SRM ARTS AND SCIENCE COLLEGE
KATTANKULATHUR – 603 203.

SYLLABUS (From 2020-2021)
DEAPRTMENT OF COMPUTER APPLICATIONS AND TECHNOLOGY (BCA)

S.NO.	PART	SUBJECT NAME
		SEMESTER I
1	I	Tamil/ Other languages – I
2	II	English – I
3	III	Core I : Problem Solving using Python
4	III	Practical I: Problem Solving using Python Lab
5	III	Allied I: Mathematics I
6	IV	Basic Tamil/Advanced Tamil/Non Major Elective I
7	IV	Soft Skill I
		SEMESTER II
8	I	Tamil/ Other languages – II
9	II	English – II
10	III	Core II :Object Oriented Programming Concepts using C ++
11	III	Practical II : C++ programming Lab
12	III	Allied II: Mathematics II
13	IV	Basic Tamil/Advanced Tamil/Non Major Elective II
14	IV	Soft Skill II
		SEMESTER III
15	III	Core III: Data Structures
16	III	Core IV: Java programming
17	III	Core V: Computer Organization
18	III	Practical III : Data Structures using Java Lab
19	III	Allied III: Financial Accounting
20	IV	Soft Skill III
21	IV	Environmental Studies
		SEMESTER IV
22	III	Core VI: Open Source Technologies
23	III	Core VII: Computer Network
24	III	Core VIII : E-Commerce technologies
25	III	Practical IV : Open Source Technologies Lab
26	III	Allied IV: Cost and Management Accounting
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		SEMESTER V	
29	III	Core IX: Software Engineering
30	III	Core X : Operating System
31	III	Core XI: Relational Database Management System
32	III	Practical V: Operating System Lab
33	III	Practical VI : PL/SQL Lab
34	III	Elective I
35	IV	Value Education
		SEMESTER VI	
36	III	Core XII: Web Design and Development
37	III	Core XIII: Data Mining
38	III	Core XIV: Mobile Application Development
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41	III	Mini Project
42	V	Extension Activities

Core – I Problem Solving using Python   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.

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, 5th Edition.
2. Timothy A. Budd, "*Exploring Python*", Tata MCGraw Hill Education Private Limited 2011, 1st 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://docs.python.org/3/tutorial/index.html

Practical - I Python Programming Lab   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 >=80   Grade B: Percentage >=70 and <80 Grade C: Percentage >=60 and <70 Grade D: Percentage >=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.
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.

CORE – II Object Oriented Programming Concepts Using C++ - I YEAR / II SEM

OBJECTIVES:

- To inculcate knowledge on Object-oriented programming concepts using C++.
- To gain Knowledge on programming with C++.

OUTCOMES:

- To write programs using OOP concepts like Abstraction, Encapsulation, Inheritance and Polymorphism

UNIT - I
Introduction to C++ - key concepts of Object-Oriented Programming –Advantages – Object Oriented Languages – I/O in C++ - C++ Declarations. Control Structures: - Decision Making and Statements: If..else, jump, goto, break, continue, Switch case statements - Loops in C++ : for, while, do - functions in C++ - inline functions – Function Overloading.

UNIT - II
Classes and Objects: Declaring Objects – Defining Member Functions – Static Member variables and functions – array of objects –friend functions – Overloading member functions – Bit fields and classes – Constructor and destructor with static members.

UNIT- III
Operator Overloading: Overloading unary, binary operators – Overloading Friend functions – type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, Hybrid, Multi path inheritance – Virtual base Classes – Abstract Classes.

UNIT - IV
Pointers – Declaration – Pointer to Class , Object – this pointer – Pointers to derived classes and Base classes – Arrays – Characteristics – array of classes – Memory models – new and delete operators – dynamic object – Binding, Polymorphism and Virtual Functions.

UNIT - V
Files – File stream classes – file modes – Sequential Read / Write operations – Binary and ASCII Files – Random Access Operation – Templates – Exception Handling - String – Declaring and Initializing string objects – String Attributes – Miscellaneous functions .

TEXT BOOK:
E. Balagurusamy, "*Object-Oriented Programming with C++*", TMH 2013, 7th Edition.
REFERENCE BOOKS:
1. Ashok N Kamthane, "*Object-Oriented Programming with ANSI and Turbo C++*", Pearson Education 2003.
2. Maria Litvin & Gray Litvin, "*C++ for you*", Vikas publication 2002.
WEB REFERENCES:
NPTEL & MOOC courses titled Object oriented programming concepts using C++
➢ https://alison.com/course/introduction-to-c-plus-plus-programming

Practical – II C++ Programming lab

I YEAR / II SEM

OBJECTIVES:

- To implement the various object oriented programming concepts using C++

OUTCOMES:
- To understand the structure and model of the C++ programming language.
- To solve problems in C++ demonstrating Object Oriented Concepts.

LIST OF EXERCISES:

1. Write a C++ program to demonstrate function overloading, Default Arguments and Inline function.
2. Write a C++ program to demonstrate Class and Objects
3. Write a C++ program to demonstrate the concept of Passing Objects to Functions
4. Write a C++ program to demonstrate the Friend Functions.
5. Write a C++ program to demonstrate the concept of Passing Objects to Functions
6. Write a C++ program to demonstrate Constructor and Destructor
7. Write a C++ program to demonstrate Unary Operator Overloading
8. Write a C++ program to demonstrate Binary Operator Overloading
9. Write a C++ program to demonstrate:

   - Single Inheritance
   - Multilevel Inheritance
   - Multiple Inheritance
   - Hierarchical Inheritance
   - Hybrid Inheritance

10 Write a C++ program to demonstrate Virtual Functions.
11. Write a C++ program to manipulate a Text File.
12. Write a C++ program to perform Sequential I/O Operations on a file.
13. Write a C++ program to find the Biggest Number using Command Line Arguments
14. Write a C++ program to demonstrate Class Template
15. Write a C++ program to demonstrate Function Template.
16. Write a C++ program to demonstrate Exception Handling.

Core – III Data Structures   II Year/III Sem.

OBJECTIVES:
- To understand the concepts of ADTs
- To learn linear data structures-lists, stacks, queues
- To apply Tree and Graph structures
- To understand sorting, searching and hashing.

OUTCOMES:
- Implement abstract data types for linear data structures.
- Apply the different linear and non linear data structures to problem solutions.
- Critically analyze the various sorting algorithms.

UNIT - I
Abstract Data Types (ADTs)- List ADT-array-based implementation-linked list implementation-singly linked lists-circular linked lists-doubly-linked lists-applications of lists-Polynomial Manipulation- All operations- Insertion-Deletion-Merge-Traversal.

UNIT - II
Stack ADT-Operations- Applications- Evaluating arithmetic expressions – Conversion of infix to postfix expression-Queue ADT-Operations-Circular Queue- Priority Queue-deQueue-applications of queues.

UNIT - III
Tree ADT-tree traversals-Binary Tree ADT-expression trees-applications of trees-binary search tree ADT- Threaded Binary Trees-AVL Trees- B-Tree- B+ Tree – Heap-Applications of heap.

UNIT - IV
Definition- Representation of Graph- Types of graph-Breadth first traversal – Depth first traversal-Topological sort- Bi-connectivity – Cut vertex- Euler circuits-Applications of graphs.

UNIT - V
Searching- Linear search-Binary search-Sorting-Bubble sort-Selection sort-Insertion sort-Shell sort-Radix sort- Hashing-Hash functions-Separate chaining- Open Addressing-Rehashing-Extendible Hashing.

TEXT BOOKS:
1. Mark Allen Weiss, *"Data Structures and Algorithm Analysis in C++",* Pearson Education 2014, 4th Edition.
2. Reema Thareja, *"Data Structures Using C",* Oxford Universities Press 2014, 2nd Edition.

REFERENCES:
1. Thomas H.Cormen,Chales E.Leiserson,Ronald L.Rivest, Clifford Stein, *"Introduction to Algorithms"*, McGraw Hill 2009, 3rd Edition.
2. Aho, Hopcroft and Ullman, *"Data Structures and Algorithms"*, Pearson Education 2003.

WEB REFERENCES:
- NPTEL & MOOC courses titled Data Structures
- https://nptel.ac.in/courses/106106127/

OBJECTIVES:
- To understand the concepts of Object Oriented Programming.
- To learn about the control structures, class with attributes and methods used in Java.

OUTCOMES:
- Knowledge of the structure and model of the Java programming language.
- Understand the basic principles of creating Java applications with GUI.
- Demonstrate use of string and String Buffers, Develop multithreaded programs in Java.

UNIT - I

Introduction to OOPS: Paradigms of Programming Languages – Basic concepts of Object Oriented Programming
– Differences between Procedure Oriented Programming and Object Oriented programming - Benefits of OOPs – Application of OOPs. Java: History – Java features – Java Environment – JDK – API. Introduction to Java: Types of java program – Creating and Executing a Java program – Java Tokens- Java Virtual Machine (JVM) – Command Line Arguments –Comments in Java program.

UNIT - II

Elements: Constants – Variables – Data types - Scope of variables – Type casting – Operators: Special operators – Expressions – Evaluation of Expressions. Decision making and branching statements- Decision making and Looping– break – labeled loop – continue Statement. Arrays: One Dimensional Array – Creating an array – Array processing – Multidimensional Array – Vectors – ArrayList – Advantages of Array List over Array Wrapper classes.

UNIT - III

Class and objects: Defining a class – Methods – Creating objects – Accessing class members – Constructors – Method overloading – Static members –Nesting of Methods – this keyword – Command line input. Inheritance: Defining inheritance –types of inheritance– Overriding methods – Final variables and methods – Final classes – Final methods - Abstract methods and classes – Visibility Control- Interfaces: Defining interface – Extending interface - Implementing Interface - Accessing interface variables. Strings: String Array – String Methods – String Buffer Class.

UNIT - IV

 Packages: Java API Packages – System Packages – Naming Conventions –Creating & Accessing a Package – Adding Class to a Package – Hiding Classes. Exception Handling: Limitations of Error handling – Advantages of Exception Handling - Types of Errors – Basics of Exception Handling – try blocks – throwing an exception – catching an exception – finally statement. Multithreading: Creating Threads – Life of a Thread – Defining & Running Thread – Thread Methods – Thread Priority – Synchronization – Implementing Runnable interface – Thread Scheduling.

UNIT - V

I/O Streams: File – Streams – Advantages - The stream classes – Byte streams – Character streams. Applets: Introduction – Applet Life cycle – Creating & Executing an Applet –Applet tags in HTML – Parameter tag – Aligning the display - Graphics Class: Drawing and filling lines – Rectangles – Polygon – Circles – Arcs – Line Graphs – Drawing Bar charts AWT Components and Even Handlers: Abstract window tool kit – Event Handlers – Event Listeners – AWT Controls and Event Handling: Labels – Text Component – Action Event – Buttons – Check Boxes – Item Event – Choice– Scrollbars – Layout Managers- Input Events – Menus.

TEXT BOOKS:
1. E. Balagurusamy, "*Programming with Java*", TataMc-Graw Hill, 5th Edition.
2. Sagayaraj, Denis, Karthick and Gajalakshmi, "*Java Programming for Core and advanced learners*", Universities Press (INDIA) Private Limited 2018.

REFERENCES:
1. Herbert Schildt, "*The complete reference Java*", TataMc-Graw Hill, 7th Edition.

WEB REFERENCES:
➤ NPTEL & MOOC courses titled Java
➤ https://nptel.ac.in/courses/106105191/

Core – V Computer Organization   II Year/III 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.

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

REFERENCE BOOKS:

1. Mathur- "Introduction to Microprocessor"- 3rd Edition- Tata McGraw-Hill-1993.
2. P. K. Ghosh and P. R. Sridhar- "0000 to 8085: Introduction to Microprocessors for Engineers and Scientists"- 2nd Edition- PHI- 1995.
3. NagoorKani- "Microprocessor (8085) and its Applications"- 2nd 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/

Practical – III Data Structures using Java lab   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
- To get familiarized to sorting and searching 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.
- Analyze various sorting methods.

LIST OF EXERCISES:

1. Write a Java programs to implement the List ADT using arrays and linked lists.

2. Write a Java programs to implement the following using a singly linked list. Stack ADT (b) Queue ADT

3. Write a java program that reads an infix expression, converts the expression to postfix form and then evaluates the postfix expression (use stack ADT).

4. Write a Java program to implement priority queue ADT.

5. Write a Java program to perform the following operations:
   - (a) Insert an element into a binary search tree.
   - (b) Delete an element from a binary search tree.
   - (c) Search for a key element in a binary search tree.

6. Write a Java program to perform the following operations
   - (a) Insertion into an AVL-tree
   - (b) Deletion from an AVL-tree

7. Write a Java programs for the implementation of BFS for a given graph.

8. Write a Java programs for the implementation of DFS for a given graph.

9. Write a Java programs for implementing the following searching methods:
   - (a) Linear search
   - (b) Binary search.

10. Write a Java programs for implementing the following sorting methods:
    - (a) Bubble sort
    - (b) Selection sort
    - (c) Insertion sort
    - (d) Radix sort.

Core – VI Open Source Technologies   II Year/IV Sem.

OBJECTIVES:

To provide a basic idea of Open source technology, their software development process to understand the role and future of open source software in the industry along with the impact of legal, economic and social issues for such software.

OUTCOMES:

To recognize the benefits and features of Open Source Technology and to interpret, contrast and compare open source products among themselves

UNIT- I
Introduction – Why Open Source – Open Source –Principles, Standards Requirements, Successes – Free Software – FOSS – Internet Application Projects

UNIT- II
Open source – Initiatives, Principles, Methodologies, Philosophy, Platform, Freedom, OSSD, Licenses – Copy right, Copy left, Patent, Zero Marginal Technologies, Income generation opportunities, Internalization

UNIT- III
Case Studies – Apache, BSD, Linux, Mozilla (Firefox), Wikipedia, Joomla, GCC, Open Office.

UNIT- IV
Open Source Project –Starting, Maintaining –Open Source – Hardware, Design, Teaching & Media

UNIT- V
Open Source Ethics – Open Vs Closed Source – Government – Ethics – Impact of Open source Technology – Shared Software – Shared Source

TEXT BOOK:

1. Kailash Vadera, Bhavyesh Gandhi, "*Open Source Technology*", Laxmi Publications Pvt Ltd 2012, 1st Edition.

REFERENCE BOOK:

1. Fadi P. Deek and James A. M. McHugh, "*Open Source: Technology and Policy*", Cambridge Universities Press 2007.

WEB REFERENCES:

➢ Coursera online course – Open Source Software Development Methods - https://www.coursera.org/learn/open- source-software-development-methods

OBJECTIVES:

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

OUTCOMES:

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

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, 4th Edition.

REFERENCE BOOKS:

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

WEB REFERENCES:

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

Core VIII – E-Commerce Technologies   II Year/IV Sem.

OBJECTIVES:
- To provide students with an overview and understanding of e-commerce with a specific emphasis on Internet Marketing.
- To explore the major issues associated with e-commerce-security, privacy, intellectual property rights, authentication, encryption, acceptable use policies, and legal liabilities.

OUTCOMES:
- Obtain a general understanding of basic business management concepts.
- Have complete knowledge about basic technical concepts relating to E-Commerce.
- Obtain thorough understanding about the security issues, threats and challenges of E-Commerce.

UNIT - I

History of E-commerce and Indian Business Context: E-Commerce –Emergence of the Internet –Emergence of the WWW – Advantages of E-Commerce – Transition to E-Commerce in India – The Internet and India – E-transition Challenges for Indian Corporate. Business Models for E-commerce: Business Model – E-business Models Based on the Relationship of Transaction Parties - E-business Models Based on the Relationship of Transaction Types.

UNIT - II

Enabling Technologies of the World Wide Web: World Wide Web – Internet Client-Server Applications – Networks and Internets – Software Agents – Internet Standards and Specifications – ISP. E-Marketing: Traditional Marketing – Identifying Web Presence Goals – Online Marketing – E-advertising – E-branding.

UNIT - III

E-Security: Information system Security – Security on the Internet – E-business Risk Management Issues – Information Security Environment in India. Legal and Ethical Issues : Cybers talking – Privacy is at Risk in the Internet Age – Phishing – Application Fraud – Skimming – Copyright – Internet Gambling – Threats to Children.

UNIT - IV

e-Payment Systems: Main Concerns in Internet Banking – Digital Payment Requirements – Digital Token-based e-payment Systems – Classification of New Payment Systems – Properties of Electronic Cash – Cheque Payment Systems on the Internet – Risk and e-Payment Systems – Designing e-payment Systems – Digital Signature – Online Financial Services in India - Online Stock Trading.

UNIT - V

Information systems for Mobile Commerce: What is Mobile Commerce? – Wireless Applications –Cellular Network – Wireless Spectrum – Technologies for Mobile Commerce – Wireless Technologies –Different Generations in Wireless Communication – Security Issues Pertaining to Cellular Technology. Portals for E- Business: Portals – Human Resource Management – Various HRIS Modules.

TEXT BOOK:
1. P.T.Joseph, S.J., *"E-Commerce - An Indian Perspective"*, PHI 2012, 4th Edition.

REFERENCE BOOKS:
1. David Whiteley , *"E-Commerce Strategy, Technologies and Applications"*, Tata McGraw Hill, 2001.
2. Ravi Kalakota, Andrew B Whinston, *"Frontiers of Electronic Commerce"*, Pearson 2006, 12th Impression.

WEB REFERENCES:
- https://www.docsity.com/en/e-commerce-notes-pdf-lecture-notes-university-level/2484734/
- https://magnetoitsolutions.com/blog/advantages-and-disadvantages-of-ecommerce
- https://www.researchgate.net/publication/320547139ECommerce_Merits_and_Demerits_A_Review_Paper

Practical – IV Open Source Technologies lab   II Year/IV Sem.

OBJECTIVES:

- To be aware of the various open source software available for different problem needs
- To be familiar with the usage of the software like installation and configuration

OUTCOMES:

- Students must be able to use appropriate open source tools based on the nature of the problem
- Students should be able to code and compile different open source software

LIST OF EXERCISES:

1. Study and usage of Libre Office Suite – Writer, Calc& Impress
2. Text Processing with PERL
3. Simple Applications using PHP
4. Simple Applications using Python
5. Image editing using GIMP
6. Study and usage of Business Intelligence tools – BIRT, JMagallanes
7. Creation of network diagrams using GraphViz
8. Linux Installation
9. Software Configuration in Linux environment.
10. Version Control System using Git.

Core IX – Software Engineering   III Year/V Sem.

OBJECTIVES:

- To introduce the software development life cycles
- To introduce concepts related to structured and objected oriented analysis & design
- 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 & MOOC courses titled Software Engineering
- https://nptel.ac.in/courses/106105182/

Core X – Operating Systems   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
- Identify the features of I/O and File handling methods

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 1/0 Requests to Hardware Operations - Performance. System Protection: Goals - Domain - Access matrix. System Security: The Security Problem - Threats – Encryption- User Authentication.

TEXTBOOK:

Abraham Silberschatz, Peter B Galvin, Gerg Gagne, "*Operating System Concepts*", Wiley India Pvt.Ltd. 2018, 9th Edition.

REFERENCES:

1. William Stallings, "*Operating Systems Internals and Design Princples*", Pearson, 2018, 9th Edition.
2. Andrew S. Tanenbaum, Herbert Bos, "*Modern Operating Systems*", Pearson 2014, 4th Edition.

WEB REFERENCES:

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

Core XI – Relational Database Management System   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.

REFERENCE BOOKS:

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

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

Practical – V Operating Systems lab   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.

Practical – VI PL/SQL Lab   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

Core XII – Web Design and Development   III Year/VI Sem.

OBJECTIVES:

- To understand Web based programming and scripting languages.
- To learn the basic web concepts and to create rich internet applications that use most recent client-side programming technologies.
- To learn the basics of HTML, DHTML, XML, CSS, Java Script and AJAX.

OUTCOMES:

- Ability to Develop and publish Web pages using Hypertext Markup Language (HTML).
- Ability to optimize page styles and layout with Cascading Style Sheets (CSS).
- Ability to Understand, analyze and apply the role of languages to create a capstone
- Website using client-side web programming languages like HTML, DHTML, CSS, XML, JavaScript, and AJAX.

UNIT I:
HTML: HTML-Introduction-tag basics- page structure-adding comments working with texts, paragraphs and line break. Emphasizing test- heading and horizontal rules-list-font size, face and color-alignment-links-tables-frames

UNIT II:
Forms & Images Using Html: Graphics: Introduction-How to work efficiently with images in web pages, image maps, GIF animation, adding multimedia, data collection with html forms textbox, password, list box, combo box, text area, tools for building web page front page

UNIT III:
XML & DHTML: Cascading style sheet (CSS)-what is CSS-Why we use CSS-adding CSS to your web pages-Grouping styles-extensible markup language (XML). Dynamic HTML: Document object model (DCOM)-Accessing HTML & CSS through DCOM Dynamic content styles & positioning-Event bubbling-data binding.

UNIT IV:
 JavaScript : Client side scripting, What is JavaScript, How to develop JavaScript, simple JavaScript, variables, functions, conditions, loops and repetition, Advance script, JavaScript and objects, JavaScript own objects, the DOM and web browser environments, forms and validations

UNIT V:
Ajax: Introduction, advantages &disadvantages, Purpose of it, ajax based web application, alternatives of ajax
Java Script & AJAX: Introduction to array-operators, making statements-date & time-mathematics-strings-Event handling- form properties. AJAX. Introduction to jQuery and AngularJS.

TEXT BOOKS:

1. Pankaj Sharma, "*Web Technology*", Sk Kataria & Sons Bangalore 2011.(UNIT I, II, III & IV).
2. Mike Mcgrath, "*Java Script*", Dream Tech Press 2006, 1st Edition. (UNIT V: JAVASCRIPT)
3. Achyut S Godbole & Atul Kahate, "*Web Technologies*", 2002, 2nd Edition. (UNIT V: AJAX)

REFERENCE BOOKS:

- Laura Lemay, Rafe Colburn , Jennifer Kyrnin, *"Mastering HTML, CSS & Javascript Web Publishing*", 2016.
- DT Editorial Services (Author), "*HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery)*", Paperback 2016, 2nd Edition.
- C. Xavier, "*World Wide Web Design with HTML*", TMH Publishers 2001.
- Wendy Willard, "*A Beginners Guide HTML",* Tata McGraw Hill 2009, 4th Edition.

WEB REFERENCES:

- NPTEL & MOOC courses titled Web Design and Development.
- https://www.udemy.com/topic/web-design/

Core – XIII Data Mining   III Year/VI Sem.

OBJECTIVES:

- To learn about data mining Concepts
- To study the different data mining techniques

OUTCOMES:

- To have knowledge in Data mining concepts
- To apply Data mining concepts in different fields

UNIT - I

Basic Data Mining Tasks – Data Mining Versus Knowledge Discovery in Data Bases – Data Mining Issues – Data Mining Matrices – Social Implications of Data Mining – Data Mining from Data Base Perspective.

UNIT - II

Data Mining Techniques – a Statistical Perspective on data mining – Similarity Measures – Decision Trees – Neural Networks – Genetic Algorithms.

UNIT - III

Classification: Introduction – Statistical – Based Algorithms – Distance Based Algorithms – Decision.

UNIT - IV

Clustering Tree – Based Algorithms – Neural Network Based Algorithms – Rule Based Algorithms – Combining Techniques: Introduction – Similarity and Distance Measures – Outliers – Hierarchical Algorithms - Partitioned Algorithms.

UNIT - V

Association Rules: Introduction - Large Item Sets – Basic Algorithms – Parallel & Distributed Algorithms – Comparing Approaches – Incremental Rules – Advanced Association Rules Techniques – Measuring the Quality of Rules.

TEXT BOOK:

1. Jiawei Han & Micheline Kamber, "*Data Mining Concepts & Techniques*", 2011, 3rd Edition.

REFERENCE BOOK:

1. Margaret H.Dunbam, "*Data Mining Introductory and Advanced Topics*", Pearson Education 2003.

WEB REFERENCES:

- NPTEL & MOOC courses titled Data Mining
- https://nptel.ac.in/courses/106105174/

Core – XIV Mobile Application Development   III Year/VI Sem.

OBJECTIVES:

- To make the student understand the basic concepts of mobile application development, be aware of Characteristics of mobile applications, User-interface design, basics of graphics and multimedia.
- To gain knowledge about testing and publishing of Android application

OUTCOMES:

- To explain the basics of mobile application development
- Develop Android application with User interface, networking and animation.
- Use simulator tools to test and publish the application.

UNIT - I

Mobile Application Development - Mobile Applications and Device Platforms - Alternatives for Building Mobile Apps -Comparing Native vs. Hybrid Applications -The Mobile Application Development Lifecycle-The Mobile Application Front-End-The Mobile Application Back-End-Key Mobile Application Services-What is Android-Android version history-Obtaining the Required Tools- Launching Your First Android Application-Exploring the IDE-Debugging Your Application-Publishing Your Application

UNIT - II

Understanding Activities-Linking Activities Using Intents-Fragments-Displaying Notifications- Understanding the Components of a Screen-Adapting to Display Orientation-Managing Changes to Screen Orientation- Utilizing the Action Bar-Creating the User Interface Programmatically Listening for UI Notifications

UNIT - III

Using Basic Views-Using Picker Views -Using List Views to Display Long Lists-Understanding Specialized Fragments - Using Image Views to Display Pictures -Using Menus with Views-Using WebView- Saving and Loading User Preferences-Persisting Data to Files-Creating and Using Databases.

UNIT - IV

Sharing Data in Android-Creating Your Own Content Providers -Using the Content Provider- SMS Messaging - Sending Email-Displaying Maps- Getting Location Data-Monitoring a Location.

UNIT - V

Consuming Web Services Using HTTP-Consuming JSON Services- Creating Your Own Services - Binding Activities to Services -Understanding Threading.

TEXT BOOK:

1. Jerome DiMarzio, "*Beginning Android Programming with Android Studio*", 4thEdition.

REFERENCE BOOKS:

1. Dawn Griffiths, David Griffiths, "*Head First Android Development: A Brain-Friendly Guide",* 2017.
2. Neil Smyth , "*Android Studio 3.0 Development Essentials: Android",* 8th Edition.
3. Pradeep Kothari, "*Android Application Development (With Kitkat Support)",* Black Book 2014.

WEB REFERENCES:

- https://developer.android.com/guide
- https://en.wikipedia.org/wiki/Android_10
- Develop App for Free
- https://flutter.dev/
- http://ai2.appinventor.mit.edu
- https://en.wikipedia.org/wiki/Android_version_history
- https://aws.amazon.com/mobile/mobile-application-development/ (Unit 1)
- https://en.wikipedia.org/wiki/Mobile_app_development

Practical – VII Mobile Application Development Lab   III Year/VI Sem.

OBJECTIVES:

- To give overall view of Mobile application development
- Develop and Publish Android applications using Graphical user interface
- Develop and Publish Android application which can use Location and network services

OUTCOMES:

At the end of the course, the student should be able to:
Use Emulator tools to design and develop applications.

Exercises:

1. Develop an application that finds greatest among three numbers using GUI Components
2. Develop an application to display your personal details using GUI Components
3. Develop an application that uses the radio button
4. Develop an application that uses the image button
5. Develop an application that uses Alert Dialog Box
6. Develop an application that uses Layout Managers.
7. Develop an application that uses audio mode (NORMAL, SILENT, VIBRATE)
8. Develop an application that uses to send messages from one mobile to another mobile.
9. Develop an application that uses to send email
10. Develop an application for mobile calls.
11. Develop an application for Student Mark sheet processing
12. Develop an application for Login Page in Database.
13. Develop an application for Google map locator (optional)

WEB REFERENCES:
Develop the App online

- https://flutter.dev/
- http://ai2.appinventor.mit.edu

Practical – VIII Mini Project   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:
The 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.

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 of XXX College"

with dated signature of internal guide, external guide and also Head of the Department/ College.

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)/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 (10) 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 40 marks based on the following components.

1. Achievement of project deliverables   - 15 Marks
2. Effective technical presentation of project work   - 10 Marks
3. Project Viva   - 15 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

Non Major Elective – I Web Application   I Year/I Sem.

OBJECTIVE:

- This course introduces the tools and menus to master PHOTOSHOP and Dream Weaver

OUTCOMES:

- To design interactive Web pages
- To design small Web pages using PHOTOSHOP and Dream Weaver

UNIT I:
Basics of Adobe Photoshop – Getting started with Photoshop – title bar – Menu bar - option bar – tool box – screen modes.

UNIT II:
Introduction to digital Image editing, Create your own painted images – Edited scanned images – import rendered visuals – Working with images and colors

UNIT III:
Using tools and palettes – selection tools, Painting and editing tools – menu commands – creating type – change the type settings – styles

UNIT IV:
Methods and Techniques of Adobe Photoshop - Layers – working with layers – merging layers –linking layers – transforming layers and layer effects- filters

UNIT V:
Getting started with Dreamweaver – creating web applications with Dreamweaver.

BOOKS FOR REFERENCE:

1. Greenberg, "*Photoshop – The Complete reference*", TMH.
2. "*Dream Weaver – Complete reference*".

WEB REFERENCE:

- ➤ NPTEL & MOOC courses titled web application.
- ➤ https://www.coursera.org/courses?query=web%20application

Non Major Elective – I Office Automation   I Year/I Sem.

OBJECTIVE:

- The major objective in introducing the Computer Skills course is to impart training for students in Microsoft Office which has different components like MS Word, MS Excel and Power point. The course is highly practice oriented rather than regular class room teaching.

OUTCOMES:

- To perform documentation
- To perform accounting operations
- To perform presentation skills

UNIT - I
Introductory concepts: History - Generation - Classification - Block diagram - Memory unit – CPU.

UNIT - II
Input Devices: Key board, Mouse and Scanner. Output devices: Monitor, Printer. Introduction to Operating systems & its features: DOS – UNIX – Windows. Introduction to Programming Languages: C, C++ and its features.

UNIT - III
Word Processing: Open, Save and close word document; Editing text – tools, formatting, bullets; Spell Checker - Document formatting – Paragraph alignment, indentation, headers and footers, numbering; printing – Preview, options, merge .

UNIT - IV
Spreadsheets: Excel – opening, entering text and data, formatting, navigating; Formulas – entering, handling and copying; Charts – creating, formatting and printing.

UNIT - V
Power point: Introduction to Power point - Features – Understanding slide types – creating & viewing slides – creating slide shows. Applying special object – including objects & pictures – Slide transition – Animation effects.

TEXT BOOKS:
1. Alexis Leon and Mathews Leon, "*Fundamentals of information technology*", Leon Press1999, 2nd Edition.
2. Peter Norton, "*Introduction to Computers*", Tata McGraw Hill.

REFERENCE BOOK:
1.Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, "*Microsoft 2003*", Tata McGraw Hill.

WEB REFERENCE:
- NPTEL & MOOC courses titled Office Automation.
- https://www.livewireindia.com/microsoftoffice_automation_software_training.php

Non Major Elective – I HTML   I Year/I Sem.

OBJECTIVE:

- This course introduces to the tags used in HTML

OUTCOMES:

- To use Knowledge of HTML and the basic tools that every Web page coder needs to know
- To implement modern Web pages with HTML

UNIT I:
Introduction: Web Basics: What is Internet – Web browsers – What is Web page – HTML Basics: Understanding tags.

UNIT II:
Tags for Document structure (HTML, Head, and Body Tag). Block level text elements: Headings paragraph (<p> tag) – Font style elements: (bold, italic, font, small, strong, strike, big tags)

UNIT III:
Lists: Types of lists: Ordered, Unordered – Nesting Lists – Other tags: Marquee, HR, BR- Using Images – Creating Hyperlinks.

UNIT IV:
Tables: Creating basic Table, Table elements, Caption – Table and cell alignment – Rowspan, Colspan – Cell padding.

UNIT V:
Frames: Frameset – Targeted Links – No frame – Forms: Input, Textarea, Select, Option.

RECOMMENDED TEXTS:
1. Laura Lemay, "*HTML Complete Reference, Teach Yourself Web Publishing with HTML*".

REFERENCE BOOKS:

1. E Stephen Mack, Janan Platt, "*HTML*".

WEB REFERENCE:

- NPTEL & MOOC courses titled HTML.
- https://www.codecademy.com/learn/learn-html

Non Major Elective – II Web Application Lab   I Year/II Sem.

OBJECTIVE:

- This course introduces the techniques used in Photoshop

OUTCOMES:

- To build web applications targeting with single codebase.
- To use various features to build hybrid web application.

LIST OF EXERCISES:

1. Working with the clone stamp tool
2. Drawing Watch using custom shapes
3. Testing lab mode
4. Using multichannel mode
5. Using the sponge Tool
6. Antique framing
7. Creating a supernova
8. Adding an arrowhead.
9. Isolating a Complex Image
10. Removing an element from an image
11. Captain kirk myopia effect
12. Adjusting the focus
13. Creating an edge mask
14. Applying Transformations
15. Correcting brightness and contrast.

Non Major Elective – II Office Automation lab   I Year/II Sem.

OBJECTIVE:
- To acquire knowledge on editor, spread sheet and presentation software.

OUTCOME:
- To demonstrate the ability to apply application software in an office environment.

LIST OF EXERCISES:

MS-WORD
1. Text Manipulation: Write a paragraph about your institution and Change the font size and type, Spell check, Aligning and justification of Text
2. Bio data: Prepare a Bio-data.
3. Find and Replace: Write a paragraph about yourself and do the following. Find and Replace - Use Numbering Bullets, Footer and Headers.
4. Tables and manipulation: Creation, Insertion, Deletion (Columns and Rows). Create a mark sheet.
5. Mail Merge: Prepare an invitation to invite your friends to your birthday party. Prepare at least five letters.

MS-EXCEL
1. Data sorting-Ascending and Descending (both numbers and alphabets)
2. Mark list preparation for a student
3. Individual Pay Bill preparation.
4. Invoice Report preparation.
5. Drawing Graphs. Take your own table.

MS-POWERPOINT
1. Create a slide show presentation for a seminar.
2. Preparation of Organization Charts
3. Create a slide show presentation to display percentage of marks in each semester for all students
   1. Use bar chart (X-axis: Semester, Y-axis: % marks).
   2. Use different presentation template different transition effect for each slide.

Non Major Elective – II HTML lab   I Year/II Sem.

OBJECTIVE:

- This course introduces to the programming in HTML

OUTCOME:

- To implement modern Web pages with HTML

LIST OF EXERCISES:

1. Write a script to create an array of 10 elements and display its contents.
2. Create a simple calculator using form fields. Have two fields for number entry and one field for the result. Allow the user to be able to use plus, minus, multiply and divide.
3. Create a document and add a link to it. When the user moves the mouse over the link, it should load the linked document on its own. (user is not required to click on the link)
4. Create a document which opens a new window without a toolbar, address bar or a status bar that unloads itself after one minute.
5. Design an HTML page that includes document structure tags, title, line break, multiple headings and link to e-mail address.
6. Create an HTML file which is the main page with an image and some text messages along with hyperlinks which is linked to various pages. The navigation should be such that the links take you to the appropriate page and then back to the main page.
7. Create a HTML page to demonstrate the usage of Frames. Choose the content of the page on your own.
8. Design an application for pay slip through HTML forms.

Elective – I Information Security   III Year/V Sem.

OBJECTIVES:

- To learn how to determine security requirements that mesh effectively with your business objectives, create policies that work for your organization, and use technology to implement your policies.

OUTCOMES:

- Students should be able to understand various security threats.
- Students should be able to understand various encryption algorithms.

UNIT - I
Protection versus security; aspects of security–data integrity, data availability, privacy; security problems, user authentication, Orange Book.

UNIT - II
Program threats, worms, viruses, Trojan horse, trap door, stack and buffer overflow; system threats- intruders; communication threats- tapping and piracy.

UNIT - III
Substitution, transposition ciphers, symmetric-key algorithms-Data Encryption Standard, advanced encryption standards, public key encryption - RSA; Diffie-Hellman key exchange, ECC cryptography, Message Authentication- MAC, hash functions.

UNIT - IV
Symmetric key signatures, public key signatures, message digests, public key infrastructures.

UNIT - V
 Intrusion detection, auditing and logging, tripwire, system-call monitoring;

TEXT BOOKS:

1. William Stallings, "*Cryptography and Network Security*", Pearson Education March 2013, 6th Edition,
2. C. Pfleeger and SL Pfleeger, "*Security in Computing*", Prentice Hall of India 2007, 3rd Edition.

REFERENCE BOOK:

1. D. Gollmann, "*Computer Security"*, John Wiley and Sons NY 2002.

WEB REFERENCES:
➢ NPTEL & MOOC courses titled Information security
➢ https://nptel.ac.in/courses/106106129/

Elective – I Resource Management Techniques   III Year/V Sem.

OBJECTIVE:
- To learn the basic concepts, models and statements of Operation Research theory which are frequently applied to business decision making.

OUTCOME:
- To make use of simplex method to solve optimization problems.
- To utilize PERT and CPM in project management.

UNIT-I:
Basics of Operations Research (OR): Characteristics of O.R - Necessity of O.R in Industry -OR and Decision making - Role of computers in O.R. Linear programming: Formulations and Graphical solution (of 2 variables) canonical & standard terms of Linear programming problem. Algebraic solution: Simplex method.

UNIT-II:
Algebraic solution: Charnes method of penalties - two phase simplex method - concept of Duality - properties of duality - Dual simplex method.

UNIT-III:
Transportation model: Definition - formulation and solution of transportation models - the row - minima, column - minima, matrix minima and vogel's approximation methods. Assignment model: Definition of Assignment model - comparison with transportation model- formulation and solution of Assignment model - variations of Assignment problem.

UNIT-IV:
Sequencing problem: Processing each of n jobs through m machines - processing n jobs through 2 machines - processing n jobs through 3 machines - processing 2 jobs through m machines - processing n jobs through m machines - travelling salesman problem. Game Theory: Characteristics of games -Maximin, Minimax criteria of optimality – Dominance property - algebraic and graphical method of solution of solving 2 x 2 games.

UNIT-V:
Pert - CPM: Networks - Fulkerson's Rule - measure of activity - PERT computation - CPM computation - resource scheduling. Simulation: Various methods of obtaining random numbers for use in computer simulation - Additive, multiplicative and mixed types of congruence random number generators - Monte Carlo method of simulation - its advantages and disadvantages.

RECOMMENDED TEXTS:
1. Hamdy A. Taha, "*Operation Research - An Introduction*", Prentice Hall of India, Pvt. Ltd. New Delhi 1996, 5th Edition
2. Ackoff R.L. and Sasieni M. W, "Fundamentals of Operations Research", John Wiley and sons New York 1968.
3. Charnes A. Cooper W. and Hendersen A. , " *Introduction to Linear Programming*", Wiley and Sons New York 1953.
4. Srinath L.S, "PERT and CPM principles and applications", Affiliated East West Press Pvt. Ltd. New York 1973.

WEB REFERENCES:
- http://ocw.mit.in
- http://ebooks.Ipude.in.operationsresearch

Elective – I Multimedia and its Applications   III Year/V Sem.

OBJECTIVES*:*
- To understand the basic concepts of Multimedia Systems
- To learn representations, perceptions and applications of Multimedia

OUTCOMES:
- To understand the technologies behind multimedia applications

UNIT- I
Definition - Classification - Multimedia application -Multimedia Hardware - Multimedia software - CDROM - DVD.

UNIT-II
Multimedia Audio: Digital medium - Digital audio technology - sound cards - recording - editing - MP3 - MIDI fundamentals - Working with MIDI - audio file formats - adding sound to Multimedia project.

UNIT-III
Multimedia Text: Text in Multimedia -Multimedia graphics: coloring - digital imaging fundamentals - development and editing - file formats - scanning and digital photography

UNIT-IV
Multimedia Animation: Computer animation fundamentals - Kinematics - morphing - animation s/w tools and techniques. Multimedia Video: How video works - broadcast video standards - digital video fundamentals – digital video production and editing techniques - file formats.

UNIT-V
Multimedia Project: stages of project - Multimedia skills - design concept - authoring - planning and costing –Multimedia Team. Multimedia-looking towards Future: Digital Communication and New Media, Interactive Television, Digital Broadcasting, Digital Radio, Multimedia Conferencing

TEXT BOOKS:
1. S.Gokul, "*Multimedia Magic*", BPB Publications, 2nd Edition.
2. Tay Vaughen, "*Multimedia Making it Work*", TMH, 6th Edition.

REFERENCE BOOKS:
1. Kiran Thakrar,Prabhat k.andleigh, "*Multimedia System Design*", Prentice Hall India, 1st Edition.
2. Malay k Pakhira , "*Computer graphics,Multimedia and Animation"*, Prentice Hall India, 2nd Edition.

WEB REFERENCES:
- NPTEL & MOOC courses titled Multi media
- https://nptel.ac.in/courses/106105163/
- W3schools.com/html/html-media.asp

Elective – I Software Project Management III YEAR / V Sem.

OBJECTIVES:

- To define and highlight importance of software project management.
- To formulate and define the software management metrics & strategy in managing projects

OUTCOMES:

- Knowledge gained to train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process

UNIT - I
Introduction to Competencies - Product Development Techniques - Management Skills - Product Development Life Cycle - Software Development Process and models - The SEI CMM - International Organization for Standardization.

UNIT - II
Managing Domain Processes - Project Selection Models - Project Portfolio Management - Financial Processes - Selecting a Project Team - Goal and Scope of the Software Project -Project Planning - Creating the Work Breakdown Structure - Approaches to Building a WBS - Project Milestones - Work Packages - Building a WBS for Software.

UNIT - III
Tasks and Activities - Software Size and Reuse Estimating - The SEI CMM - Problems and Risks - Cost Estimation - Effort Measures - COCOMO: A Regression Model - COCOMO II - SLIM: A Mathematical Model - Organizational Planning - Project Roles and Skills Needed.

UNIT - IV
Project Management Resource Activities - Organizational Form and Structure - Software Development Dependencies - Brainstorming - Scheduling Fundamentals - PERT and CPM - Leveling Resource Assignments - Map the Schedule to a Real Calendar - Critical Chain Scheduling.

UNIT - V
Quality: Requirements – The SEI CMM - Guidelines - Challenges - Quality Function Deployment - Building the Software Quality Assurance - Plan - Software Configuration Management: Principles - Requirements - Planning and Organizing - Tools - Benefits - Legal Issues in Software - Case Study

TEXT BOOK:
1. Robert T. Futrell, Donald F. Shafer, Linda I. Safer, "*Quality Software Project Management*", Pearson Education Asia 2002.

REFERENCE BOOKS:
1. Pankaj Jalote, "*Software Project Management in Practice*", Addison Wesley 2002.
2. Hughes, "*Software Project Management*", Tata McGraw Hill 2004, 3rd Edition.

WEB REFERENCES:
➢ NPTEL & MOOC courses titled Software Project Management
➢ www.smartworld.com/notes/software-project-management

Elective – II IOT and its Applications   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:

After learning the course, the student able to:
- 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 Gas Industry, 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.

TEXT BOOK:

1. Vijay Madisetti and ArshdeepBahga, "*Internet of Things: (A Hands-on Approach)*", Universities Press (INDIA) Private Limited 2014, 1st Edition.

REFERENCE BOOKS:

1. Michael Miller, "*The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities AreChanging the World*", kindle version.
2. Francis daCosta, "*Rethinking the Internet of Things: A Scalable Approach to Connecting Everything*", Apress Publications 2013, 1st Edition,.
3. WaltenegusDargie, ChristianPoellabauer, "*Fundamentals of Wireless Sensor Networks: Theory and Practice*"
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/

Elective – II Data Analytics Using R   III Year/VI Sem.

OBJECTIVES:

- To make the student understand the basic concepts of data analytics, be familiar with the data analytics life cycle, learn the basics of R Language, be exposed to data pre-processing, model creations and visualizing the results using R .

OUTCOMES:

- Write R program to pre-process the data for analytics.
- Understand the various methods to analyze the data and create models.
- Present the analytics results to using visualization techniques.

UNIT - I
Introduction to Big Data Analytics - Big Data Overview - State of the Practice in Analytics-Key Roles for the New Big Data Ecosystem -Examples of Big Data Analytics - Data Analytics Lifecycle - Data Analytics Lifecycle Overview - Phase 1: Discovery - Phase 2: Data Preparation -Phase 3: Model Planning -Phase 4: Model Building -Phase 5: Communicate Results - Phase 6: Operationalize- What is R - Why R -Advantages of R Over Other Programming Languages-Handling Packages in R

UNIT - II
Getting Started with R-Working with Directory- Data Types in R-Few Commands for Data Exploration-Challenges of Analytical Data Processing- Expression, Variables and Functions-Missing Values Treatment in R - Using the 'as Operator to Change the Structure of Data - Vectors -Matrices -Factors -List -Few Common Analytical Tasks-Aggregating and Group Processing of a Variable-Simple Analysis Using R- Methods for Reading Data-Comparison of R GUIs for Data Input- Using R with Databases and Business Intelligence

UNIT - III
Exploring Data in R-Data Frames-R Functions for Understanding Data in Data frames-Load Data Frames-Exploring Data- Data Summary-Finding the Missing Values - Invalid Values and Outliers - Descriptive Statistics-Spotting Problems in Data with Visualization -Linear Regression Using R - Model Fitting - Linear Regression-Assumptions of Linear Regression- Validating Linear Assumption-Logistic Regression-What is Regression-Introduction to Generalized Linear Models-Logistic Regression-Binary Logistic Regression-Diagnosing Logistic Regression -Multinomial Logistic Regression Models

UNIT - IV
Decision Tree-What is a Decision Tree-Decision Tree Representation in R-Appropriate Problems for Decision Tree Learning- Basic Decision Tree Learning Algorithm-Measuring Features- Hypothesis Space Search in Decision Tree Learning-Inductive Bias in Decision Tree Learning-Why Prefer Short Hypotheses - Issues in Decision Tree Learning-What is Time Series Data - Reading Time Series Data - Plotting Time Series Data - Decomposing Time Series Data-Forecasts using Exponential Smoothing-ARIMA Models.

UNIT - V
Clustering -What is Clustering-Basic Concepts in Clustering- Hierarchical Clustering -k-means Algorithm-CURE Algorithm-Clustering in Non-Euclidean Space-Clustering for Streams and Parallelism - Association Rules - Frequent Item set- Data Structure Overview - Mining Algorithm Interfaces - Auxiliary Functions-Sampling from Transactions-Generating Synthetic Transaction Data -Additional Measures of Interestingness - Distance based Clustering Transactions and Associations.

TEXT BOOKS:
1. "*Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data*", EMC Education Services 2015.
2. Seema Acharya, "*Data Analytics using R*", McGraw Hill Education 2018, 1st Edition.

REFERENCE BOOKS:
1. Anil Maheshwari, "*Data Analytics Made Accessible*".
2. Michael Milton, "*Head First Data Analysis*".
3. V.K.Jain, "*Data Science and Analytics*".

WEB REFERENCES:
➢ https://analytics.google.com/analytics/academy/course/6
➢ https://www.youtube.com/watch?v=D2YcHRiIzCk
➢ https://online-learning.harvard.edu/subject/data-anaysis.
➢ https://analytics.google.com/analytics/academy/

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