Jaya College of Arts and Science, Thiruninravur-602024.

Department of Computer Science

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

Course Structure

B.Sc COMPUTER SCIENCE

Programme Objective

- 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
- To apply knowledge of computing, mathematics, and basic sciences
- To Build up programming, analytical and logical thinking abilities.
- To analyze a problem, and identify and define the computing requirements appropriate to its solution
- To understanding professional, ethical, legal, security and social issues and responsibilities
- To use current techniques, skills, and tools necessary for computing practice.
- To identify and analyze user needs and take them into account in the selection, creation, evaluation, and administration of computer-based systems
- To understanding of best practices and standards and their application
- To function effectively on teams to accomplish a common goal
- To gain management skills to cater the corporate sector
- To know the recent developments in IT, future possibilities and limitations, and understand the value of lifelong learning.
- To communicate scientific information in a clear and concise manner

Programme Outcomes

- To apply basic knowledge of computing, mathematics, and basic sciences
- To Build up programming, analytical and logical thinking abilities.
- To adapt to current frameworks and programming trends in the industry
- To understanding professional, ethical, legal, security and social issues and responsibilities
- To be equipped with the knowledge of the internals of the computer as a hardware to adopt to the innovations in the industry.
- To be equipped with the accommodative knowledge of research areas and future trends.
- To use current techniques, skills, and tools necessary for computing practice.

SYLLABUS

2020-21

S.NO.	PART	SUBJECT NAME	CREDITS	MAXIMUM MARKS		
SEMESTER I				EXTERNAL MARKS	INTERNAL MARKS	TOTAL
1	I	Tamil/ Other languages – I	3	75	25	100
2	II	English - I	3	75	25	100
3	III	Core I : Problem Solving using Python	4	75	25	100
4	III	Practical I : Problem Solving using Python Lab	3	60	40	100
5	III	Allied I: Mathematics I	5	75	25	100
6	IV	Basic Tamil/Advanced Tamil/Non	2	75	25	100

		Major Elective I				
7	IV	Soft Skill I	3	50	50	100
		Total Credits	**23**			
SEMESTER II			**CREDITS**	**EXTERNAL MARKS**	**INTERNAL MARKS**	**TOTAL**
8	I	Tamil/ Other languages – II	3	75	25	100
9	II	English - II	3	75	25	100
10	III	Core II : Computer Organization	4	75	25	100
11	III	Practical II : Computer Organization Lab	3	60	40	100
12	III	Allied II: Mathematics II	5	75	25	100
13	IV	Basic Tamil/Advanced Tamil/Non Major Elective II	2	75	25	100
14	IV	Soft Skill II	3	50	50	100
		Total Credits	**23**			
SEMESTER III			**CREDITS**	**EXTERNAL MARKS**	**INTERNAL MARKS**	**TOTAL**
15	I	Tamil/ Other languages – III	3	75	25	100
16	II	English - III	3	75	25	100
17	III	Core III : Java and Data Structures	4	75	25	100
18	III	Practical III : Data Structures using Java Lab	3	60	40	100
19	III	Allied III: Physics I / Statistics I	5	75	25	100
20	IV	Soft Skill III	3	50	50	100
21	IV	Environmental Studies	Examination will be held in Semester IV			
		Total Credits	**21**			
SEMESTER IV			**CREDITS**	**EXTERNAL MARKS**	**INTERNAL MARKS**	**TOTAL**
22	I	Tamil/ Other languages – IV	3	75	25	100
23	II	English - IV	3	75	25	100
24	III	Core IV : Web technology	4	75	25	100
25	III	Practical IV : Web Technology Lab	3	60	40	100
26	III	Allied IV: Physics II / Statistics II	5	75	25	100

27	IV	Soft Skill IV	3	50	50	100
28	IV	Environmental Studies	2	75	25	100
		Total Credits	**23**			

SEMESTER V			**CREDITS**	**EXTERNAL MARKS**	**INTERNAL MARKS**	**TOTAL**
29	III	Core V: Computer Network	4	75	25	100
30	III	Core VI: Operating System	5	75	25	100
31	III	Core VII: Relational Database Management System	4	75	25	100
32	III	Practical V: Operating System Lab	3	60	40	100
33	III	Practical VI : PL/SQL Lab	3	60	40	100
34	III	Elective I	5	75	25	100
35	IV	Value Education	2			
		Total Credits	**26**			
SEMESTER VI			**CREDITS**	**EXTERNAL MARKS**	**INTERNAL MARKS**	**TOTAL**
36	III	Core VIII: Software Engineering	4	75	25	100
37	III	Core IX: Introduction to Data Science	5	75	25	100
38	III	Core X: Introduction to Cloud Computing	4	75	25	100
39	III	Practical VII: CASE Tools and Testing tools Lab	3	60	40	100
40	III	Elective II	5	75	25	100
41	III	Practical VIII : Mini Project	5	60	40	100
42	V	Extension Activities	1			
		Total Credits	**27**			
		Total credits (Core, Elective, SBS)	**143**			

Non Major Elective I - I Semester
Web Application Office Automation HTML
Non Major Elective II – II Semester

Web Application Lab Office Automation Lab HTML Lab
Elective I
Artificial Intelligence and Expert System Graphics and Visualization Network Security
Elective II
Mobile Computing IOT and its Applications Block chain Technology

CORE - I PROBLEM SOLVING USING PYTHON

I YEAR / I SEM

Course Objective

- To Understand the principles of Python and acquire skills in programming in python
- To develop the emerging applications of relevant field using Python
- To implement Object Oriented Skills in Python
- Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.
- To acquire skills in developing small size programs using Python features

Course 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 turtle graphics programs in Python
- Ability To use Python files and data structures

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 - IV

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

Course Objective

- 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
- Apply data structures in Python to real life applications
- Apply Object concept in Python to real life applications

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 COMPUTER ORGANIZATION

I YEAR / II SEM

Course Objective

- 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 access
- To understand communication between processor and I/O devices
- To understand communication between processor and Memory

Course 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.
- Ability to write device related assmebly programs

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 - II COMPUTER ORGANIZATION LAB

I YEAR / II SEM

Course Objective

- To understand the programming features and operations of assembly language programs using 8085 microprocessor kit or Simulator
- Assess and solve basic binary math operations using the microprocessor 8085 Assembly language
- Apply knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the 8085 microprocessor.
- Develop assembly language program using 8085 simulator
- Understand Interrupt handling

Course Outcomes

- Implement the arithmetic operations in assembly language programming
- Understand the programming logic of 8085 in various aspects
- Write programs using different devices
- Write programs to solve real life problems
- Write programs to develop embedded softwares

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

CORE - III JAVA AND DATA STRUCTURES

II YEAR / III SEM

Course Objective

- 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.
- To implement Object Oriented Skills in Java

Course Outcomes

- Students will be able to develop Java Standalone applications and Applets.
- Choose the appropriate data structure for modeling a given problem
- Implement java programs for Threads
- Implement Java programs for specfic data structures
- Implement linear and non linear data structures

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.

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, 4th 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, 2nd Edition

WEB REFERENCES:

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

PRACTICAL - III DATA STRUCTURES USING JAVA LAB

II YEAR / III SEM

Course Objective

- To implement linear and non-linear data structures
- To understand the different operations of search trees
- To implement graph traversal algorithms
- To understand the time and space complexities of data structures
- To understand evaluation of expressions

Course 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
- To implement evaluation of expressions
- To implement and test time and space complexities of data structures
- To implement Tree and Graph

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

CORE - IV WEB TECHNOLOGY

II YEAR / IV SEM

Course Objective

- 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 develop complex e-commerce sites with MySQL database, building, connectivity, and maintenance
- To Understand Client Server Concept
- To Understand Three Tier architecture

Course Outcomes

- Understand the general concepts of PHP scripting language for the development of Internet websites.
- Understand working with Arrays
- Understand working with Functions
- 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/

PRACTICAL IV WEB TECHNOLOGY LAB

II YEAR / IV SEM

Course Objective

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

Course 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.
- Develop programs using XML

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

CORE - V COMPUTER NETWORK

III YEAR / V SEM

Course Objective

- To understand the concept of Computer network
- To impart knowledge about networking and inter networking devices
- To impart knowledge on data link layer
- To impart knowledge on Transport and Network layer
- To impart knowledge on Network security

Course 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
- Understand IP addressing
- Understand Client Server model

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 - VI OPERATING SYSTEM

Course Objective

- 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
- To understand Protection and Security

Course Outcomes

- Understand the structure and functions of Operating System
- Compare the performance of Scheduling Algorithms
- Analyze resource management techniques
- To develop to skill to write program
- To test and undrestand Process management

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.

TEXT BOOK:

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

REFERENCES:

1. William Stallings, "*Operating Systems Internals and Design Principles*", 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 - VII RELATIONAL DATABASE MANAGEMENT SYSTEM III YEAR / V SEM

Course Objective

- 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.
- Understand PL/SQL

Course 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
- Develop programs using PL/SQL

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 SYSTEM LAB

III YEAR / V SEM

Course Objective

- 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
- To understand Deadlocks
- To understand Basic I/O programming

Course 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
- Implement deadlocks
- Implement Page replacement algorithms

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

Course Objective

- 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.
- Understand Curosrs, Triggers

Course 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.
- Implement Exception Handling
- Implement SQL queries

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 - VIII SOFTWARE ENGINEERING

III YEAR / VI SEM

Course Objective

- 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
- To introduce different testing tools
- To understand different requirement analysis

Course Outcomes

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

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/

CORE IX INTRODUCTION TO DATA SCIENCE

III YEAR / VI SEM

Course Objective

- To introduce the concepts, techniques and tools with respect to data science practice, including data collection and integration
- To explore data analysis
- To understand predictive modeling and descriptive modeling
- To understand effective communication.
- To understand Machine learning

Course Outcomes

- To describe what Data Science is
- To describe what Statistical Inference means
- Identify probability distributions
- Understand to fit a model to data and use tools
- To understand 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, 2nd Edition.

WEB REFERENCES

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

CORE - X INTRODUCTION TO CLOUD COMPUTING III YEAR /V I SEM

Course Objective

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

Course Outcomes

- To explain and apply levels of services of Cloud
- To describe the security aspects in cloud.
- To understand Data storage in Cloud
- To understand Cloud computing tools
- To understand Cloud Applications

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:u

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 Madisetti ,"*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/

PRACTICAL - VII CASE TOOLS AND TESTING

III YEAR / VI SEM

Course Objective

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

Course Outcomes

- Students must be able to analyze the problem
- Students must design the problem at hand.
- Students solve different problems
- Students should be able to use UML tools for the designing the software
- Students be able to 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)

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:
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.
c**) 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.

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 40 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

ELECTIVE I ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM III YEAR / V SEM

Course Objective

- To Acquire Knowledge on various AI Techniques
- To acquire Knowledge on Expert Systems
- To have enriched knowledge regarding heuristic search
- To understand Predicate Logic
- To understand Knowledge representation and Expert systems

Course Outcomes

- Gain a working knowledge of the foundations of and modern applications in, artificial intelligence
- Understand heuristic search, knowledge representation and logic
- To solve AI problems
- Ability to understand Reasoning
- Ability to understand issues in Knowledge representation

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, 2nd Edition. 2. George F Luger , "*Artificial Intelligence"*, Pearson 2002, 4th 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/

ELECTIVE - I GRAPHICS AND VISUALIZATION

III YEAR / V SEM

Course Objective

- 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.

Course Outcomes

- Know the principles of Display devices
- Understand various algorithms to scan, convert and basic geometrical primitives, transformations
- Understnad 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, 4th Edition.

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/

ELECTIVE - I NETWORK SECURITY

III YEAR / V SEM

Course Objective

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

Course Outcomes

- Compare various Cryptographic Techniques
- To implement RSA
- To implement Hash functions
- Design simple applications
- 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 2013,6th Edition.

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, 4th 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, 2nd Edition.

WEB REFERENCES:

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

ELECTIVE - II MOBILE COMPUTING

III YEAR / VI SEM

Course Objective

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

Course 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.
- Ability to understand security issues
- Ability to understand Routing protocols

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.

REFERENCES:

1. Jochen H. Schller, "*Mobile Communications*", Pearson Education, New Delhi, 2007, 2nd Edition.
2. Dharma Prakash Agarval, 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.smartzworld.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/

ELECTIVE - II IOT AND ITS APPLICATIONS

III YEAR / VI SEM

Course Objective

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

Course Outcomes

- Use of Devices, Gateways and Data Management in IoT.
- Design IoT applications in different domain
- Design to analyze the performance of IoT application
- Implement basic IoT applications on embedded platform.
- Implement to understand the basic architecture

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

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 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, 1st Edition.
3. Waltenegus 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/

ELECTIVE - II BLOCK CHAIN TECHNOLOGY

III YEAR / VI SEM

Course Objective

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

Course Outcomes

- State the basic concepts of block chain
- Paraphrase the list of consensus
- Demonstrate and Interpret working of Hyper ledger Fabric
- Implement SDK composer tool
- 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 Madisetti, "*Block chain Applications: A Hands-On Approach*", Arshdeep Bahga, Vijay Madisetti publishers 2017.

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.comguide/what-is-block-chain-technology
- https://nptel.ac.in/courses/106105184/