.

**WEB REFERENCES:**

- NPTEL & MOOC courses titled Computer organization
- <https://nptel.ac.in/courses/106105163/>
- <https://nptel.ac.in/courses/106103068/>

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**BCE-DSC04**

**CORE-IV: PRACTICAL - II**  
**COMPUTER ORGANIZATION LAB**

**I YEAR / II SEM**

**OBJECTIVES:**

- To understand the programming features and operations of assembly language programs using 8085 microprocessor kit or Simulator

**OUTCOMES:**

- Implement the arithmetic operations in assembly language programming
- Understand the programming logic of 8085 in various aspects

**LIST OF EXERCISES:**

**I :** Addition and Subtraction

1. 8 - bit addition
2. 16 - bit addition
3. 8 - bit subtraction
4. BCD subtraction

**II :** Multiplication and Division

1. 8 - bit multiplication
2. BCD multiplication
3. 8 - bit division

**III:** Sorting and Searching

1. Searching for an element in an array.
2. Sorting in ascending order.
3. Finding largest and smallest elements from an array
4. Reversing array elements
5. Block move
6. Sorting in descending order

**IV:** Code Conversion

1. BCD to Hex and Hex to BCD
2. Binary to ASCII and ASCII to binary
3. ASCII to BCD and BCD to ASCII

**V:** Applications

1. Square of a single byte Hex number
2. Square of a two digit BCD number
3. Square root of a single byte Hex number
4. Square root of a two digit BCD number

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**BCE-CSC05**

**CORE-V: JAVA AND DATA STRUCTURES**  
(Common paper to B.Sc.Software Applications)

**II YEAR / III SEM**

**OBJECTIVES:**

- To enable the students to learn the basic concepts of Java programming
- To use class and objects to create applications
- To have an overview of interfaces, packages, multithreading and exceptions.
- To familiarize students with basic data structures and their use in algorithms.

**OUTCOMES:**

- Students will be able to develop Java Standalone applications and Applets.
- Choose the appropriate data structure for modeling a given problem.

**UNIT - I**

History and Evolution of Java - Features of Java - Object Oriented Concepts – Bytecode - Lexical Issues - Data Types – Variables- Type Conversion and Casting- Operators - Arithmetic Operators - Bitwise - Relational Operators - Assignment Operator - The conditional Operator - Operator Precedence- Control Statements – Arrays.

**UNIT - II**

Classes - Objects - Constructors - Overloading method - Static and fixed methods - Inner Classes - String Class- Overriding methods - Using super-Abstract class - this keyword – finalize() method – Garbage Collection.

**UNIT - III**

Packages - Access Protection - Importing Packages - Interfaces - Exception Handling - Throw and Throws-The Java Thread Model- Creating a Thread and Multiple Threads - Thread Priorities Synchronization-Inter thread Communication - Deadlock - Suspending, Resuming and stopping threads – Multithreading-I/O Streams - File Streams - Applets .

**UNIT - IV**

Abstract Data Types(ADTs)-List ADT-Array based implementation-linked list implementation-singly linked list-doubly linked list-circular linked list-Stack ADT operations-Applications-Evaluating arithmetic expressions-Conversion of infix to postfix expression-Queue ADT-operations-Applications of Queues.

**UNIT - V**

Trees-Binary Trees- representation - Operations on Binary Trees- Traversal of a Binary Tree -Binary Search Trees, Graphs-Representation of Graphs - Traversal in Graph -Dijkstra’s Algorithm, Depth-First vs Breadth-First Search.

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**TEXT BOOKS:**

1. E.Balagurusamy,” *Programming with Java: A Primer*”, Tata McGraw Hill 2014, 5th Edition.
2. Mark Allen Weiss, “*Data Structures and Algorithms Analysis in C++*”, Person Education 2014, 4<sup>th</sup> Edition.

**REFERENCES:**

1. Herbert Schildt, “*JAVA 2: The Complete Reference*”, McGraw Hill 2018, 11th Edition.
2. Aho, Hopcroft and Ullman, “*Data Structures and Algorithms* “, Pearson Education 2003.
3. S. Sahni, “*Data Structures, Algorithms and Applications in JAVA*”, Universities Press 2005, 2<sup>nd</sup> Edition

**WEB REFERENCES:**

- NPTEL & MOOC courses titled Java and Data Structures
- <https://nptel.ac.in/courses/106106127/>
- <https://nptel.ac.in/courses/106105191/>

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**BCE-CSC06**

**CORE-VI: PRACTICAL-III**  
**DATA STRUCTURES USING JAVA LAB**  
(Common paper to B.Sc.Software Applications)

**II YEAR/ III SEM**

**OBJECTIVES:**

- To implement linear and non-linear data structures
- To understand the different operations of search trees
- To implement graph traversal algorithms

**OUTCOMES:**

- Write functions to implement linear and non-linear data structure operations.
- Suggest appropriate linear and non-linear data structure operations for solving a given problem.

**LIST OF EXERCISES:**

1. Write a Java program to implement the Stack ADT using a singly linked list.
2. Write a Java program to implement the Queue ADT using a singly linked list.
3. Write a Java program for the implementation of circular Queue.
4. Write a Java program that reads an infix expression, converts into postfix form
5. Write a Java program to evaluate the postfix expression (use stack ADT).
6. Write a Java program to an Insert an element into a binary search tree.
7. Write a Java program to delete an element from a binary search tree.
8. Write a Java program to search for a key element in a binary search tree.
9. Write a Java program for the implementation of BFS for a given graph.
10. Write a Java program for the implementation of DFS for a given graph.

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**BCE-CSC07**

**CORE-VII: WEB TECHNOLOGY**  
(Common paper to B.Sc. Software Application)

**II YEAR / IV SEM**

**OBJECTIVES:**

- To use PHP and MySQL to develop dynamic web sites for user on the Internet
- To develop web sites ranging from simple online information forms to complex e-commerce sites with MySQL database, building, connectivity, and maintenance

**OUTCOMES:**

- Understand the general concepts of PHP scripting language for the development of Internet websites.
- Understand the basic functions of MySQL database program and XML concepts
- Learn the relationship between the client side and the server side scripts.

**UNIT - I**

Introducing PHP – Basic development Concepts – Creating first PHP Scripts – Using Variable and Operators – Storing Data in variable – Understanding Data types – Setting and Checking variables Data types – Using Constants – Manipulating Variables with Operators.

**UNIT - II**

Controlling Program Flow: Writing Simple Conditional Statements - Writing More Complex Conditional Statements – Repeating Action with Loops – Working with String and Numeric Functions.

**UNIT - III**

Working with Arrays: Storing Data in Arrays – Processing Arrays with Loops and Iterations – Using Arrays with Forms - Working with Array Functions – Working with Dates and Times.

**UNIT - IV**

Using Functions and Classes: Creating User-Defined Functions - Creating Classes – Using Advanced OOP Concepts. Working with Files and Directories: Reading Files-Writing Files-Processing Directories.

**UNIT - V**

Working with Database and SQL : Introducing Database and SQL- Using MySQL-Adding and modifying Data-Handling Errors – Using SQLite Extension and PDO Extension. Introduction XML - Simple XML and DOM Extension.

**TEXT BOOK:**

1. VikramVaswani, “*PHP A Beginner's Guide*”, Tata McGraw Hill 2008.

**REFERENCE BOOKS:**

1. Steven Holzner , “*The PHP Complete Reference*”, Tata McGraw Hill, 2007.
2. Steven Holzer , “*Spring into PHP*”, Tata McGraw Hill 2011, 5thEdition.

**WEB REFERENCES:**

- <https://www.w3schools.com/php/>
- <https://www.phptpoint.com/php-tutorial-pdf/>
- <http://www.xmlsoftware.com/>

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**BCE-CSC08**

**CORE-VIII: PRACTICAL-IV (WEB TECHNOLOGY LAB)**  
(Common paper to B.Sc.Software Applications)

**II YEAR / IV SEM**

**OBJECTIVES:**

1. The objectives of this course are to have a practical understanding about how to write PHP code to solve problems.
2. Display and insert data using PHP and MySQL.
3. Test, debug, and deploy web pages containing PHP and MySQL.
4. It also aims to introduce practical session to develop simple applications using PHP and MySQL.

**OUTCOMES:**

- On the completion of this laboratory course the students ought to
- Obtain knowledge and develop application programs using Python.
- Create dynamic Web applications such as content management, user registration, and e-commerce using PHP and to understand the ability to post and publish a PHP website.
- Develop a MySQL database and establish connectivity using MySQL.

**LIST OF PRACTICALS**

1. Write a PHP program which adds up columns and rows of given table
2. Write a PHP program to compute the sum of first n given prime numbers
3. Write a PHP program to find valid an email address
4. Write a PHP program to convert a number written in words to digit.
5. Write a PHP script to delay the program execution for the given number of seconds.
6. Write a PHP script, which changes the colour of the first character of a word
7. Write a PHP program to find multiplication table of a number.
8. Write a PHP program to calculate Factorial of a number.
9. Write a PHP script to read a file, reverse its contents, and write the result back to a new file
10. Write a PHP script to look through the current directory and rename all the files with extension .txt to extension .xtx.
11. Write a PHP script to read the current directory and return a file list sorted by last modification time. (*using filemtime()*)
12. Write a PHP code to create a student mark sheet table. Insert, delete and modify records.
13. From a XML document (email.xml), write a program to retrieve and print all the e-mail addresses from the document using XML
14. From a XML document (tree.xml), suggest three different ways to retrieve the text value 'John' using the DOM:
15. Write a program that connects to a MySQL database and retrieves the contents of any one of its tables as an XML file. Use the DOM.



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**BCE-CSC09**

**CORE-IX: COMPUTER NETWORK**

(Common paper to B.Sc.Software Applications-VI Sem. & B.C.A.)

**III YEAR / V SEM**

**OBJECTIVES:**

- To understand the concept of Computer network
- To impart knowledge about networking and inter networking devices

**OUTCOMES:**

- Analyze different network models
- Describe, analyze and compare a number of data link, network and transport layer
- Analysing key networking protocols and their hierarchical relationship in the conceptual model like TCP/IP and OSI

**UNIT - I**

Introduction – Network Hardware - Software - Reference Models - OSI and TCP/IP Models - Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Layer - Theoretical Basis for Data Communication - Guided Transmission Media.

**UNIT - II**

Wireless Transmission - Communication Satellites - Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues - Error Detection and Correction.

**UNIT - III**

Elementary Data Link Protocols - Sliding Window Protocols - Data Link Layer in the Internet - Medium Access Layer - Channel Allocation Problem - Multiple Access Protocols - Bluetooth.

**UNIT - IV**

Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms - IP Protocol - IP Addresses - Internet Control Protocols.

**UNIT - V**

Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection - Simple Transport Protocol - Internet Transport Protocols (ITP) - Network Security: Cryptography.

**TEXT BOOK :**

1. A. S. Tanenbaum, “*Computer Networks*”, Prentice-Hall of India 2008, 4<sup>th</sup> Edition.

**REFERENCE BOOKS:**

1. Stallings, “*Data and Computer Communications*”, Pearson Education 2012, 7<sup>th</sup> Edition.
2. B. A. Forouzan, “*Data Communications and Networking*”, Tata McGraw Hill 2007, 4<sup>th</sup> Edition.
3. F. Halsall, “*Data Communications, Computer Networks and Open Systems*”, Pearson Education 2008.
4. D. Bertsekas and R. Gallager, “*Data Networks*”, PHI 2008, 2<sup>nd</sup> Edition.
5. Lamarca, “*Communication Networks*”, Tata McGraw Hill 2002.

**WEB REFERENCES:**

- NPTEL & MOOC courses titled Computer Networks
- <https://nptel.ac.in/courses/106106091/>

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**B.Sc. DEGREE COURSE IN COMPUTER SCIENCE**  
**SYLLABUS WITH EFFECT FROM 2020-2021**

**BCE-CSC10**

**CORE-X: OPERATING SYSTEM**  
(Common paper to B.Sc. Software Applications & B.C.A.)

**III YEAR / V SEM**

**OBJECTIVES:**

- To understand the fundamental concepts and role of Operating System.
- To learn the Process Management and Scheduling Algorithms
- To understand the Memory Management policies
- To gain insight on I/O and File management techniques

**OUTCOMES:**

- Understand the structure and functions of Operating System
- Compare the performance of Scheduling Algorithms
- Analyze resource management techniques

**UNIT - I**

Introduction: Views - Types of System - OS Structure – Operations - Services – Interface- System Calls- System Structure - System Design and Implementation. Process Management: Process - Process Scheduling - Inter-process Communication. CPU Scheduling: CPU Schedulers - Scheduling Criteria - Scheduling Algorithms.

**UNIT - II**

Process Synchronization: Critical- Section Problem - Synchronization Hardware Semaphores - Classical Problems of Synchronization - Monitors. Deadlocks: Characterization - Methods for Handling Deadlocks - Deadlock Prevention - Avoidance - Detection - Recovery.

**UNIT - III**

Memory Management: Hardware - Address Binding – Address Space - Dynamic Loading and Linking – Swapping – Contiguous Allocation - Segmentation - Paging – Structure of the Page Table.

**UNIT - IV**

Virtual Memory Management: Demand Paging - Page Replacement Algorithms - Thrashing. File System: File Concept -. Access Methods - Directory and Disk Structure - Protection - File System Structures - Allocation Methods - Free Space Management.

**UNIT - V**

I/O Systems: Overview - I/O Hardware - Application I/O Interface - Kernel I/O Subsystem - Transforming I/O Requests to Hardware Operations - Performance. System Protection: Goals - Domain - Access matrix. System Security: The Security Problem - Threats – Encryption- User Authentication.

**TEXT BOOK:**

1. Abraham Silberschatz, Peter B Galvin, Greg Gagne, “*Operating System Concepts*”, Wiley India Pvt. Ltd 2018, 9<sup>th</sup> Edition,.

**REFERENCES:**

1. William Stallings, “*Operating Systems Internals and Design Principles*”, Pearson, 2018, 9<sup>th</sup> Edition.
2. Andrew S. Tanenbaum, Herbert Bos, “*Modern Operating Systems*”, Pearson 2014, 4<sup>th</sup> Edition.

**WEB REFERENCES:**

- NPTEL & MOOC courses titled Operating Systems
- <https://nptel.ac.in/courses/106106144/>

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**SYLLABUS WITH EFFECT FROM 2020-2021**

**BCE-CSC12**

**CORE-XII: PRACTICAL – V (OPERATING SYSTEM LAB)**  
(Common paper to B.Sc.Software Applications & B.C.A.)

**III YEAR / V SEM**

**OBJECTIVES:**

- To learn Process management and scheduling.
- To understand the concepts and implementation of memory management policies.
- To understand the various issues in Inter Process Communication.

**OUTCOMES:**

- Understand the process management policies and scheduling process by CPU.
- Analyze the memory management and its allocation policies.
- To evaluate the requirement for process synchronization.

**PROGRAM LIST:**

1. Basic I/O programming.  
To implement CPU Scheduling Algorithms:
2. Shortest Job First Algorithm.
3. First Come First Served Algorithm.
4. Round Robin and Priority Scheduling Algorithms.
5. To implement reader/writer problem using semaphore.
6. To implement Banker's algorithm for Deadlock avoidance.  
Program for page replacement algorithms:
7. First In First Out Algorithm.
8. Least Recently Used Algorithm.
9. To implement first fit, best fit and worst fit algorithm for memory management.
10. Program for Inter-process Communication.

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**SYLLABUS WITH EFFECT FROM 2020-2021**

**BCE-CSC11**

**CORE-XI: RELATIONAL DATABASE MANAGEMENT SYSTEM**

(Common paper to B.Sc. Software Applications & B.C.A.)

**III YEAR / V SEM**

**OBJECTIVES:**

- Gain a good understanding of the architecture and functioning of Database Management Systems
- Understand the use of Structured Query Language (SQL) and its syntax.
- Apply Normalization techniques to normalize a database.
- Understand the need of transaction processing and learn techniques for controlling the consequences of concurrent data access.

**OUTCOMES:**

- Describe basic concepts of database system
- Design a Data model and Schemas in RDBMS
- Competent in use of SQL
- Analyze functional dependencies for designing robust Database

**UNIT - I**

Introduction to DBMS – Data and Information - Database – Database Management System – Objectives - Advantages – Components - Architecture. ER Model: Building blocks of ER Diagram – Relationship Degree – Classification – ER diagram to Tables – ISA relationship – Constraints – Aggregation and Composition – Advantages

**UNIT - II**

Relational Model: CODD's Rule- Relational Data Model - Key - Integrity – Relational Algebra Operations – Advantages and limitations – Relational Calculus – Domain Relational Calculus - QBE.

**UNIT - III**

Structure of Relational Database. Introduction to Relational Database Design - Objectives – Tools – Redundancy and Data Anomaly – Functional Dependency - Normalization – 1NF – 2NF – 3NF – BCNF. Transaction Processing – Database Security.

**UNIT - IV**

SQL: Commands – Data types – DDL - Selection, Projection, Join and Set Operations – Aggregate Functions – DML – Modification - Truncation - Constraints – Subquery.

**UNIT - V**

PL/SQL: Structure - Elements – Operators Precedence – Control Structure – Iterative Control - Cursors - Procedure - Function - Packages – Exceptional Handling - Triggers.

**TEXT BOOK:**

1. S. Sumathi, S. Esakkirajan, “*Fundamentals of Relational Database Management System*”, Springer International Edition 2007.

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**REFERENCE BOOKS:**

1. Abraham Silberchatz, Henry F. Korth, S. Sudarshan, “*Database System Concepts*”, McGrawHill 2019, 7<sup>th</sup> Edition.
2. Alexis Leon & Mathews Leon, “*Fundamentals of DBMS*”, Vijay Nicole Publications 2014, 2<sup>nd</sup> Edition.

**WEB REFERENCES:**

- NPTEL & MOOC courses titled Relational Database Management Systems
- <https://nptel.ac.in/courses/106106093/>
- <https://nptel.ac.in/courses/106106095/>

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**BCE-CSC13**

**CORE-XIII: PRACTICAL – VI (PL/SQL LAB)**  
(Common paper to B.Sc.Software Applications & B.C.A.)

**III YEAR / V SEM**

**OBJECTIVES:**

- Learn the various DDL and DML commands
- Understand queries in SQL to retrieve information from data base
- Understand PL/SQL statements: Exception Handling, Cursors, and Triggers.
- Develop database applications using front-end and back-end tools.

**OUTCOMES:**

- Implement the DDL , DML Commands and Constraints
- Create, Update and query on the database.
- Design and Implement simple project with Front End and Back End.

**LIST OF EXERCISES**

- 1) DDL commands with constraints.
- 2) DML Commands with constraints.
- 3) SQL Queries: Queries, sub queries, Aggregate function
- 4) PL/SQL : Exceptional Handling
- 5) PL/SQL : Cursor
- 6) PL/SQL : Trigger
- 7) PL/SQL : Packages
- 8) Design and Develop Application for Library Management
- 9) Design and Develop Application for Student Mark Sheet Processing
- 10) Design and Develop Application for Pay Roll Processing

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**BCE-CSC15**

**CORE-XV: INTRODUCTION TO DATA SCIENCE**

(Common paper to B.Sc. Software Applications as Elective)

**III YEAR / VI SEM**

**OBJECTIVES:**

- To introduce the concepts, techniques and tools with respect to the various facets of data science practice, including data collection and integration, exploratory data analysis, predictive modeling, descriptive modeling and effective communication.

**OUTCOMES:**

- To describe what Data Science is, what Statistical Inference means, identify probability distributions, fit a model to data and use tools for basic analysis and communication

**UNIT-I**

Introduction to Data Science – Benefits and uses – Facets of data – Data science process – Big data ecosystem and data science

**UNIT-II**

The Data science process – Overview – research goals - retrieving data - transformation – Exploratory Data Analysis – Model building

**UNIT-III**

Algorithms - Machine learning algorithms – Modeling process – Types – Supervised – Unsupervised - Semi-supervised

**UNIT-IV**

Introduction to Hadoop – framework – Spark – replacing MapReduce– NoSQL – ACID – CAP – BASE – types

**UNIT-V**

Case Study – Prediction of Disease - Setting research goals - Data retrieval – preparation - exploration - Disease profiling - presentation and automation

**TEXT BOOK**

1. Davy Cielen, Arno D. B. Meysman, Mohamed Ali, “*Introducing Data Science*”, manning publications 2016.

**REFERENCE BOOKS**

1. Roger Peng, “*The Art of Data Science*”, lulu.com 2016.
2. MurtazaHaider, “*Getting Started with Data Science – Making Sense of Data with Analytics*”, IBM press, E-book.
3. Davy Cielen, Arno D.B. Meysman, Mohamed Ali, “*Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools*”, Dreamtech Press 2016.
4. Annalyn Ng, Kenneth Soo, “*Numsense! Data Science for the Layman: No Math Added*”, 2017, 1st Edition.
5. Cathy O’Neil, Rachel Schutt, “*Doing Data Science Straight Talk from the Frontline*”, O’Reilly Media 2013.
6. Lillian Pierson, “*Data Science for Dummies*”, 2017, 2<sup>nd</sup> Edition.

**WEB REFERENCES**

- NPTEL online course– Data Science for Engineers - <https://nptel.ac.in/courses/106106179/>

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**SYLLABUS WITH EFFECT FROM 2020-2021**

**BCE-DSC16**

**CORE-XVI: INTRODUCTION TO CLOUD COMPUTING**

**III YEAR / VI SEM**

**OBJECTIVES:**

- To understand the concepts in Cloud Computing and its Security
- To understand the evolving computer model caned cloud computing.
- To introduce the various levels of services that can be achieved by cloud.

**OUTCOMES:**

- To explain and apply levels of services of Cloud
- To describe the security aspects in cloud.

**UNIT - I**

Cloud Computing Foundation: Introduction to Cloud Computing – Move to Cloud Computing – Types of Cloud – Working of Cloud Computing

**UNIT - II**

Cloud Computing Architecture : Cloud Computing Technology – Cloud Architecture – Cloud Modeling and Design - Virtualization : Foundation – Grid, Cloud and Virtualization – Virtualization and Cloud Computing

**UNIT - III**

Data Storage and Cloud Computing : Data Storage – Cloud Storage – Cloud Storage from LANs to WANs – Cloud Computing Services : Cloud Services – Cloud Computing at Work

**UNIT - IV**

Cloud Computing and Security : Risks in Cloud Computing – Data Security in Cloud – Cloud Security Services – Cloud Computing Tools : Tools and Technologies for Cloud – Cloud Mashaps – Apache Hadoop – Cloud Tools

**UNIT - V**

Cloud Applications – Moving Applications to the Cloud – Microsoft Cloud Services – Google Cloud Applications – Amazon Cloud Services – Cloud Applications

**TEXT BOOK:**

1. A.Srinivasan and J.Suresh, “*Cloud Computing – A Practical Approach for Learning and Implementation*”, Pearson India Publications 2014.

**REFERENCE BOOK:**

1. Rajkumar Buyya, James Broberg, Andrzej , “*Cloud Computing: Principles and Paradigms*”, Wiley India Publications 2011.
2. Arshdeep Bahga and Vijay Madiseti , “*Cloud Computing – A Hands on Approach*”, Universities Press (India) Pvt Ltd. 2014.

**WEB REFERENCES:**

- NPTEL & MOOC courses titled Cloud computing
- <https://nptel.ac.in/courses/106105167/>



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**SYLLABUS WITH EFFECT FROM 2020-2021**

**BCE-CSC14**

**CORE-XIV: SOFTWARE ENGINEERING**

(Common paper to B.Sc.Software Applications-V Sem. & B.C.A.-V Sem.)

**III YEAR / VI SEM**

**OBJECTIVES:**

- To introduce the software development life cycles
- To introduce concepts related to structured and objected oriented analysis & design co
- To provide an insight into UML and software testing techniques

**OUTCOMES:**

- The students should be able to specify software requirements, design the software using tools
- To write test cases using different testing techniques.

**UNIT- I**

Introduction – Evolution – Software Development projects – Emergence of Software Engineering.  
Software Life cycle models – Waterfall model – Rapid Application Development – Agile Model – Spiral Model

**UNIT- II**

Requirement Analysis and Specification – Gathering and Analysis – SRS – Formal System Specification

**UNIT- III**

Software Design – Overview – Characteristics – Cohesion & Coupling – Layered design – Approaches  
Function Oriented Design – Structured Analysis – DFD – Structured Design – Detailed design

**UNIT- IV**

Object Modeling using UML – OO concepts – UML – Diagrams – Use case, Class, Interaction, Activity,  
State Chart – Postscript

**UNIT- V**

Coding & Testing – coding – Review – Documentation – Testing – Black-box, White-box, Integration,  
OO Testing, Smoke testing.

**TEXT BOOK:**

1. Rajib Mall, “*Fundamentals of Software Engineering*”, PHI 2018, 5th Edition.

**REFERENCE BOOKS:**

1. Roger S. Pressman, “*Software Engineering - A Practitioner’s Approach*”, McGraw Hill 2010, 7th Edition.
2. Pankaj Jalote, “*An Integrated Approach to Software Engineering*”, Narosa Publishing House 2011, 3rd Edition.

**WEB REFERENCES:**

- NPTEL online course – Software Engineering - <https://nptel.ac.in/courses/106105182/>

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**BCE-DSC17**

**CORE-XVII: PRACTICAL - VII**  
**CASE TOOLS AND TESTING TOOLS LAB**

**III YEAR / VI SEM**

**OBJECTIVES:**

- To get familiarized to the usage of UML tool kit.
- To understand the requirements of the software and to map them appropriately to subsequent phases of the software development
- To develop the ability to verify and validate their designs

**OUTCOMES:**

- Students must be able to analyze and design the problem at hand.
- Students should be able to use UML tools for the designing the software and test the correctness and soundness of their software through testing tools.

**LIST OF EXERCISES:**

1. Using UML tools produce analysis and design models for
  - a. Library Management System
  - b. Automatic Teller Machine
  - c. Student Information Management
  - d. Matrimony Service
  - e. Stock Management System
2. Study of Open source testing tools (eg. Selenium, WATIS, Apache JMeter, TestNG )

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**BCE-CSC18**

**CORE-XVIII: PRACTICAL - VIII**  
**MINI PROJECT**  
(Common paper to B.Sc.Software Applications & B.C.A.)

**III YEAR / VI SEM**

**OBJECTIVES:**

The aim of the mini project is that the student has to understand the real time software development environment. The student should gain a thorough knowledge in the problem, he/she has selected and the language / software, he/she is using.

**Project planning:**

B.Sc (Computer Science / Software Application)/BCA Major Project is an involved exercise, which has to be planned well in advance. The topic should be chosen in the beginning of final year itself. Related reading training and discussions of first internal project viva voce should be completed in the first term of final year.

**I Selection of the project work**

Project work could be of three types.

**a) Developing solution for real life problem**

In this case a requirement for developing a computer-based solution already exists and the different stages of system development life cycle is to be implemented successfully. Examples are accounting software for particular organization, computerization of administrative function of an organization, web based commerce etc.

**b) System Software Project**

Projects based on system level implementation. An example is a Tamil language editor with spell checker, compiler design.

**b) Research level project**

These are projects which involve research and development and may not be as a structured and clear cut as in the above case. Examples are Tamil character recognition, neural net based speech recognizer etc. This type of projects provides more challenging opportunities to students.

**II Selection of team**

To meet the stated objectives, it is imperative that major project is done through a team effort. Though it would be ideal to select the team members at random and this should be strongly recommended, due to practical consideration students may also be given the choice of forming themselves into teams with three members. A team leader shall be selected. Team shall maintain the minutes of meeting of the team members and ensure that tasks have been assigned to every team member in writing. Team meeting minutes shall form a part of the project report. Even if students are doing project as groups, each one must independently take different modules of the work and must submit the report.

**III Selection of Tools**

No restrictions shall be placed on the students in the choice of platform/tools/languages to be utilized for their project work, though open source is strongly recommended, wherever possible. No value shall be placed on the use of tools in the evaluation of the project.

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**IV Project management**

Head of the Department / Principal of the college should publish the list of student's project topic, internal guide and external organization and teams agreed before the end of July. Changes in this list may be permitted for valid reasons and shall be considered favorably by the Head of the department / Principal of the college any time before commencement of the project. Students should submit a fortnightly report of the progress, which could be indication of percentage of completion of the project work. The students should ideally keep a daily activity book. Team meeting should be documented and same should be submitted at the end of the project work.

**V Documentation**

Three copies of the project report must be submitted by each student (one for department library, one for the organization where the project is done and one for the student himself/herself). The final outer dimensions of the project report shall be 21cm X 30 cm. The color of the flap cover shall be light blue. Only hard binding should be done. The text of the report should be set in 12 pt, Times New Roman, 1.5 spaced.

Headings should be set as follows: CHAPTER HEADINGS 16 pt, Arial, Bold, All caps, Centered.

1. Section Headings 14 pt Bookman old style, Bold, Left adjusted.

1.1 Section Sub-heading 12 pt, Bookman old style.

Title of figures tables etc are done in 12 point, Times New Roman, Italics, centered.

Content of the Project should be relevant and specify particularly with reference to the work. The report should contain the requirement specification of the work, Analysis, Design, Coding, testing and Implementation strategies done.

- Organizational overview (of the client organization, where applicable)
- Description of the present system
- Limitations of the present system
- The Proposed system - Its advantages and features
- Context diagram of the proposed system
- Top level DFD of the proposed system with at least one additional level of expansion
- Program List (Sample code of major functions used)
- Files or tables (for DBMS projects) list. List of fields or attributes (for DBMS projects) in each file or table.
- Program – File table that shows the files/tables used by each program and the files are read, written to, updated, queried or reports were produced from them.
- Screen layouts for each data entry screen.
- Report formats for each report.

**Some general guidelines on documentation are:**

1. Certificate should be in the format: **"Certified that this report titled.....is a bonafide record of the project work done by Sri/ Kum .....under our supervision and guidance, towards partial fulfillment of the requirement for award of the Degree of B.Sc Computer Science/BCA/BSc Software Applications of XXX College"** with dated signature of internal guide, external guide and also Head of the Department/ College.

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2. If the project is done in an external organization, another certificate on the letterhead of the organization is required: “**Certified that his/her report titled .....is a bonafide record of the project work done by Sri/Kum.....under my supervision and guidance, at the .....department of..... (Organization) towards partial fulfillment of the requirement for the award of the Degree of B.Sc (Computer Science/Software Applications) / BCA of XXX College.**

3. Page numbers shall be set at right hand bottom, paragraph indent shall be set as 3.

4. Only 1.5 space need be left above a section or subsection heading and no space may be left after them.

5. References shall be IEEE format (see any IEEE magazine for detail) While doing the project keep note of all books you refer, in the correct format and include them in alphabetical order in your reference list.

**VI Project Evaluation:**

**Internal Assessment**

There shall be six components that will be considered in assessing a project work with weightage as indicated.

1. Timely completion of assigned tasks as evidenced by team meeting minutes 20%
2. Individual involvement, team work and adoption of industry work culture 10%
3. Quality of project documentation (Precision, stylistics etc) 10%
4. Achievement of project deliverables 20%
- 5 Effective technical presentation of project work 10%
6. Viva 30%

Based on the above 6 components internal mark 40 can be awarded.

**External Assessment**

Dissertation/Project submitted at the end of third year shall be valued by two examiners appointed by the Controller for the conduct of practical exam. The board of examiners shall award 60 marks based on the following components.

1. Achievement of project deliverables - 20 Marks
2. Effective technical presentation of project work - 20 Marks
3. Project Viva - 20 Marks

There shall be a common written examination conducted for all the candidates in each group together for a minimum of 10 minutes.

- (i) Requirement Specification of Project
- (ii) Design of Project
- (iii) Testing and Implementation of Project

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**BCE-DSE1A**

**ELECTIVE-I(A): ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM**

**III YEAR / V SEM**

**OBJECTIVES:**

- To Acquire Knowledge on various AI Techniques and Expert Systems
- To have enriched knowledge regarding heuristic search, Knowledge representation and Expert systems

**OUTCOMES:**

- Gain a working knowledge of the foundations of and modern applications in, artificial intelligence heuristic search, knowledge representation and logic.

**UNIT - I**

Introduction: AI Problems – AI techniques – Criteria for success. Problems, Problem Spaces, Search: State space search – Production Systems – Problem Characteristics – Issues in design of Search.

**UNIT - II**

Heuristic Search techniques: Generate and Test – Hill Climbing – Best-Fist, Problem Reduction, Constraint Satisfaction, Means-end analysis.

**UNIT- III**

Knowledge representation issues: Representations and mappings – Approaches to Knowledge representations – Issues in Knowledge representations – Frame Problem.

**UNIT - IV**

Using Predicate Logic: Representing simple facts in logic – Representing Instance and Isa relationships – Computable functions and predicates – Resolution – Natural deduction.

**UNIT - V**

Representing knowledge using rules: Procedural Vs Declarative knowledge – Logic programming – Forward Vs Backward reasoning – Matching – Control knowledge Brief explanation of Expert Systems- Definition- Characteristics-architecture- Knowledge Engineering- Expert System Life Cycle-Knowledge Acquisition Strategies- Expert System Tools.

**TEXT BOOK:**

1. Elaine Rich and Kevin Knight, Shiva Shankar Nair, “*Artificial Intelligence*”, McGraw-Hill Companies, 3rd edition.

**REFERENCE BOOKS:**

1. Stuart Russell & Peter Norvig , “*Artificial Intelligence A Modern Approach*”, Perason, 2<sup>nd</sup> Edition.
2. George F Luger , “*Artificial Intelligence*”, Pearson 2002, 4<sup>th</sup> Edition.
3. V S Janaki Raman, K Sarukesi, P Gopalakrishnan, “*Foundations of Artificial Intelligent and Expert Systems*”, MacMillan India limited.

**WEB REFERENCES:**

- NPTEL & MOOC courses titled Artificial Intelligence and Expert Systems
- <https://nptel.ac.in/courses/106106140/>
- <https://nptel.ac.in/courses/106106126/>

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**BCE-DSE1B**

**ELECTIVE-I(B): GRAPHICS AND VISUALIZATION**

**III YEAR / V SEM**

**OBJECTIVES:**

- To introduce theoretical concepts behind computer graphics
- Overview of interactive computer Graphics
- Learn about two and three dimensional graphics
- Understand the concept of clipping and windowing
- To introduce the algorithms, tools and techniques for implementing the same.

**OUTCOMES:**

- Know the principles of Display devices
- Understand various algorithms to scan, convert and basic geometrical primitives, transformations, Area filling and clipping.
- Capture the significances of viewing and projections.
- Define the fundamentals of 2D, 3D and color models.

**UNIT - I**

Introduction – Display devices – Hard copy devices – Interactive input devices – display processors - graphics software – O/P primitives – line drawing algorithm – DDA- Bresenham’s – anti aliasing of lines – line command – circle drawing algorithm.

**UNIT - II**

Attributes of output primitives – line style – color and intensity- Character attributes – Two dimensional transformations - basic and composite transformation – matrix representation – other transformation.

**UNIT - III**

Windowing and Clipping: windowing concepts – window to view port transformation – Clipping – line – polygon clipping

**UNIT - IV**

Interactive Input methods - Physical input devices – Logical classification of input devices – Interactive picture construction techniques – Input functions

**UNIT - V**

Three dimensional concepts – Display methods – Three dimensional Geometric and Modeling transformations – Other transformations – 3D viewing – Projections – animation-Visible surface detection methods-classification of visible-surface detection Algorithms-Blackface detection-Depth buffer method-Scan line method-Color models and Color Applications.

**TEXT BOOK:**

1. Donald Hearn and M. Pauline Baker, Warren Carithers, “*Computer Graphics With Open GL*”, Pearson Education 2010, 4<sup>th</sup> Edition.

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**REFERENCE BOOKS:**

1. W. M. New Man and R. F. Sproull, "*Principles of interactive Computer Graphics*". McGraw Hill International Edition. 1979.
2. Jeffrey McConnell, "*Computer Graphics: Theory into Practice*", Jones and Bartlett Publishers 2006.
3. Hill F S Jr., "*Computer Graphics*", Maxwell Macmillan 1990.

**WEB REFERENCES:**

- NPTEL and MOOC courses titled Computer Graphics
- <https://nptel.ac.in/courses/106106090/>
- <https://nptel.ac.in/courses/106102065/>
- <https://nptel.ac.in/courses/106102063/>



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**SYLLABUS WITH EFFECT FROM 2020-2021**

**BCE-DSE1C**

**ELECTIVE-I(C): NETWORK SECURITY**

**III YEAR / V SEM**

**OBJECTIVES:**

- To Understand OSI security architecture and to acquire fundamental knowledge on the concepts of finite fields and number theory
- To Understand various block cipher and stream cipher models and the principles of symmetric & public key cryptosystems
- To learn the system security practices.

**OUTCOMES:**

- Compare various Cryptographic Techniques
- Design Secure applications

**UNIT I**

OSI Security Architecture – Security attacks, services and mechanisms – Network security Model – Classical encryption techniques: Symmetric cipher model, Substitution techniques – Transposition techniques – Rotor machines – Steganography

**UNIT II**

Number theory and finite fields: The Euclidean algorithm – Modular arithmetic - Groups, Rings and Fields – Finite fields of the Form  $GF(p)$  – Polynomial arithmetic – prime numbers – Fermat's and eulers theorems

**UNIT III**

Block Ciphers and Data Encryption Standard: Traditional block cipher structure – Data Encryption – Strengths of DES – Block Cipher Design Principles – Advanced Encryption Standard – AES structure – AES transformation functions – AES Key expansion – implementation

**UNIT IV**

Public Key Cryptography and RSA – Principles of Public-key Crypto systems – RSA algorithm - Diffie – Hellman Key exchange - Elgamal Cryptographic System

**UNIT V**

Hash functions – Applications – two simple hash functions – Hash functions based on Cipher block chaining - Secure Hash Algorithm (SHA)

**TEXT BOOK:**

1. William Stallings, “*Cryptography and Network Security: Principles and Practice*”, Pearson Education 2013, 6<sup>th</sup> Edition.

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**SYLLABUS WITH EFFECT FROM 2020-2021**

**REFERENCE BOOKS:**

1. Behrouz A. Ferouzan, “*Cryptography & Network Security*”, Tata McGraw Hill 2007.
2. Man Young Rhee, “*Internet Security: Cryptographic Principles, Algorithms and Protocols*”, Wiley Publications 2003.
3. Charles Pfleeger, “*Security in Computing*”, Prentice Hall of India 2006, 4<sup>th</sup> Edition.
4. Ulysess Black, “*Internet Security Protocols*”, Pearson Education Asia 2000.
5. Charlie Kaufman and Radia Perlman, Mike Speciner, “*Network Security, Private Communication in Public World*”, PHI 2002, 2<sup>nd</sup> Edition.

**WEB REFERENCES:**

- NPTEL & MOOC courses titled Network Security
- <https://nptel.ac.in/courses/106105031/>

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**BCE-CSE2B**

**ELECTIVE-II(B): IOT AND ITS APPLICATIONS**  
(Common paper to B.Sc.Software Applications & B.C.A.)

**III YEAR / VI SEM**

**OBJECTIVES:**

- To understand the concepts of Internet of Things and the application of IoT.
- To Determine the Market perspective of IoT.
- To Understand the vision of IoT from a global context

**OUTCOMES:**

- Use of Devices, Gateways and Data Management in IoT.
- Design IoT applications in different domain and be able to analyze their performance
- Implement basic IoT applications on embedded platform.

**UNIT – I**

IoT & Web Technology, The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics.

**UNIT - II**

M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

**UNIT - III**

IoT Architecture -State of the Art – Introduction, State of the art, Architecture. Reference Model-Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture-Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

**UNIT - IV**

IoT Applications for Value Creations Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and GasIndustry, Opinions on IoT Application and Value for Industry, Home Management, eHealth.

**UNIT - V**

Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security

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**TEXT BOOK:**

1. Vijay Madiseti and ArshdeepBahga, “*Internet of Things: (A Hands-on Approach)*”, Universities Press (INDIA) Private Limited 2014, 1<sup>st</sup> Edition.

**REFERENCE BOOKS:**

1. Michael Miller, “*The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World*”, Pearson Education 2015.
2. Francis da Costa, “*Rethinking the Internet of Things: A Scalable Approach to Connecting Everything*”, Apress Publications 2013, 1<sup>st</sup> Edition.
3. Walteneagus Dargie, Christian Poellabauer, “*Fundamentals of Wireless Sensor Networks: Theory and Practice*”, **Wiley 2014.**
4. CunoPfister, “*Getting Started with the Internet of Things*”, O’Reilly Media 2011.

**WEB REFERENCES:**

- <https://github.com/connectIOT/iottoolkit>
- <https://www.arduino.cc/>
- <http://www.zettajs.org/>

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**BCE-DSE2A**

**ELECTIVE-II(A): MOBILE COMPUTING**

**III YEAR / VI SEM**

**OBJECTIVES:**

- To make the student understand the concepts of mobile computing and familiar with the network protocol stack
- To be exposed to Ad-Hoc networks Gain knowledge about different mobile platforms and application development.

**OUTCOMES:**

- Explain the basics of mobile telecommunication system.
- Choose the required functionality at each layer for given application.
- Use simulator tools and design Ad hoc networks and develop a mobile application.

**UNIT - I**

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

**UNIT - II**

Mobile Internet Protocol and Transport Layer-Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization. Overview of TCP/IP – Architecture of TCP/IP-Adaptation of TCP Window – Improvement in TCP Performance.

**UNIT - III**

Mobile Telecommunication System-Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Tele communication System (UMTS).

**UNIT - IV**

Mobile Ad-Hoc Networks-Ad-Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols –Popular Routing Protocols – Vehicular Ad Hoc networks ( VANET) – MANET Vs VANET –Security.

**UNIT - V**

Mobile Platforms and Applications-Mobile Device Operating Systems – Special Constrains & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone – M-Commerce – Structure– Pros & Cons – Mobile Payment System – Security Issues.

**TEXT BOOK:**

1. Prasant Kumar Pattnaik, Rajib Mall, “*Fundamentals of Mobile Computing*”, PHI Learning Pvt. Ltd, New Delhi 2012.

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**SYLLABUS WITH EFFECT FROM 2020-2021**

**REFERENCES:**

1. Jochen H. Schiller, “*Mobile Communications*”, Pearson Education, New Delhi, 2007, 2<sup>nd</sup> Edition.
2. Dharma Prakash Agarwal, Qing and An Zeng, “*Introduction to Wireless and Mobile systems*”, Thomson Asia Pvt Ltd. 2005.
3. Uwe Hansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, “*Principles of Mobile Computing*”, Springer 2003.

**WEB REFERENCES:**

- NPTEL & MOOC courses titled Mobile Computing
- <https://www.smartworld.com/notes/mobile-computing-pdf-notes-mc-notes-pdf/>
- <https://www.vidyarthiplus.com/vp/Thread-IT6601-Mobile-Computing-Lecture-Notes-All-Uni>
- <https://nptel.ac.in/courses/106106147/>

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**SYLLABUS WITH EFFECT FROM 2020-2021**

**BCE-DSE2C**

**ELECTIVE-II(C): BLOCK CHAIN TECHNOLOGY**

**III YEAR / VI SEM**

**OBJECTIVES:**

- To understand the concepts of block chain technology
- To understand the consensus and hyper ledger fabric in block chain technology.

**OUTCOMES:**

- State the basic concepts of block chain
- Paraphrase the list of consensus and Demonstrate and Interpret working of Hyper ledger Fabric
- Implement SDK composer tool and explain the Digital identity for government

**UNIT - I**

History: Digital Money to Distributed Ledgers -Design Primitives: Protocols, Security, Consensus, Permissions, Privacy- : Block chain Architecture and Design-Basic crypto primitives: Hash, Signature-Hash chain to Block chain-Basic consensus mechanisms.

**UNIT - II**

Requirements for the consensus protocols-Proof of Work (PoW)-Scalability aspects of Block chain consensus protocols: Permissioned Block chains-Design goals-Consensus protocols for Permissioned Block chains.

**UNIT - III**

Decomposing the consensus process-Hyper ledger fabric components-Chain code Design and Implementation: Hyper ledger Fabric II:-Beyond Chain code: fabric SDK and Front End-Hyper ledger composer tool.

**UNIT - IV**

Block chain in Financial Software and Systems (FSS): -Settlements, -KYC, -Capital markets-Insurance-Block chain in trade/supply chain: Provenance of goods, visibility, trade/supply chain finance, invoice management/discounting.

**UNIT - V**

Block chain for Government: Digital identity, land records and other kinds of record keeping between government entities, public distribution system / social welfare systems: Block chain Cryptography: Privacy and Security on Block chain.

**TEXT BOOKS:**

1. Mark Gates, “*Block chain: Ultimate guide to understanding block chain, bit coin, crypto currencies, smart contracts and the future of money*”, Wise Fox Publishing and Mark Gates 2017.
2. Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O'Dowd, Venkatraman Ramakrishna, “*Hands-On Block chain with Hyper ledger: Building decentralized applications with Hyperledger Fabric and Composer*”, 2018.
3. Bahga, Vijay Madiseti, “*Block chain Applications: A Hands-On Approach*”, Arshdeep Bahga, Vijay Madiseti publishers 2017.

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**REFERENCE BOOKS :**

1. Andreas Antonopoulos, “*Mastering Bitcoin: Unlocking Digital Crypto currencies*”, O'Reilly Media, Inc. 2014.
2. Melanie Swa, “*Block chain*”, O'Reilly Media 2014.

**WEB REFERENCES:**

- NPTEL & MOOC courses titled blockchain technology
- blockgeeks.com/guide/what-is-block-chain-technology  
<https://nptel.ac.in/courses/106105184/>



**UNIVERSITY OF MADRAS**  
**U.G. DEGREE COURSE**

**ENVIRONMENTAL STUDIES PROGRAMME**  
ABILITY ENHANCEMENT COMPULSORY COURSES  
(AECC- Environmental Studies)

Syllabus with effect from the academic year 2018-2019  
( i.e. for batch of candidates admitted to the course from the academic year 2017-18)

Credits: 2

II Year / III/IV Sem.

**Unit 1: Introduction to Environmental Studies**

- Multidisciplinary nature of environmental studies;
- Scope and importance; concept of sustainability and sustainable development.

**Unit 2 : Ecosystem (2 lectures)**

- What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem:  
Food chains, food webs and ecological succession, Case studies of the following ecosystem:
  - a) Forest ecosystem
  - b) Grassland ecosystem
  - c) Desert ecosystem
  - d) Aquatic ecosystem (ponds, stream, lakes, rivers, ocean, estuaries)

**Unit 3: Natural Resources : Renewable and Non – renewable Resources ( 6 lectures)**

- Land resources and land use change: Land degradation, soil erosion and desertification.
- Deforestation : Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.
- Water : Use and over –exploitation of surface and ground water, floods, droughts, conflicts over water ( international and inter-state).
- Energy resources : Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

**Unit 4: Biodiversity and Conservation ( 8 lectures)**

- Levels of biological diversity: genetics, species and ecosystem diversity, Biogeographic zones of India: Biodiversity patterns and global biodiversity hot spots
- India as a mega- biodiversity nation, Endangered and endemic species of India.
- Threats to biodiversity: Habitat loss, poaching of wildlife, man- wildlife conflicts, biological invasions; Conservations of biodiversity: In-situ and Ex-situ Conservation of biodiversity.
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

**Unit 5: Environmental Pollution (8 lectures)**

- Environmental pollution: types, causes, effects and controls: Air, Water, soil and noise Pollution.
- Nuclear hazards and human health risks
- Solid waste management: Control measures of urban and industrial waste
- Pollution case studies.

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### Unit 6: Environmental Policies & Practices ( 8 lecturers)

- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
- Environment Laws: Environment Protection Act, Air (Prevention & Control of Pollution) Act; Water (Prevention and Control of Pollution ) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD).
- Nature reserves, tribal populations and rights, and human Wildlife conflicts in Indian context.

### Unit 7: Human Communities and the Environment (7 lectures)

- Human population growth, impacts on environment, human health and welfare.
- Resettlement and rehabilitation of projects affected persons; case studies.
- Disaster management: floods, earthquake, cyclone and landslides.
- Environmental movements : Chipko, Silent Valley, Bishnois of Rajasthan.
- Environmental ethics : Role of Indian and other religions and cultures in environmental conservation.
- Environmental communication and public awareness, case studies(e.g. CNG Vehicles in Delhi)

### Unit 8 : Field Work (6 lectures)

- Visit to an area to document environmental assets: river / forest/ flora/ fauna etc.
- Visit to a local polluted site – Urban / Rural/ Industrial/ Agricultural.
- Study of common plants, insects, birds and basic principles of identification.
- Study of simple ecosystem- pond, river, Delhi Ridge etc.

(Equal to 5 Lectures)

### Suggested Readings:

1. Carson , R. 2002.Silent Spring, Houghton Mifflin Harcourt.
2. Gadgil , M.,& Guha, R. 1993.This Fissured Land: An Ecological History of India. Univ.of California Press.
3. Glesson, B. and Low, N.(eds.)1999. Global Ethics and Environment, London, Routledge.
4. Gleick,P.H.1993.Water Crisis. Pacific Institute for Studies in Dev.,Environment & Security. Stockholm Env.Institute, Oxford Univ.Press.
5. Groom, Martha J., Gary K.Meffe, and Carl Ronald Carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates,2006.
6. Grumbine,R.Edward, and Pandit,M.K2013.Threats from India's Himalayas dams .Science,339:36-37
7. McCully,P.1996.Rivers no more :the environmental effects of dams(pp.29-64).Zed books.
8. McNeill,John R.2000.Something New Under the Sun: An Environmental History of the Twentieth Century.
9. Odum,E.P.,Odum, H.T.& Andrees,J.1971.Fundamental of Ecology. Philadelphia Saunders.
10. Pepper,I.L.,Gerba,C.P & Brusseau,M.L.2011.Environmental and Pollution Science. Academic Press.
11. Rao,M.N.& Datta,A.K1987.Waste Water Treatment. Oxford and IBH Publishing Co.Pvt.Ltd.
12. Raven,P.H.,Hassenzahl,D.M & Berg,L.R.2012 Environment.8<sup>th</sup> edition. John Willey & sons.

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13. Rosencranz, A., Divan, S., & Noble, M.L. 2001. Environmental law and policy in India. Tirupathi 1992.
14. Sengupta, R. 2003. Ecology and Economics: An approach to sustainable development. OUP
15. Singh, J.S., Singh, S.P and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S.Chand Publishing, New Delhi.
16. Sodhi, N.S., Gibson, L. & Raven, P.H (eds). 2013. Conservation Biology :Voices from the Tropics. John Willey & Sons.
17. Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian Subcontinent.
18. Warren, C.E. 1971. Biology and water Pollution Control. WB Saunders.
19. Willson, E.O. 2006. The Creation: An appeal to save life on earth..New York: Norton.
20. World Commission on Environment and Development. 1987. Our Common Future. Oxford University Press.

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**UNIVERSITY OF MADRAS**  
**U.G. DEGREE COURSE**

**PART – IV - VALUE EDUCATION**

**Common for all U.G. & Five Year Integrated Courses**  
**(Effective from the Academic Year 2012 – 2013)**

**SYLLABUS**

**CREDITS: 2**

**III YEAR / V SEM**

**Objective:** Value are socially accepted norms to evaluate objects, persons and situations that form part and parcel of sociality. A value system is a set of consistent values and measures. Knowledge of the values are inculcated through education. It contributes in forming true human being, who are able to face life and make it meaningful. There are different kinds of values like, ethical or moral values, doctrinal or ideological values, social values and aesthetic values. Values can be defined as broad preferences concerning appropriate courses of action or outcomes. As such, values reflect a person's sense of right and wrong or what "ought" to be. There are representative values like, "Equal rights for all", "Excellence deserves admiration". "People should be treated with respect and dignity". Values tend to influence attitudes and behavior and help to solve common human problems. Values are related to the norms of a culture.

**UNIT I:** Value education-its purpose and significance in the present world – Value system – The role of culture and civilization – Holistic living – balancing the outer and inner – Body, Mind and Intellectual level – Duties and responsibilities.

**UNIT II:** Salient values for life – Truth, commitment, honesty and integrity, forgiveness and love, empathy and ability to sacrifice, care, unity, and inclusiveness, Self esteem and self confidence, punctuality – Time, task and resource management – Problem solving and decision making skills – Interpersonal and Intra personal relationship – Team work – Positive and creative thinking.

**UNIT III:** Human Rights – Universal Declaration of Human Rights – Human Rights violations – National Integration – Peace and non-violence – Dr.A P J Kalam's ten points for enlightened citizenship – Social Values and Welfare of the citizen – The role of media in value building.

**UNIT IV:** Environment and Ecological balance – interdependence of all beings – living and non-living. The binding of man and nature – Environment conservation and enrichment.

**UNIT V:** Social Evils – Corruption, Cyber crime, Terrorism – Alcoholism, Drug addiction – Dowry – Domestic violence – untouchability – female infanticide – atrocities against women – How to tackle them.

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**Books for Reference :**

1. M.G. Chitakra: Education and Human Values, A.P.H. Publishing Corporation, New Delhi, 2003.
2. Chakravarthy, S.K: Values and ethics for Organizations: Theory and Practice, Oxford University Press, New Delhi, 1999.
3. Satchidananda, M.K: Ethics, Education, Indian Unity and Culture, Ajantha Publications, Delhi, 1991.
4. Das, M.S. & Gupta, V.K.: Social Values among Young adults: A changing Scenario, M.D. Publications, New Delhi, 1995.
5. Bandiste, D.D.: Humanist Values: A Source Book, B.R. Publishing Corporation, Delhi, 1999.
6. Ruhela, S.P.: Human Values and education, Sterling Publications, New Delhi, 1986.
7. Kaul, G.N.: Values and Education in Independent Indian, Associated Publishers, Mumbai, 1975.
8. NCERT, Education in Values, New Delhi, 1992.
9. Swami Budhananda (1983) How to Build Character A Primer : Rmakrishna Mission, New Delhi.
10. A Culture Heritage of India (4 Vols.), Bharatiya Vidya Bhuvan, Bombay, (Selected Chapters only)
11. For Life, For the future : Reserves and Remains – UNESCO Publication.
12. Values, A Vedanta Kesari Presentation, Sri Ramakrishna Math, Chennai, 1996.
13. Swami Vivekananda, Youth and Modern India, Ramakrishna Mission, Chennai.
14. Swami Vivekananda, Call to the Youth for Nation Building, Advaita Ashrama, Calcutta.
15. Awakening Indians to India, Chinmayananda Mission, 2003.

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# **SHRI KRISHNASWAMY COLLEGE FOR WOMEN**

**ANNA NAGAR, CHENNAI-40.**

## **DEPARTMENT OF COMPUTER SCIENCE.**

**B.Sc.(Computer Science) – SYLLABUS PRIOR 2020-21**

### **PROGRAMMING IN C++ AND DATA STRUCTURES**

Unit 1: Introduction to C++; Tokens, Keywords, Identifiers, Variables, Operators, Manipulators, Expressions and Control Structures in C++; Pointers - Functions in C++ - Main Function - Function Prototyping -Parameters Passing in Functions - Values Return by Functions – Inline Functions - Friend and Virtual Functions

Unit-2: Classes and Objects; Constructors and Destructors; and Operator Overloading and Type Conversions - Type of Constructors – Function overloading. Inheritance : Single Inheritance - Multilevel Inheritance - Multiple Inheritance - Hierarchical Inheritance - Hybrid Inheritance. Pointers, Virtual Functions and Polymorphism; Managing Console I/O operations.

Unit 3: Working with Files: Classes for File Stream Operations -Opening and Closing a File - End-of-File Deduction - File Pointers - Updating a File - Error Handling during File Operations - Command-line Arguments. Data Structures: Definition of a Data structure – primitive and composite Data Types, Asymptotic notations, Arrays, Operations on Arrays, Order lists.

Unit-4: Stacks - Applications of Stack - Infix to Postfix Conversion, Recursion, Maze Problems - Queues - Operations on Queues, Queue Applications, Circular Queue. Singly Linked List - Operations, Application - Representation of a Polynomial, Polynomial Addition; Doubly Linked List - Operations, Applications.

Unit-5 : Trees and Graphs: Binary Trees - Conversion of Forest to Binary Tree, Operations - Tree Traversals; Graph - Definition, Types of Graphs, Hashing Tables and Hashing Functions, Traversal – Shortest Path; Dijkstra's Algorithm.

#### **1. Recommended Texts**

i. E. Balagurusamy,1995, Object Oriented Programming with C++, Tata McGraw-Hill

Publishing Company Ltd.

ii..E.Horowitz and S.Shani,1999,Fundamentals of Data Structures in C++ , Galgotia Pub.

#### **2. Reference Books**

- i. Robert Lafore, Object Oriented Programming in Microsoft C++, Galgotia publication.
- ii. H.Schildt, C++,1998,The Complete Reference-1998-TMH Edition, 1998
- iii.R. Kruse C.L. Tondo and B. Leung ,1997, Data Structures and Program design in C, PHI.
- iii.Cangsam,Augenstein,Tenenbaum,Data Structures using C & C++,PHI
- iv.D.Samantha,2005, Classic Data Structures, PHI,New Delhi.

## **PRACTICAL – III DATA STRUCTURES USING C++**

1. Implement PUSH, POP operations of stack using Arrays.
2. Implement PUSH, POP operations of stack using Pointers.
3. Implement add, delete operations of a queue using Arrays.
4. Implement add, delete operations of a queue using Pointers.
5. Conversion of infix to postfix using stack operations
6. Postfix Expression Evaluation.
7. Addition of two polynomials using Arrays and Pointers.
8. Creation, insertion, and deletion in doubly linked list.
9. Binary tree traversals (in-order, pre-order, and post-order) using linked list.
- 10.Depth First Search and Breadth first Search for Graphs using Recursion.

# **PROGRAMMING IN JAVA**

Unit 1: Introduction to Java-Features of Java-Basic Concepts of Object Oriented Programming-Java Tokens-Java Statements-Constants Variables-Data Types- Type Casting-Operators-Expressions-Control Statements: Branching and Looping Statements.

Unit-2: Classes, Objects and Methods-Constructors-Methods Overloading-Inheritance-Overriding Methods- Finalizer and Abstract Methods-Visibility Control –Arrays, Strings and Vectors-String Buffer Class-Wrapper Classes.

Unit 3: Interfaces-Packages-Creating Packages-Accessing a PackageMultithreaded

Programming-Creating Threads-Stopping and Blocking a Thread-Life Cycle of a Thread-Using Thread Methods-Thread PrioritySynchronization-Implementingthe Runnable Interface.

Unit-4: Managing Errors and Exceptions-Syntax of Exception Handling Code-Using Finally Statement-Throwing Our Own Exceptions-Applet Programming-Applet Life Cycle-Graphics Programming-Managing Input/Output Files: Concept of Streams-Stream Classes-Byte Stream Classes-Character Stream Classes – Using Streams-Using the File ClassCreation of Files-Random Access Files-Other Stream Classes.

Unit-5: : Network basics –socket programming – proxy servers – TCP/IP– Net Address – URL – Datagrams -Java Utility Classes-Introducing the AWT: Working with Windows, Graphics and Text- AWT ClassesWorking with Frames-Working with Graphics-Working with ColorWorking with Fonts-Using AWT Controls, Layout Managers and Menus.

## **1. Recommended Texts**

- i. E. Balagurusamy,2004,Programming with JAVA, 2nd Edition,Tata McGraw-Hill Publishing Co.Ltd.
- ii. Herbert Schildt,2005,The Complete Reference Java™ 2, 5<sup>th</sup> Edition,Tata McGraw-Hill



Publishing Co. Ltd.

## **2. Reference Books**

- i. Y. Daniel Liang ,2003, An Introduction to JAVA Programming, Prentice-Hall of India Pvt. Ltd.
- ii. Cay S. Horstmann and Gary Cornell,2005, Core JavaTM2 Volume I-Fundamentals, 7th Edition- Pearson Education.
- iii. Ken Arnold, James Gosling and David Holmes,2003, The JavaTM Programming Language, 3rd Edition, Pearson Education.

## **JAVA PROGRAMMING LAB**

### **APPLICATIONS:**

1. Substring Removal from a String. Use String Buffer Class.
2. Determining the Perimeter and Area of a Triangle. Use Stream Class.
3. Determining the Order of Numbers Generated randomly using Random Class.
4. Usage of Calendar Class and Manipulation.
5. Implementation of Point Class for Image Manipulation.
6. String Manipulation Using Char Array.
7. Database Creation for Storing E-mail Addresses and Manipulation.
8. Usage of Vector Classes.
9. Interfaces and Packages
10. Implementing Thread based Applications and Exception Handling.
11. Application using Synchronization such as Thread based, Class based and Synchronized Statements.
12. Textfiles (copy, display, counting characters, words and lines)
13. Data file creating and processing for electricity billing.
14. Data file creating and processing for telephone billing
15. Working with Frames and Various Controls.
16. Working with Dialog Box and Menus.

17. Working with Colors and Fonts.
18. Drawing various shapes using Graphical statements.
19. Working with panel and all types of Layout.
20. Design a simple calculator with minimal of 10 operations
21. Usage of buttons, labels, text components in suitable application
22. Usage of Radio buttons, check box ,choice list in suitable application.

## **OPERATING SYSTEMS**

Unit 1: Introduction: Views –Goals –Types of system – OS Structure – Components – Services - System Structures – Layered Approach –Virtual Machines - System Design and Implementation. Process Management: Process - Process Scheduling – Cooperating Process –Threads -Interprocess Communication. CPU Scheduling : CPU Schedulers – Scheduling criteria – Scheduling Algorithms

Unit-2:– Process Synchronization: Critical-Section problem - Synchronization Hardware – Semaphores – Classic Problems of Synchronization – Critical Region – Monitors. Deadlock : Characterization – Methods for handling Deadlocks – Prevention,Avoidance, and Detection of Deadlock - Recovery from deadlock.

Unit 3: Memory Management: Address Binding – Dynamic Loading and Linking – Overlays – Logical and Physical Address Space - Contiguous Allocation – Internal & External Fragmentation . Non Contiguous Allocation:Paging and Segmentation schemes – Implementation – Hardware Protection – Sharing - Fragmentation.

Unit-4: Virtual Memory :: Demand Paging – Page Replacement – Page Replacement Algorithms – Thrashing. – File System: Concepts – Access methods – Directory Structure –Protection Consistency Semantics – File System Structures – Allocation methods – Free Space Management.

Unit-5 : I/O Systems: Overview - I/O Hardware – Application I/O Interface – Kernel I/O subsystem – Transforming I/O Requests to Hardware Operations – Performance. Secondary Storage Structures :

Protection – Goals- Domain Access matrix – The security problem – Authentication – Threats – Threat Monitoring – Encryption..

### **1. Recommended Texts**

i. Silberschatz A., Galvin P.B., Gange,. 2002 , Operating System Principles ,Sixth Edition, John Wiley & Sons.

## **2. Reference Books**

i. H.M. Deitel ,1990, An Introduction to Operating System,- Second Edition,Addison Wesley.

### **DATABASE MANAGEMENT SYSTEMS**

Unit 1: Advantages and Components of a Database Management Systems – Feasibility Study – Class Diagrams – Data Types – Events – Normal Forms – Integrity – Converting Class Diagrams to Normalized Tables – Data Dictionary.

Unit-2: Query Basics – Computation Using Queries – Subtotals and GROUP BY Command – Queries with Multiple Tables – Subqueries – Joins – DDL & DML – Testing Queries

Unit 3: Effective Design of Forms and Reports – Form Layout – Creating Forms – Graphical Objects – Reports – Procedural Languages – Data on Forms – Programs to Retrieve and Save Data – Error Handling.

Unit-4: Power of Application Structure – User Interface Features – Transaction – Forms Events – Custom Reports – Distributing Application – Table Operations – Data Storage Methods – Storing Data Columns – Data Clustering and Partitioning.

Unit-5 : Database Administration – Development Stages – Application Types – Backup and Recovery – Security and Privacy – Distributed Databases – Client/Server Databases – Web as a Client/Server System – Objects – Object Oriented Databases – Integrated Applications.

### **Recommended Texts**

1. G. V. Post – Database Management Systems Designing and Building Business

Application – McGraw Hill International edition – 1999.

### **Reference Books**

1.Raghu Ramakrishnan – Database Management Systems – WCB/McGraw Hill – 1998.

2.C.J. Date – An Introduction to Database Systems – 7th Edition – Addison Wesley -2000.

## **Computer Architecture and Organization**

Unit 1: Computer Evolution: Pentium and Power PC Evolution. Computer System: Components – Function – Interconnection Structures – Bus Interconnection – Basics of PCI Bus. Memory: Characteristics – Hierarchy – Cache Memory – Principles – Cache Design – Locality of Reference.

Unit-2: Main Memory: Static RAM – Dynamic RAM – Types of ROM – Memory Chip Organization – Types of DRAM. External Memory: Magnetic Disk – Basics of RAID – Optical Memory – Magnetic Tapes

Unit 3: : Input/Output: External Devices – I/O Module – Programmed I/O – Interrupt Driven I/O – DMA – I/O Channels & Processors. Computer Arithmetic: ALU – Integer Representation and Arithmetic – Floating Point Representation and Arithmetic. Instruction Set: Characteristics – Operand Types – Operation Types – Addressing Modes – Instruction Formats – Pentium and Power PC Operands, Operations, Addressing Modes (Simple Examples).

Unit-4: CPU: Organization of Processors and Registers – Instruction Cycle – Instruction Pipelining – Pentium Processor. RISC: Characteristics – Large Register File – Register Optimization – Architecture – RISC Vs CISC Characteristics – Pipelining.

Unit-5: Control Unit: Micro-Operations – Control of Processors – Hardwired Implementation - Micro Programmed Control Concepts – Microinstruction Sequencing – General Microinstruction Execution.

### **1. Recommended Texts**

i.W. Stallings ,2003,Computer Organization and Architecture, 6th Edition- PHI,New Delhi.

### **2. Reference Books**

i.C. Hamacher, Z. Vranesic, S.Zaky, 2002, Computer Organization,5th Edition,Mcgraw Hill.

## **VISUAL PROGRAMMING**

Unit 1: Customizing a Form - Writing Simple Programs - Toolbox - Creating Controls - Name Property - Command Button - Access Keys - Image Controls - Text Boxes - Labels - Message Boxes - Grid – Editing Tools - Variables - Data Types - String - Numbers.

Unit-2: Displaying Information - Determinate Loops – Indeterminate Loops - Conditionals - Built-in Functions - Functions and Procedures.

Unit 3: Lists - Arrays - Sorting and Searching - Records – Control Arrays - Combo Boxes - Grid Control - Projects with Multiple forms - DoEvents and Sub Main - Error Trapping.

Unit-4: VB Objects - Dialog Boxes - Common Controls - Menus – MDI Forms - Testing, Debugging and Optimization - Working with Graphics.

Unit-5 : Monitoring Mouse activity - File Handling - File System Controls - File System Objects - COM/OLE - automation – DLL Servers - OLE Drag and Drop.

### **1. Recommended Texts**

Gary Cornell - Visual Basic 6 from the Ground up - Tata McGraw Hill - 1999.

Noel Jerke - Visual Basic 6 (The Complete Reference) - Tata McGraw Hill – 1999

## **PRACTICAL – V: RDBMS LAB**

Create database and performing the operations given below using a

Menu Driven program: Insertion, (b)Deletion, (c)Modification,

(d)Generating a reports (Simple) for the following Systems using any RDBMS package :

Payroll

Mark sheet Processing

Savings bank account for banking

Inventory System

Invoice system

Library information system

Student information system

Income tax processing system

Electricity bill preparation system

Telephone directory maintenance.

## **DATA COMMUNICATION AND NETWORKING**

Unit 1: Introduction to Data Communication, Network, Protocols & standards and standards organizations - Line Configuration - Topology - Transmission mode - Classification of Network - OSI Model - Layers of OSI Model.

Unit-2: Parallel and Serial Transmission - DTE/DCE/such as EIA-449, EIA-530, EIA-202 and x.21 interface - Interface standards - Modems - Guided Media - Unguided Media - Performance - Types of Error – Error Detection - Error Corrections.

Unit 3: : Multiplexing - Types of Multiplexing – Multiplexing Application - Telephone system - Project 802 - Ethernet - Token Bus - Token Ring - FDDI - IEEE 802.6 - SMDS - Circuit Switching – Packet Switching - Message switching - Connection Oriented and Connectionless services.

Unit-4: History of Analog and Digital Network - Access to ISDN - ISDN Layers - Broadband ISDN - X.25 Layers - Packet Layer Protocol - ATM - ATM Topology - ATM Protocol.

Unit-5 : Repeaters - Bridges - Routers - Gateway - Routing algorithms - TCP/IP Network, Transport and Application Layers of TCP/IP – World Wide Web.

### **1. Recommended Texts**

i. Behrouz and Forouzan, 2001, Introduction to Data Communication and Networking, 2nd Edition, TMH.

### **2. Reference Books**

i. Jean Walrand 1998, Communication Networks (A first Course), Second Edition, WCB/McGraw Hill.

ii. Behrouz and Forouzan, 2006, Data Communication and Networking, 3rd Edition, TMH.

## **WEB TECHNOLOGY**

Unit 1: Introduction to` VBScript - Adding VBScript Code to an HTML Page - VB Script Basics - VBScript Data Types - VBScript Variables - VBScript Constants - VBScript Operators – mathematical- comparisonlogical - Using Conditional Statements - Looping Through Code - VBScript Procedures – type casting variables - math functions –date functions – string functions –other functions - VBScript Coding Conventions - Dictionary Object in VBScript - Err Object

Unit-2: Introduction to Javascript – Advantages of Javascript – Javascript syntax - Data type – Variable - Array – Operator & Expression – Looping – control structures - Constructor Function – user defined function Dialog Box .

Unit 3: Javascript document object model – Introduction – Object in HTML – Event Handling – Window object – Document object – Browser object – Form object – Navigator object – Screen object – Build in object – User defined object – Cookies.

Unit-4: ASP.NET Language Structure – Page Structure – Page event , Properties & Compiler Directives . HTML server controls – Anchor, Tables, Forms, Files . Basic Web server Controls – Lable, Text box, Button, Image Links, Check & radio Button, Hyperlink, Data List Web Server Controls – Check box list. Radio button list, Drop down list, List box, Data grid, Repeater.

Unit-5: Request and Response Objects, Cookies, Working with Data – OLEDB connection class, command class, transaction class, data adaptor class, data set class. Advanced issues – email, Application issues, working with IIS and page Directives, error handling. Security – Authentication, IP Address, Secure by SSL & Client Certificates

### **1.Recommended Texts**

i.I.Bayross, 2000, Web Enable Commercial Application Development Using HTML,

DHTML, Javascript, Perl CGI, BPB Publications.

ii. A.Russell Jones, Mastering Active Server Pages 3, BPB Publications.

### **2. Reference Books**



- i. Hathleen Kalata, Internet Programming with VBScript and JavaScript, Thomson Learning
- ii. Mike McGrath, XML Harness the Power of XML in easy steps, Dreamtech Publications
- iii. T.A. Powell, 2002, Complete Reference HTML , TMH.
- iv. J.Jaworski, 1999, Mastering Javascript, BPB Publications.
- v. Powell, Thomas; Schneider, Fritz, JavaScript: The Complete Reference, 2<sup>nd</sup> edition 2004, TMH

## **PRACTICAL – VI -WEB APPLICATIONS LAB**

### **VB SCRIPT & JAVASCRIPT**

1. Write a program outputs the squares, roots, cubes and complements of integers between 1 and 100.
2. Create a calculator.
3. Write a script to Sort numbers and strings
4. Create a program to generate a hit counter
5. Create a program to verify whether email address provided by user is valid or invalid.
6. Write a program to scroll the text on status bar.
7. The form consists of two multiple choice list and one single choice list
  - a. the first multiple choice list display the major dishes available.
  - b. the second Multiple choice list display the stocks available.
  - c. The single choice list display the miscellaneous (Milkshakes, soft drinks, softy available etc.)
8. Write a script to create a digital clock.
9. Create a web page using two image file which switch black and white one another as the mouse pointer moves over the image. Use the On Mouse over and On Mouse event, onDbclick handler
10. Build a WWW page with an image and 3 buttons., Pick three favorite graphics, Label the buttons and make each one swap in the graphic you have chosen

11. Create a frameset that has two frames, side by side.
  1. Make the left-hand frame contain a form with 3 radio buttons
  2. The buttons should be for three search engines:
    - a. Yahoo (<http://www.yahoo.com>)
    - b. Altavista (<http://www.altavista.com>)
    - c. Infoseek (<http://www.infoseek.com>)
  3. When the user clicks on of the option buttons, the frame on the right hand side should be loaded with the right search engine.
12. Write a program to implement Employee database with all validation

## **OBJECT ORIENTED ANALYSIS AND DESIGN**

Unit 1: System Development - Object Basics - Development Life Cycle - Methodologies - Patterns - Frameworks - Unified Approach - UML.

Unit-2: Use-Case Models - Object Analysis - Object relations - Attributes - Methods - Class and Object responsibilities - Case Studies.

Unit 3: Design Processes - Design Axioms - Class Design – Object Storage - Object Interoperability - Case Studies.

Unit-4: User Interface Design - View layer Classes - Micro-Level Processes - View Layer Interface - Case Studies.

Unit-5 : Quality Assurance Tests - Testing Strategies – Object orientation on testing - Test Cases - test Plans - Continuous testing - Debugging Principles - System Usability - Measuring User Satisfaction - Case Studies.

### **Recommended Texts**

1. Ali Bahrami - Object Oriented Systems Development - McGraw Hill International Edition - 1999.
2. Grady Booch- Object Oriented Analysis and design –Addison Wesley.

## **SOFTWARE ENGINEERING**

Unit 1: Introduction to Software Engineering Some definition – Some size factors – Quality and productivity factors – Managerial issue. Planning a Software Project: Defining the problem – Developing a solution strategy – planning the development process – planning an organization structure – other planning activities.

Unit-2: Software Cost Estimation: Software – Cost factors – Software cost estimation techniques – specification techniques – level estimation – estimating software maintenance costs. The software requirements specification – formal specification techniques - languages and processors for requirements specification.

Unit 3: Software Design: Fundamental Design concepts – Modules and modularizing Criteria – Design Notations – Design Techniques – Detailed Design Consideration – Real time and distributed system design – Test plan – Mile stones walk through and inspection.

Unit-4: Implementation issues : Structured Coding techniques – coding style – standards and guidelines – documentation guidelines – type checking – scoping rules – concurrency mechanisms.

Unit-5 : Quality assurance – walk through and inspection – Static analysis – symbolic exception – Unit testing and Debugging – System testing – Formal verification: Enhancing maintainability during development – Managerial aspects of software maintenance –Configuration management – source code metrics – other maintenance tools and techniques.

### **1. Recommended Texts**

i. Richard E.Fairly - Software Engineering Concepts - Tata McGraw-Hill book Company.

### **2. Reference Books**

i. R.S.Pressman, 1997, Software Engineering – 1997 - Fourth Ed., McGraw Hill.

ii. Rajib Mall ,2004,Fundamentals of Software Engineering,2nd Edition, PHI.