

MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI

UG COURSES – AFFILIATED COLLEGES

B.Sc . COMPUTER SCIENCE

(Choice Based Credit System)

(with effect from the academic year 2020-2021 onwards)

Se m	Par t I/ II/ III/ IV/ V	Subject No.	Subject Status	Subject Title	Contact Hrs/ Week	L	T	P	Credits
III	III	15	Core	Java Programming	5	4	1	0	4
	III	16	Core	Digital Design	4	4	0	0	4
	III	17	Major Practical - III	Java Programming Lab	6	0	0	6	2
	III	18	Allied -III	Scripting Languages	4	4	0	0	3
	III	19	Allied Practical - II	Scripting Languages Lab	4	0	0	4	2
	III	20	Skill Based Core-I	Introduction to Big Data analytics	5	5	0	0	4
	IV	21	Non-Major Elective	1. Fundamentals of Internet and Emerging Technologies 2. Basic Programming Design	2	2	0	0	2
			Common	Yoga*	2	2	0	0	2
Subtotal (excluding Yoga)					30	19	1	10	21
IV	III	22	Core	Data Structures	5	4	1	0	4
	III	23	Core	Computer Architecture	5	5	0	0	4
	III	24	Major Practical - IV	Data Structure lab	5	0	0	5	2
	III	25	Allied -IV	Machine Learning	4	4	0	0	3
	IV	26	Allied Practicals	PYTHON	4	4	0	0	2

	III	27	Skill Based – Core II	Multimedia Applications	5	5	0	0	4
	IV	28	Non-Major Elective	1. HTML 2. Programming in C	2	2	0	0	2
			Common	Computers for Digital Era *	2	2	0	0	2
	V		Extension Activity	NCC, NSS, YRC, YWF	0	0	0	0	1
	Subtotal (Excluding Computer for Digital Era)				30	24	1	5	23
V	III	29	Core	Relational Database Management System	4	4	0	0	4
	III	30	Core	Data Communication and Computer Networks	5	5	0	0	4
	III	31	Core	PHP and mySQL	5	4	1	0	4
	III	32	Major Practical - V	PHP and mySQL Lab	4	0	0	4	2
	III	33	Major Practical - VI	Machine learning practicals	5	0	0	5	2
	III	34	Major Elective – I (Anyone)	1. Mobile application Development 2. Introduction to Security in Computing 3. Cloud Computing	5	5	0	0	4
	III	35	Skill Based Common	Personality Development/ Effective Communication/ Youth Development	2	2	0	*	2
	Subtotal				30	20	1	9	22
VI	III	36	Core	Operating System	5	5	0	0	4
	III	37	Core	Software Engineering and Testing	4	4	0	0	4
	III	38	Core	Computer Graphics and Visualization	5	4	1	0	4
	III	39	Core	Introduction to Digital Image Processing	4	4	0	0	4

	III	40	Major Practical - VII	Computer Graphics Lab	4	0	0	4	2
	III	42	Major Elective - II	1. Internet of Things(IoT) 2. Information Technology Service Management (ITSM) 3. Neural Networks	4	4	0	0	4
	III	41	Project	Digital Image Processing using SciLab/MathLab	4	0	0	4	4
Subtotal					30	21	1	8	26
Total credits(including Yoga & Computers for Digital Era)									141

➤ L-Lecture T-Tutorial P-Practical

Distribution of marks between External and Internal Assessment is

For Theory 75 : 25

For Practical 50 : 50

Internal Marks for Practical shall be allotted in the following manner

Continuous Assessment:25 marks “N” number of practical’s being conducted based on the practical prescribed in the syllabus and the marks should be distributed equally for each practical.

Test: 25 marks Two tests should be conducted and average of tests be taken.

Calculation of marks: Sum of marks awarded to number of practicals + the average marks of two tests

Total-50 marks

SEMESTER III

MSU/ 2020-21/ UG-Colleges /Part - III (B.Sc. Computer Science) / Semester – III /Core

JAVA PROGRAMMING

L T P C

4 1 0 4

Objectives:

- To understand the basic concepts & tools of Object – Oriented Paradigm in programming
- To understand the fundamentals of applet, event – driven programming
- To build ability to develop Applet programs with tools of Java
- To mould the skills to develop software

UNIT I

Class, Objects, Inheritances, Arrays, Strings:

Classes, Objects and methods: Defining A Class – Fields Declaration – Methods Declaration – Creating Objects – Accessing Class Members – Constructors – Methods Overloading – Static Members – Nesting Of Methods. Extending a Class – Overriding Methods – Final – Variables, Methods And Classes – Finalizer Methods.(12L)

UNIT II

Arrays, Strings, Interfaces and Packages:

One-Dimensional Arrays – Creating An Array – Two-Dimensional Arrays – Strings.

Interfaces: Defining Interfaces – Extending Interfaces – Implementing Interfaces – Accessing Interface Variables.Java API Packages – Using System Packages – Naming Conventions – Creating Packages - Accessing A Package – Using A Package – Adding Classes To A Package – Hiding Classes – Static Import. (12L)

UNIT III

Multithreading and Exceptions:

Creating Threads – Extending Thread Class – Stopping And Blocking A Thread – Life Cycle Of A

Thread – Using Thread Methods – Thread Exceptions – Thread Priority – Synchronization
– Implementing Runnable Interface. Managing Errors and Exceptions: Types Of Errors – Exceptions
– Syntax Of Exception Handling Code – Multiple Catch Statements – Finally Statement –
Throwing Our Own Exceptions – Using Exceptions For Debugging(12L).

UNIT IV

Applet Programming

Applet Programming: How Applets Differ From Applications? – Preparing Applets – Building Applet Code – Applet Life Cycle – Creating An Executable Applet – Designing A Web Page – Applet Tag – Adding Applet To HTML File – Running Applet - More About Applet Tag - Passing Parameters To Applets – Aligning The Display – Displaying Numerical Values (12L).

UNIT V

Event Handling and Graphics Programming

Getting Input from User – Event Handling. The Graphics Class – Drawing Lines, Rectangles, Circles, Ellipses, Arcs, Polygons – Line Graphs – Using Control Loops in Applets – Drawing Bar Charts – Introducing to AWT Package. (12L).

TEXT BOOK:

Programming with Java A Primer – E.Balagurusamy, McGraw Hill- Fourth Edition

REFERENCE BOOKS:

Java2 – Complete Reference – Herbert Schildt, McGraw Hill Publications

DIGITAL DESIGN

L T P C

4 0 0 4

Objective:

To understand the concept of digital systems, to operate on various number systems and simplify Boolean functions and to distinguish logical and combinational circuits.

Unit I

Number Systems :Codes and Digital Logic Binary Number System –Binary to Decimal Conversion – Decimal to Binary Conversion –Octal Numbers –Hexadecimal Numbers –The ASCII Code –The Excess-3 Code –The Gray Code. Digital Logic:The Basic gates NOT, OR , AND –Universal Logic Gates NOR,NAND –AND-OR Invert Gates.(12L)

Unit II

Combinational Logic: Circuits Boolean Laws and Theorems –Sum of Products Method–Truth Table to Karnaugh Map –Pairs, Quads and Octets –Karnaugh Simplifications –Don't Care Conditions –Product of Sums Method –Product of Sums Simplification.(12L)

Unit III

Data Processing and Arithmetic circuits :Multiplexers –De-multiplexers –1-of-16-Decoders –BCD-to-Decimal Decoders –Seven-Segment decoders –Encoders –Exclusive-OR gates. Arithmetic Circuits:Binary Addition –Binary Subtraction –Unsigned Binary Numbers –Sign-Magnitude Numbers –2's Complement Representation –2's Complement Arithmetic.(14L)

Unit IV:

Flip-Flops:RS Flip Flops –Edge Triggered RS Flip Flops -Edge Triggered D Flip Flops -Edge Triggered JK Flip Flops –JK Master Slave Flip Flops. (10L)

Unit V:

Registers :Types of Registers –Serial in serial out –serial in parallel out –parallel in serial out –parallel in parallel out–Universal Shift Register.(12L)

Text Book:

Digital Principles and Applications, by Albert Paul Malvino & Donald P. Leach, Seventh Edition,
McGraw Hill Education Private Limited

Reference Books:

1. Fundamentals of Digital Circuits, A. Anand Kumar, Second Edition, PHI Learning Private Limited.
2. Digital design, M. Morris Mano, Third Edition, Pearson Education

**MSU/ 2020-21/ UG-Colleges /Part - III (B.Sc. Computer Science) / Semester – III /Major
Practical-III**

L T P C

0 0 6 2

JAVA PROGRAMMING LAB**Objective:**

To understand and make effective use of Java Programming to develop softwares.

1. Write a JAVA program using Multiple Constructors
2. Write a JAVA program using different types of inheritance
3. Write a JAVA program using Overriding Methods.
4. Write a JAVA program using one-dimensional arrays
5. Write a JAVA program using Two-dimensional arrays
6. Write a JAVA program implementing interface(s)
7. Write a JAVA program to create and import package
8. Write a JAVA program to create and deal multiple threads
9. Write a JAVA program with throwing your own exception
10. Write a JAVA program using Applet to Design a Web Page.
11. Write a JAVA program using Applet to Display

12. Write a JAVA program for handling mouse events
13. Write a JAVA program for handling keyboard events.

MSU/ 2020-21/ UG-Colleges /Part - III (B.Sc. Computer Science) / Semester – III / Allied-III

SCRIPTING LANGUAGES

L T P C

4 0 0 2

Objectives:

- To Understand the concepts of scripting languages for developing web-based projects
- Ability to understand the differences between Scripting languages and programming languages

Unit I:

Introduction to Web programming and HTML

Examining the Pieces of Web Programming: Creating a Simple Web Page - Creating a Dynamic Web Page - Storing Content (12L)

The Basics of HTML5: Diving into Document Structure - Looking at the Basic HTML5 Elements - Marking Your Text - Working with Characters - Making a List - Building Tables

Unit II:

CSS and HTML Forms

The Basics of CSS3: Understanding Styles - Styling Text - Working with the Box Model - Styling Tables - Positioning Elements

HTML5 Forms: Understanding HTML5 Forms - Using Input Fields - Adding a Text Area - Using Drop-Down Lists - Enhancing HTML5 Forms - Using HTML5 Data Validation (12L)

Unit III: Advanced CSS and HTML Multimedia

Advanced CSS3: Rounding Your Corners - Using Border Images - Looking at the CSS3 Colors - Adding Shadows. **HTML5 and Multimedia:** Working with Images - Playing Audio - Watching Videos(12L)

Unit IV:

JavaScript

JAVASCRIPT: Knowing Why You Should Use JavaScript - Seeing Where to Put Your JavaScript Code - The Basics of JavaScript - Controlling Program Flow - Working with Functions. **Advanced JavaScript Coding:** Understanding the Document Object Model - Finding Your Elements (12L)

Unit V:

Introduction to jQuery

Using jQuery: Using jQuery Functions - Finding Elements - Replacing Data - Changing Styles

Reacting to Events with JavaScript and jQuery: Understanding Events - Focusing on JavaScript and Events - Looking at jQuery and Events(12L)

Text Book:

1. PHP, MySQL & Javascript for dummies - Richard Blum, Wiley Publishing – 2018 (Book:Chapter - 1:1, 2:1, 2:2, 2:3, 2:4, 2:5, 3:1, 3:2, 3:3, 3:4)

Reference Books:

1. MASTERING HTML, CSS & JavaScript Web Publishing – Laura Lemay, Rafe Coburn and Jennifer Kyrnin – BPB publishing – 2016

2. Beginning HTML, XHTML, CSS and Java script - Jon Duckett - Wiley Publishing

3. Web Technologies for Beginners - Ashwin Mehta - Shroff Publishers & Distributors Pvt. Ltd.

Objectives:

- To develop knowledge in web-based projects

SCRIPTING LANGUAGES LAB

1. Create a web page with HTML5 media elements.
2. Use CSS script to display different background-colour for different tags including header, footer, nav etc. in a form. Use HTML5 data validation.
3. Develop a HTML Form, which accepts any Mathematical expression. Write JavaScript code to Evaluates the expression and Displays the result.
4. Write a JavaScript code to find the sum of N natural Numbers. (Use user-defined function)
5. Create a web page using two image files, which switch between one another as the mouse pointer moves over the image. Use the on Mouse Over and on Mouse Out event handlers.
6. Create a form having number of elements (Textboxes, Radio buttons, Checkboxes, and so on). Write JavaScript code to count the number of elements in a form.
7. Create a HTML form that has number of Textboxes. When the form runs in the Browser fill the textboxes with data. Write JavaScript code that verifies that all textboxes has been filled. If a textboxes has been left empty, popup an alert indicating which textbox has been left empty.
8. Create a form for Student information. Write JavaScript code to find Total, Average, Result and Grade.

INTRODUCTION TO BIG DATA ANALYTICS

L T P C

5 0 0 4

Objectives:

- To make the students understand Big Data Analytics
- To understand the various algorithms in Big Data Analytics

UNIT I:

From Data to Big Data: Introduction - No analytics without data - Databases - Raw data - Text - Images, audios and videos - The Internet of Things - From bytes to yottabytes: the data revolution - Big data: definition - The 3Vs model - Why now and what does it bring? - Conclusions.

Big Data: Introduction - Beyond the 3Vs - From understanding data to knowledge - Improving decision-making - Things to take into account - Data complexity - Data quality: look out! Not all data are the right data - What else?...Data security - Big data and businesses - Opportunities - Challenges – Conclusions(12L)

UNIT II:

Building an Understanding of Big Data Analytics: Introduction - Before breaking down the process. What is data analytics? - Before and after big data analytics - Traditional versus advanced analytics: What is the difference? - Advanced analytics: new paradigm - New statistical and computational paradigm within the big data context – Conclusions.

Why Data Analytics and When Can We Use It? Introduction - Understanding the changes in context - When real time makes the difference - What should data analytics address? - Analytics culture within companies - Big data analytics application: examples - Conclusions (12L)

UNIT III:

Data Analytics Process: Introduction - Understanding data analytics is good but knowing how to use it is better! (What skills do you need?) - First phase: find the data - Second phase: construct the

data - Third phase: go to exploration and modelling - Fourth phase: evaluate and interpret the results - Fifth phase: transform data into actionable knowledge - Disciplines that support the big data analytics process – Conclusions. (12L)

UNIT IV:

Supervised versus Unsupervised Algorithms: Introduction - Supervised and unsupervised learning - Supervised learning: predict, predict and predict! - Unsupervised learning: go to profiles search! - Regression versus classification - Regression - Classification - Clustering gathers data - What good could it serve? - Principle of clustering algorithms - Partitioning your data by using the K-means algorithm – Conclusion(12L)

UNIT V:

Applications and Examples: Introduction - Which algorithm to use? - Supervised or unsupervised algorithm: in which case do we use each one? - What about other ML algorithms? - The duo big data/ML: examples of use – Conclusions. (12L)

Textbook:

Data Analytics and Big Data -Soraya Sedkaoui, Wiley – ISTE 2018.

Reference Books

1. Michael Minelli, Michele Chamboss, Ambiga Dhiraj , "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for today's businesses" John Wiley , 2014.
2. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, EMC Education Services.

1. FUNDAMENTALS OF INTERNET AND EMERGING TECHNOLOGIES

Course Objective:

1. To introduce the background, drivers and history in the invention of computers so that the student gains a big picture of the subject.
2. To provide a high level understanding various branches of Computer Science so that students can detect their interest and specialization
3. To introduce the computational models such as cloud computing and make students choose one for their use
4. Understand the Artificial Intelligence technologies, Networks and Cybersecurity and its impact on human life in future
5. Introduce Computer Ethics and help the society retain human values while technology is developing.

Unit I

Man and Machines - Human Capability of five senses to see, hear, smell, speak and act - Basic Structure of a Computer - Data - Characteristics of a Computer-History of Computers - - Classification of Computers (6L)

Unit II

Application Software and Programming Languages - Application Software - Packaged Software Products (Off-the-Shelf Products) - Office Automation - Core Banking System - Enterprise Software Products – SAP - Sales Force – Oracle - CRM and ERP - Early High Level Programming Languages - Translators (Compilers and Interpreters) – FORTRAN – BASIC – COBOL – PASCAL - C Language - Web Programming Languages – HTML - Java Script - Objected Oriented Programming with C++ - C++ Language - C# Language - Java Programming - Modern Programming Language – Python - GO Language - Swift Language - Kotlin Language - R Language - Artificial Intelligence Languages - Database Management Software (6L)

Unit III

Digital Transformation - Data (High Value Commodity) - Digital Transformation in Business - Features of Digital Transformation - Banking and Financial Services Industry (BFSI) - Human Resource Management – Healthcare - Big Data Analytics in Healthcare - Virtual Reality Wearable medical devices - Retail Industry and CPG -Computer Networks - Basic Networking Terminologies - Node / Host - Client / Server - MAC Address - IP Address - Unicast, Multicast and Broadcast - Half Duplex and Full Duplex – Encapsulation - Network Protocols - Open System Interconnection (OSI) Model - TCP/IP Protocol Suite - Transfer Control Protocol (TCP) - User Datagram Protocol (UDP) – Ethernet - Hardware Used for Networking - Hubs and Switches – Routers - Networking Cables - Coaxial Cable - Twisted Pair Cable - Fiber Optics Cable - Network Topology - Ring Topology - Star Topology (Hub and Spoke Topology) - Bus Topology - More Topologies - Wireless Networks - Radio Waves - Micro Waves – Bluetooth – WiFi - Types of Networks - Personal Area Network (PAN) - Local Area Network (LAN) - MAN and WAN (6L)

Unit IV

Cyber Security - IT Assets - Risk and Vulnerabilities - Computer Security Types - Fundamental Principles of Security - Physical Safety and Security - Access Control - Biometric Access Control - Network Security - AAA Server – Firewall – Malware – Spyware – Adware – Spamware – Virus – Ransomware – Worms - Trojan Horse - Computer Virus - Types of Computer Viruses - Antivirus Protection - Digital Signature - Cyber Crime – Hacking – Phishing - Spam e-mails - Attack using Malware - ATM Skimming – Ransomware - Fake News - Deep fake – Cyberbullying - Cyber Law (IT Law) -Cloud Computing and Virtualization - Own Versus Hire - Benefits and Challenges of Cloud Computing – Virtualization –Hypervisor - Data Center - Hardware Platform Infrastructure - Infrastructure as a Service (IaaS) - Software as a Service (SaaS) - Platform as a Service (PaaS) - Application as a Service (AaaS) - Functions as a Service (FaaS) - Cloud Deployment Models - Private Cloud - Community Cloud - Public Cloud - Hybrid Cloud (6L)

Unit V

Artificial Intelligence - Machine Learning - Training Data - Machine Learning Models - Deep Learning and Neural Networks - Robotics Process Automation (RPA) - Speech Recognition - Natural Language Processing – Bots - Natural Language Generation - Computer Vision – Biometrics - Sentiment Analysis - Artificial Intelligence Applications - Banking and Financial Fraud Detection - Medical Diagnostics - Retail Business - Autonomous Car / Driverless Car
Professional Ethics in Computer - Ethics and Law - Ethical Behaviors - Professional Ethics Frameworks

- Utilitarian Ethics - Deontological Ethics - Virtue Ethics, Communitarian Ethics - Ethical Issue in Computer Science - Intellectual Property Rights (IPR) - Data Protection Law - Information Security and Privacy - Software License - Open-Source Software - Freeware - Unethical Content Filtering - Technology Impact on Society (6L)

Textbook

Fundamentals of Internet and Emerging Technologies (2021), C. Xavier, New Age International Publishers Ltd., New Delhi., Chapters 1, 2, 3 and 9 to 16 only.

Reference Book

1. Introduction to Computer Science, Second Edition, ITL Education Solutions Ltd, Pearson Education
2. Introduction to Computers, Peter Norton, 7th Edition, McGraw Hill Education
3. Fundamentals of Computers, V.Rajaram, 5th Edition, PHI

2. BASIC PROGRAMMING DESIGN

Objectives

- Understand the basic design in programming
- Know the various techniques in program design

Unit-I

Computer Program: Introduction – Developing a program – Algorithm – Flowchart – Decision Tables.(6L)

Unit-II

Program Testing and Debugging – Program Documentation – Program Paradigms: Unstructured programming, Structured programming and Object Oriented Programming – Characteristics of a Good Programming. (6L)

Unit-III

Computer Languages: Evolution Programming Languages – Classification of Programming Languages – Generation of Programming Languages – Features of Good Programming language. (6L)

Unit-IV

Computer Software: Software Definition – Relationship between Software and Hardware - Software Categories : System Software and Application Software – Terminology Software Firmware, Liveware, Freeware, Public Domain Software, Shareware, Commercial Software and Proprietary Software. (6L)

Unit V

Evolution of Internet - Internet Basics: Basic Internet Terms – Getting connected to Internet -Internet Applications – E-mail – Searching the Web – Internet and Viruses. (6L)

Text Book:

Introduction to Computer Science, IITL Education Solutions Limited, 2/e, Pearson

Reference Books:

1. Fundamentals of Computers, V.Rajaram, 5th Edition, PHI
2. Introduction to Computers, Peter Norton, 7/e, TMH.

SEMESTER IV

MSU/ 2020-21/ UG-Colleges /Part - III (B.Sc. Computer Science) / Semester – IV /Core

DATA STRUCTURES

L T P C

4 1 0 4

Objectives

- To understand the concepts of basic data structures such as stack, Queues and Linked list.
- To have general understanding of the network structures through trees and graph.
- To make the students to understand the basic algorithms for sorting.

Unit I

Basic Concepts:- Algorithm specification – Data Abstraction – Performance Analysis. **Arrays and Structures:-** Arrays: Abstract data type – Polynomials – Sparse Matrices – Representation of Multidimensional Arrays. (12L)

Unit II

Stacks and Queues:- Stacks – Queues – Evaluation of Expressions. **Linked Lists:-** Singly Linked Lists and Chains – Linked Stacks and Queues – Polynomials: Polynomial Representation – Adding Polynomials. Sparse Matrices: Sparse Matrix Representation. – Doubly Linked Lists. (12L)

Unit III

Trees:- Introduction – Binary Trees – Binary Tree Traversals: Inorder Traversal – Preorder Traversal – Postorder Traversal. Heaps – Binary Search Trees Forests: Transforming a Forest into a Binary Tree. (12L)

Unit IV

Graphs: - The Graph Abstract Data Type-Elementary Graph Operations – Minimum Cost Spanning Trees: Kruskal’s Algorithm – Prim’s Algorithm. – Sollin’s algorithm Shortest Paths and Transitive Closure: Single Source/ All Destination: Nonnegative Edge Costs - All Pairs Shortest Paths. (12L)

Unit V

Sorting:- Motivation – Insertion Sort – Quick Sort – Merge Sort: Recursive Merge Sort. – Heap Sort – External Sorting: Introduction – k-way Merging..**Hashing:**- Static Hashing: Hash Tables, Hash functions.(12L)

Text Book:

Fundamentals of Data Structures in C by Ellis Horowitz, Sartaj Sahni, Susan Anderson- Freed – Second Edition – Universities Press (India) Private Limited(2019).

Reference Books:

1. Data Structures Using C, Second Edition by Reema Thareja – Oxford University Press
2. Data Structures by Dr N Jeya Prakash – Anuradha Publications

COMPUTER ARCHITECTURE

L T P C
5 0 0 4

Objectives:

- Understand the basics of Computers and its Organization
- Know the various Technologies behind the Computer Architecture

UNIT I

Basic Computer Organization And Design : Instruction codes - Computer Registers - Computer Instructions - Timing and Control - Instruction Cycle - Control Memory-Address Sequencing

(12L)

UNIT II

Central Processing Unit : General Register Organization – Stack Organization – Instruction Formats – Addressing Modes – Data transfer and manipulation – Program Control.

(12L)

UNIT III

Computer Arithmetic : Hardware Implementation and Algorithm for Addition, Subtraction, Multiplication, Division-Booth Multiplication Algorithm-Floating Point Arithmetic.

UNIT IV

Input Output Organization : Input – Output Interface – Asynchronous data transfer – Modes of transfer – Priority Interrupt – Direct Memory Access (DMA).

(12L)

Unit V **Memory Organisation:** Memory Hierarchy - Main memory - Auxillary memory - Associative memory - Cache memory - Virtual memory. (12L)

Text Book:

Computer system Architecture - by Morris Mano, Third Edition. P.H.I Private Limited.

Reference Books:

1. “Computer System Architecture”, John. P. Hayes.
2. “Computer Organization, C. Hamacher, Z. Vranesic, S.Zaky.
3. “Computer Architecture and parallel Processing “, Hwang K. Briggs.
4. “Computer Organization and Architecture, William Stallings , Sixth Edition, Pearson Education, 2003.

MSU/ 2020-21 / UG-Colleges /Part-III (B.Sc. Computer Science) / Semester – IV /Skill based Core II

L T P C

5 0 04

Multimedia Applications

Objective

To know about the various Applications of Multimedia.

UNIT I

What is Multimedia : Definition – Where to use Multimedia - Delivering Multimedia . Text: About Fonts and Faces - Using Text in Multimedia - Computers and Text - Font Editing and Design Tools - Hypermedia and Hypertext. (12L)

UNIT II

Images: Plan Approach - Organize Tools - Configure Computer Workspace - Making Still Images - Color - Image File Format Sound: The Power of Sound - Digital Audio - Midi Audio - Midi vs. Digital Audio - Multimedia System Sounds - Audio File Formats -Vaughan's Law of Multimedia Minimums - Adding Sound to Multimedia Project.(12L)

UNIT III

Animation: The Power of Motion - Principles of Animation - Animation by Computer - Making Animations that Work. Video: Using Video – How Video Works and is Displayed - Digital Video Containers - Obtaining Video Clips - Shooting and Editing Video. (12L)

UNIT IV

Making Multimedia: The Stage of Multimedia Project - The Intangible Needs - The Hardware Needs - The Software Needs - Authoring Systems Needs. Multimedia Skills: The Team Planning and Costing: The Process of Making Multimedia - Scheduling - Estimating - RFPs and Bid Proposals. (12L)

UNIT V

Designing and Producing: Designing – Producing - Content and Talent: Acquiring Content - Ownership of Content Created for Project - Acquiring Talent Delivering: Testing – Preparing for Delivery - Delivering on CD-ROM - Delivering on DVD – Wrapping it Up – Delivering on World Wide Web. (12L)

TEXT BOOK

1. "Multimedia: Making It Work", 8th Edition - Tay Vaughan, Osborne/McGraw- Hill, 2001.

REFERENCE BOOK

1. "Multimedia Computing, Communication & Applications"- Ralf Steinmetz & Klara Nahrstedt, Pearson Education, 2012.
2. “Multimedia Technology and Applications” – David Hillman, Galgotia Publications Pvt Ltd (19 February 1998)

MACHINE LEARNING

**LTPC
4003**

Objectives:

- To introduce students to the basic concepts and techniques of Machine Learning.
- To have a thorough understanding of the Supervised and Unsupervised learning techniques
- To study the various probability based learning techniques
- To understand graphical models of machine learning algorithms

Unit I :

Introduction and Foundations Introduction to AI, Introduction to Machine Learning, Python –Data Visualization Matplotlib with Hands on-Pandas and Data frame(12L)

Unit II:

Linear Regression Supervised Learning -Classification problem -Linear Regression and Logistic Regression -Gradient Descent Optimization -Concepts, Training Data –Test Data -Algorithm and Implementation(12L)

Unit III:

SVM and k-NN Support Vector Machines -Concepts, Training Data –Test Data–Data Normalization - Algorithm and Implementation-K-Nearest Neighbours -Concepts, Algorithm and Implementation(12L)

Unit IV:

Decision Trees and Naïve Bayes Algorithm Decision Trees –Concepts, Algorithm and Implementation-Naïve –Bayes Algorithms –Concepts, Algorithm and Implementation(12L)

Unit V:

ClusteringK-means Clustering –Concepts, Algorithm and Implementation-Machine Learning and Data Science –Ethical and moral issues and Challenges(12L)

Reference Books:

1. Building Machine Learning Systems with Python, Willi Richert, Luis Pedro Coelho, PACKT Publishing, 2013
2. Artificial Intelligence –A Modern Approach, Third Edition, Stuart J Russel, Peter Norvig
3. Getting Started with TensorFlow, Giancarlo Zaccaro, PACKT Publishing, 2016.
4. Machine Learning –An Algorithmic Perspective, Stephen Marsland, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
5. Machine Learning, Tom M Mitchell, First Edition, McGraw Hill Education, 2013.

DATA STRUCTURE L A B

L T P C

0 0 5 2

Objective: To develop skills in implementing data structure algorithms

Each exercise should be completed within two hours.

It is compulsory to complete all the exercises given in the list in the stipulated time.

1. Search an element in a list using Binary Search.
2. Implementation of Stack- Push and Pop.
3. Implementation of Queue – Enqueue and Dequeue
4. Implementation of Binary Tree Traversals using recursion.
a) Pre-order b) In-order c) Post-Order
5. Implementation of Breadth First Search algorithm.
6. Implementation of Depth First Search algorithm.
7. Implementation of Merge Sort
8. Implementation of Quick Sort

PYTHON

L T P C

0 0 4 3

Objectives:

To understand the concepts in python and develop programs

1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
3. Write a program (WAP) to display the first n terms of Fibonacci series.
4. WAP to find factorial of the given number.
5. WAP to find sum of the following series for n terms: $1 - 2/2! + 3/3! - \dots - n/n!$
6. WAP to calculate the sum and product of two compatible matrices.
7. WAP to explore String functions.
8. WAP to create and read a CSV file and display the file contents.
9. WAP to write the text "hello python" in an existing file.
10. WAP to set background color and draw a circle using turtle module

1. HTML

Objectives:

To study the basic concepts of Web design using HTML.

To learn the various tags used in HTML

To make use of Dynamic HTML

Unit I:

Introduction to HTML: Designing a Home page – History of HTML – HTML generations-HTML Documents-Anchor tag –Hyper links –Sample HTML documents.(6L)

Unit II :

Head and Body section: Header Section –Title-Prologue-Links-Colorful web page –Comments lines Designing the body: Heading printing –Aligning the headings-Horizontal rule- paragraph-Tab settings-Image and pictures-Embedding PNG format Images(6L)

Unit III:

Ordered and unordered lists: List-Unordered lists- headings in a list – ordered lists- Nested lists. Table handling: Tables- table creation in HTML- Width of the Tables and cells-Cells spanning multiple rows/Columns- Coloring cells – Column specification(6L)

Unit IV:

Frames: Frame set - Definition – Frame definition –Nested Frames Web Page Design Project : Frameset Definition – Animals – Birds – Fish Forms: Action attributes –Method attributes –Enctype attribute – Drop down list- sample forms(6L)

Unit V:

DHTML and Style sheets: Defining styles –Elements of styles- Linking a style sheet to an HTML document –Inline styles –Internal & External style sheets –Multiple styles(6L)

Text Book:

World Wide Web Design with HTML, C. Xavier, TMH, 2001

Reference Book:

Internet & World Wide Web, H.M.Deital, P.J.Deital & A.B.Goldberg, Pearson Education

Fundamentals of information technology, Mathew's lenon and Alxis leon, Vijay Nicole privatelimited, Chennai.

2..PROGRAMMING IN C

Objectives:

To obtain knowledge about the structure of the programming language C and to develop the program writing and logical thinking skill.

UNIT I

C Declarations –Introduction-Character Set-C tokens-Keywords and Identifiers- Constants-Variables- Data types- Declaration of Variables- Initializing Variables- Dynamic Initialization- Type Modifiers- Type Conversion- Constant And Volatile Variables

Operators and Expressions:- Introduction – Arithmetic Operators – Relational Operators – Logical Operators – Assignment Operators – Increment and Decrement Operators – Conditional Operator – Bitwise Operators – Special Operators – Arithmetic Expressions – Evaluation of Expressions – Operator Precedence.(6L)

Unit II

Input and Output in C: Introduction – Formatted Functions – Flags, widths and Precision with Format String – Unformatted Functions – Commonly used Library functions. **Decision Statements :** Introduction – Simple IF statement – The IF...Else Statement – Nesting of IF...Else Statements – The ELSE IF ladder – The Break Statement – The Continue Statement – The Goto Statement – The Switch Statement.(6L)

Unit III

Loop Control:- Introduction –The WHILE Statement – The DO Statement – The FOR statement – Nested FOR Loops. **Arrays :-** Introduction – One-dimensional arrays

Declaration of One-dimensional arrays – Initialization of One-dimensional arrays –Array terminology -Two-dimensional arrays – Initialization of Two-dimensional arrays.(6L)

Unit IV

Strings and Standard functions:- Introduction – Declaring and Initializing String Variables – Display of strings in different formats – String Standard functions – String Conversion Functions.(6L)

Unit V

Functions:- Introduction – Basics of a function - Function definition – The Return statement Types of functions – Call by Value and Reference – Function as an argument – Function with operators – function and decision statements – function and loop statements – functions with arrays.(6L)

Text Book:

Programming in ANSI C – 8th Edition by E Balagurusamy – McGraw Hill Publishing Company Limited.

Reference Book:

Programming in C – 3th Edition by Ashok Kamthane – Pearson Education

Computer Basics and C Programming by V. Rajaraman – PHI Learning Private Limited

Programming with C, Third Edition, Byron S Gottfried, McGraw Hill Education Private Limited.

SEMESTER V

MSU/ 2020-21 / UG-Colleges /Part-III (B.Sc. Computer Science) / Semester – V /Core

RELATIONAL DATABASE MANAGEMENT SYSTEM

L T P C

4 0 0 4

Objectives:

- To understand relational database concepts and transaction management concepts in database system.
- To write SQL programs that use: procedure, function, package, cursor and Exceptions.
- To Use current techniques and tools necessary for complex computing practices.

UNIT I

Introduction: Database - system applications-Purpose of Database Systems - View of Data- Database languages -Relational Databases - Database Design - Data Storage and Querying - Transaction Management - Database Architecture - Data Mining and Information Retrieval-Specialty Databases - Database Users and Administrators. (12L)

UNIT II

Introduction to the Relational Model and Introduction to SQL: Structure of Relational Databases -Database Schema-Keys-Schema Diagrams- Relational Query Languages-Relational Operations- Overview of the SQL Query Language -SQL Data Definition-Basic Structure of SQL Queries (12L)

UNIT III

SQL operations and Intermediate SQL : Additional Basic Operations-Set Operations-Null values-Aggregate functions- Nested Sub queries- Views - Integrity Constraints - SQL Data Types and Schemas . (12L)

UNIT IV :

Database Design using E-R Model & Relational Database Design: Overview – E-R Model – Complex

attributes – Mapping Cardinalities – Primary key – Removing redundant attributes – Reducing E-R diagrams to schema –Extended E-R features –Features of good Relational design – Decomposition – Normal forms – Functional Dependency – Decomposition Functional & Multi value Dependencies – More Normal Forms. (12L)

UNIT V

Implementation using Oracle: Creating Table-Modifying Table-Creating SEQUENCE- Creating a Views - PL/SQL- Stored procedures and Functions. (12L)

Text Books:

1. Database System Concepts – Abraham Silberschatz, Henry F.Horth and S.Sudarashan, McGraw-Hill International Seventh Edition.
2. Oracle8i Jose A.Ramalho BPB Publications

Reference Books:

1. Database Management Systems, R.Panneerselvam, PHI Learning Private Limited
2. Database Management Systems, Ramakrishnan and Gehrke, Mc Graw Hill Publications
3. Relational Database Management Systems,P. Simon Navis, Ave Maria Publications

DATA COMMUNICATION AND COMPUTER NETWORKS

L T P C

5 0 0 4

Objectives:

- To understand the concepts in Computer Network and Data Communication
- To know about the various protocols used in network

Unit-I

Introduction - Data communication – Networks-the Internet –Protocols and Standards.

Network Models –Layered tasks –OSI model- layers in OSI model-TCP/IP protocol Suit-Addressing. (12L)

Unit II

Physical layer – Analog and digital – Transmission Impairment –Data rate limits- Performance- Transmission mode -Bandwidth Utilization- Multiplexing. Transmission media – Guided and Unguided media.(12L)

Unit III

Switching – Circuit Switched Network-Datagram Network – Virtual Circuit Network. Using telephone and cable networks – Telephone Network- Dial-Up Modem–Digital Subscriber line – Cable TV Network - Cable TV for Data transfer. (12L)

Unit IV

Data Link Layer :Error Detection and Correction- Introduction- Checksum. Data link control-Framing-Flow and Error Control-Protocols-Noiseless Channels-Noisy Channels. Wired LANs-IEEE standards-Standard Ethernet- Changes in the Standard – Fast Ethernet-Gigabit Ethernet.(12L)

Unit V

Wireless LANs: IEEE 802.11-Blue tooth. Connecting LANs - Connecting devices. Wireless WANs: Cellular Telephony, Satellite Networks. Network Layer- IPv4 Address-IPv6 Address-Internetworking. Transport Layer- Process to Process delivery –UDP-TCP. Application Layer- Name space-DNS. (12L)

Text Book

Data Communication and Networking –“BEHROUZ A FOROUZAN “,The McGraw- Hill- 4th edition.

References

1. Data Communication and Computer Networks – “ PrakashC.Gupta
2. Computer Networks Protocols,Standards and Interfaces- “ Uyles Black
3. Data Communications and Computer Networks – Brijendra Singh

PHP and mySQL

L T P C

4 1 0 4

Objectives:

- To learn and use open source database management system MySQL
- To create dynamic web pages and websites.
- To connect web pages with database.
- To understand the concepts of open sources

UNIT-I

Introduction: Introduction- Open source PHP – PHP history- features-variables- statements operators conditional statements-if-switch-nesting conditions-merging forms with conditional statements-loops-while-do-for – loop iteration with break and continue. (12L)

UNIT – II

Arrays and Functions: Arrays: Creating an array- modifying array-processing array-grouping form with arrays- using array functions- creating user defined functions- using files- sessions- cookies- executing external programs- Creating sample applications using PHP. (12L)

UNIT –III

File Handling Opening files using fopen - looping over a files content with feof- reading text from a file using fgets - closing a file- reading character with fgetc- reading whole file with file_get contents reading a fle into into an array with file-checking if a file exists-fscanf-parse_ini_file- Getting file information with stat-fseek- copying files with copy- deleting files-writing to a file-reading and writing binary files –locking files (12L)

UNIT-IV

MySQL: Effectiveness of MySQL -MySQL Tools-Prerequisites for MySQL connection-Databases and tables- MySQL data types-Creating and manipulating tables-Insertion-updation and deletion of rows in tables -Retrieving data- Sorting and filtering retrieved data -Advanced data filteringData manipulation functions-Aggregate functions -Grouping data- Sub queries- Joining Tables- Set operators-Full text searching. (12L)

UNIT-V

PHP with MySQL: Working MySQL with PHP-database connectivity- usage of MYSQLcommands in PHPprocessing result sets of queries- handling errors-debugging and diagnostic functionsvalidating user input through Database layer and Application layer- formatting query output with Character-Numeric- Date and time –sample database applications. (12L)

Text Books:

1. VIKRAM VASWANI- “PHP and MySQL”- McGraw-Hill- 2005
2. BEN FORTA - ”MySQL Crash course “ SAMS- 2006.
- 3 . Steven Holzner , The Complete reference PHP, Tata McGraw Hill,2008

Reference Books:

- Tim Converse- Joyce Park and Clark Morgan- ”PHP 5 and MySQL” -Wiley India reprint - 2008.
- Robert Sheldon- Geoff Moes- ”Beginning MySQL”-Wrox- 2005

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PHP and mySQL Lab

L T P C

4 0 0 2

Objective:

➤ To develop knowledge about basic PHP Programs.

1. Create a simple HTML form and accept the user name and display the name through PHP echo statement.
2. Write a PHP script to redirect a user to a different page.
3. Write a PHP function to test whether a number is greater than 30, 20 or 10 using ternary operator
4. Create a PHP script which display the capital and country name from the given array. Sort the list by the name of the country
5. Write a PHP script to calculate and display average temperature, five lowest and highest temperatures.
6. Create a script using a for loop to add all the integers between 0 and 30 and display the total.
7. Write a PHP script using nested for loop that creates a chess board.
8. Write a PHP function that checks if a string is all lower case.
9. Write a PHP script to calculate the difference between two dates.
10. Write a PHP script to display time in a specified time zone

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Machine learning Practicals

L T P C

0 0 4 2

Exercises

1. Data Visualization with Python Matplotlib
2. Pandas and Data frames
3. Datasets – Training Data, Test Data, Data Normalization
4. Linear Regression with Gradient Descent Optimizer
5. Logistic Regression
6. Support Vector Machines
7. K-Nearest Neighbors
8. Decision Trees
9. Naïve – Bayes
10. K-means Clustering

1. **MOBILE APPLICATION DEVELOPMENT**

Objective:

To make the students understand the basics of Mobile Applications

Unit-I:

Getting Started: Diving in - Welcome to Androidville - The Android platform - Install Android Studio - How to build the app - Activities and layouts - first Android app - a complete folder structure - Useful files in your project - Edit code with the Android Studio editors - Run the app in the Android emulator - Creating an Android Virtual Device - Run the app in the emulator - watch progress in the console - What's in the layout? - activity_main.xml has two elements - Update the text displayed in the layout.

Building Interactive Apps: Apps that do something: building a Beer Adviser app - Create the project - a default activity and layout - A closer look at the design editor - Add a button using the design editor - activity_find_beer.xml has a new button - A closer look at the layout code - the app, test drive - Hardcoding text makes localization hard - Create the String resource - Use the String resource in your layout - The code for activity_find_beer.xml - Add values to the spinner - Add the string-array to strings.xml - Test drive the spinner - We need to make the button do something - Make the button call a method - The activity code - Add an onClickFindBeer() method to the activity - onClickFindBeer() needs to do something - Once you have a View, you can access its methods - Update the activity code - The first version of the activity - What the code does - Build the custom Java class.(12L)

Unit-II:

Multiple Activities and Intents: State your intent - More than one activity in an app - the app structure - create the project - Update the layout - Create the second activity and layout - Android manifest file - An intent - What happens when you run the app - Pass text to a second activity - Update the text view properties - putExtra() method - Update the CreateMessageActivity code - Get ReceiveMessageActivity

to use the information in the intent - What happens when the user clicks the Send Message button - send messages to other people

How Android apps work - Create an intent that specifies an action - Change the intent to use an action - the intent filter - if users ALWAYS want to choose an activity - when createChooser() method is called - Change the code to create a chooser.

The Activity Lifecycle: Being an activity - How do activities really work? - The Stopwatch app - Add String resources - How the activity code will work - Add code for the buttons - The runTimer() method - The full runTimer() code - The full StopwatchActivity code -

Rotating the screen changes the device configuration - The states of an activity - The activity lifecycle: from create to destroy - The updated StopwatchActivity code - What happens when you run the app - There's more to an activity's life than create and destroy -

The updated StopwatchActivity code - when the app is run - when an app is only partially visible - The activity lifecycle: the foreground lifetime - Stop the stopwatch if the activity's paused - Implement the onPause() and onResume() methods - The complete StopwatchActivity code - Your handy guide to the lifecycle methods.(12L)

Unit-III:

Views and View Groups: Enjoy the view - Your user interface is made up of layouts and GUI components - LinearLayout displays - Add a dimension resource file - Using margins - change a basic linear layout - adding weight to a view - Values you can use with the android:gravity attribute - The full linear layout code - Frame layouts stack their views - Add an image to your project - The full code to nest a layout - FrameLayout: a summary - Playing with views - Editable text view - Toggle button - Switch - Checkboxes - Radio buttons - Spinner - Image view - Adding images to buttons - Scroll views - Toasts.

Constraint Layouts: Put things in their place - Nested layouts can be inefficient - the Constraint Layout - the Constraint Layout Library - Add the String resources to strings.xml - Use the blueprint tool - Position views using constraints - Add a vertical constraint - Changes to the blueprint are reflected in the XML - center views - Adjust a view's position by updating its bias - change a view's size - align views - build a real layout.(12L)

Unit-IV:

List views and Adapters: Getting organized - Every app starts with ideas - Use list views to navigate to data - The drink detail activity - The Starbuzz app structure - The Drink class - The top-level layout contains an image and a list - The full top-level layout code - Get list views to respond to clicks with a

listener - Set the listener to the list view - A category activity displays the data for a single category - Update activity_drink_category.xml - For nonstatic data, use an adapter - Connect list views to arrays with an array adapter - Add the array adapter to DrinkCategoryActivity - App review - How clicks are handled in TopLevelActivity - The full DrinkCategoryActivity code - Update the views with the data - The DrinkActivity code - when the app is run.

Fragments: Make it modular - Your app needs to look great on ALL devices - Your app may need to behave differently too - Fragments allow you to reuse code - The phone version of the app - Create the project and activities - Add a button to MainActivity's layout - How to add a fragment to your project - The fragment's onCreateView() method - Add a fragment to an activity's layout - Get the fragment and activity to interact - The Workout class - Pass the workout ID to the fragment - Get the activity to set the workout ID - The fragment lifecycle - Set the view's values in the fragment's onStart() method - How to create a list fragment - The updated WorkoutListFragment code - The code for activity_main.xml - Connect the list to the detail - The code for WorkoutListFragment.java - MainActivity needs to implement the interface - DetailActivity needs to pass the ID to WorkoutDetailFragment.(12L)

Unit-V:

SQLite Databases: Fire up the database - Back to Starbuzz - Android uses SQLite databases to persist data - SQLite classes - The current Starbuzz app structure - change the app to use a database - The SQLite helper manages database - Create the SQLite helper - Inside a SQLite database - create tables using Structured Query Language (SQL) - Insert data using the insert() method - Insert multiple records - The StarbuzzDatabaseHelper code - What the SQLite helper code does - What if changes to the database is needed? - SQLite databases have a version number - when the version number is changed - Upgrade your database with onUpgrade() - Downgrade your database with onDowngrade() - upgrade the database - Upgrade an existing database - Update records with the update() method - Apply conditions to multiple columns - Change the database structure - Delete tables by dropping them - The full SQLite helper code.

Basic cursors: Getting data out - The new Starbuzz app structure - change DrinkActivity to use the Starbuzz database - The current DrinkActivity code - Get a reference to the database - Get data from the database with a cursor - Return all the records from a table - Return records in a particular order - Return selected records - The DrinkActivity code so far - To read a record from a cursor, you first need to navigate to it - Navigate cursors - Get cursor values - The DrinkActivity code - The current

DrinkCategoryActivity code - Get a reference to the Starbuzz database - replace the array data in the list view - A simple cursor adapter maps cursor data to views - use a simple cursor adapter - Close the cursor and database - The DrinkCategoryActivity code.(12L)

Text Book:

1. Head First Android Development (Nov 2019) - Dawn Griffiths & David Griffiths, O'Reilly Media/Shroff Publishers & Distributors Pvt. Ltd.- ISBN: 9789352136063 (Chapters 1-7, 9, 15, 16)

Reference Books:

1. Beginning Android Programming with Android Studio (Wrox Beginning Guides) 4e, 2016 - J. F. DiMarzio - Wiley
2. Android Developer Fundamentals Course: 2017
<https://google-developer-training.github.io/android-developer-fundamentals-course-concepts/en/android-developer-fundamentals-course-concepts-en.pdf>
3. Android Programming Unleashed, 1e, 2013 - B.W.Harwani – Pearson

2.INTRODUCTION TO SECURITY IN COMPUTING

Objectives

- To understand the concepts of basic concepts in security in computing
- To know about the various security algorithms

Unit-I

Model of network security – Security attacks, services and attacks – OSI security architecture – Classical encryption techniques – SDES – Block cipher PrinciplesDES – Strength of DES – Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – RC4 - Differential and linear cryptanalysis – Placement of encryption function – traffic confidentiality.(12L)

Unit-II

Number Theory – Prime number – Modular arithmetic – Euclid's algorithm - Fermet's and Euler's theorem – Primality – Chinese remainder theorem – Discrete logarithm –

Public key cryptography and RSA – Key distribution – Key management – Diffie Hellman key exchange – Elliptic curve cryptography. (12L)

Unit-III

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA - HMAC – CMAC - Digital signature and authentication protocols – DSS. (12L)

Unit-IV

Authentication applications – Kerberos – X.509 Authentication services - E- mail security – IP security - Web security(12L)

Unit-V

Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles – Trusted systems – Practical implementation of cryptography and security(12L)

Text Book:

1. William Stallings, “Cryptography & Network Security”, Pearson Education, Fourth Edition 2010.

Reference Books:

1. Charlie Kaufman, Radia Perlman, Mike Speciner, “Network Security, Private communication in public world”, PHI Second Edition, 2002.
2. Bruce Schneier, Neils Ferguson, “Practical Cryptography”, Wiley Dreamtech India Pvt Ltd, First Edition, 2003.

3. Douglas R Simson “Cryptography – Theory and practice”, CRC Press, First Edition, 1995.

3.CLOUD COMPUTING

Objective:

To know in detail about the various Cloud Computing concepts

UNIT I:

Introduction to cloud computing- History of cloud computing. Fundamentals of the cloud computing ecosystem. Cloud computing characteristics. Technical characteristics of cloud computing Basic characteristics of cloud computing- Advantages and disadvantages of cloud computing. Comparison of traditional and cloud computing paradigms. Cluster computing- Grid computing.. Cloud computing- Evaluating the cloud's business impact and economics Business drivers of cloud computing adoption. Future of the cloud (FoC).

Cloud Services and Deployment Models. Objectives. Cloud deployment models. Public (external) cloud. Private/Internal/Corporate cloud. Hybrid cloud. Cloud Service Models- Infrastructure-as-a-Service (IaaS) Platform-as-a-Service (PaaS). Software as a-Service (SaaS) Cloud infrastructure mechanisms Logical network perimeter (LNP) Virtual server. Cloud storage devices (CSD) Cloud usage monitor -Resource replication. Ready-made environment. Cloud service management.(12L)

UNIT II:

Cloud Computing Architecture.. Objectives. Cloud computing architecture design principles.. Cloud computing life cycle (CCLC). Phase 1- Architect. Phase 2- Engage Phase 3- Operate.. Phase 4- Refresh .Cloud computing reference architecture Load balancing approach Mobile cloud computing (MCC). Mobile computing features.. Challenges.. Mobile cloud computing architecture.

Virtualization Technology. Objectives. Understanding virtualization Adopting virtualization. Techniques of virtualization. How virtualization works? XEN- Kernel-based virtual machine (KVM). VMware. Virtual Box –Citrix.Types of Virtualization Data virtualization-Desktop virtualization -CPU virtualization Network virtualization. Storage virtualization -Server virtualization. Virtualization in Cloud(12L)

UNIT III:

Service oriented Architecture Objectives SOA foundation.. Web Services and SOA .SOA communication. SOA components. SOA Infrastructure. Need of SOA. Business Process Management (BPM).Business Process Management Platform as a Service - BPM PaaS Business Process as a Service-BPaaS.

Cloud Security and Privacy... Objectives. Cloud security - Cloud CIA security model.. Data confidentiality Data integrity.. Data availability., Cloud computing security architecture Service provider security issues. Security issues in virtualization. Cloud legal issues . Performance monitoring and management of cloud services Legal issues in cloud computing Data security in cloud .The cloud risk management framework. Risk management process for cloud consumers- Requirement for risk management in ISO/IEC 27001- Data privacy risks in the cloud. Availability risks. Service provisioning risks . **(12L)**

UNIT IV:

Business continuity and disaster recovery Disaster recovery requirements... Mechanisms for cloud disaster recovery. Disaster recovery as a service. The cloud disaster recovery architecture. Challenges of the cloud disaster recovery. Threats in cloud. Security techniques for threats protection. Cloud service level agreements (SLA) practices Components of a cloud SLA. Types of SLAS. Cloud vendors. Issues of Quality of Cloud Services. Techniques for providing QoS to the cloud applications. Migration of a local server into cloud.. Preliminary checklist/planning for migration. Migration steps. Types of migration for cloud-enabled applications.. Trust management. Trust management evaluation attributes. Cloud trust management techniques

Cloud Computing Applications.. Objectives. Introducing cloud computing applications Google App Engine. Google Apps. Gmail. Google Docs.. Google Calendar Google Drive. Google Cloud Data store. Drop box Cloud. Apple iCloud Microsoft Windows Azure Cloud. Amazon Web Services (AWS) Amazon Elastic Compute Cloud (Amazon EC2) Amazon Simple Storage Service (S3). **(12L)**

UNIT V:

Cloud Computing Technologies, Platforms and Services. Objectives. High-performance computing with cloud technologies. Message Passing Interface (MPI).. Map Reduce programming model. Dryad and DryadLINQ.. Eucalyptus cloud platform. Components of Eucalyptus OpenNebula cloud platform. Layers of OpenNebula Features of OpenNebula. OpenStack cloud platform.. OpenStack components Benefits of Open Stack.. Nimbus Cloud Computing Platform Features of Nimbus. The Apache Hadoop ecosystem

Architecture of Hadoop Major components of Hadoop. Hadoop and cloud..

Adoption of Cloud Computing. Objectives. Adoption of cloud computing in the current era Factors affecting cloud computing adoption. Technological factors. Organizational factors Environmental factors.. Cloud computing existing areas of application.. Cloud computing in education. Cloud computing in healthcare. Cloud computing in politics. Cloud computing in business. Cloud computing in agriculture. Case studies Cloud computing adoption in Sub-Saharan Africa. Cloud computing adoption in India. Cloud computing certifications Google Cloud Certifications.. IBM Cloud Certifications.. Amazon Web Services (AWS) Cloud Certifications.(12L)

Text Book:

Cloud Computing, Kamal Kant Hiran,Ruchi Dosai, Temitayo Fagbola,Mehul Mahrishi, BPB publication, First edition 2019.

Reference Book:

1. Cloud Computing, V. K. Pachghare, PHI Learning Pvt Ltd, 2016
2. 2 Cloud Computing, Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, TMH, 2010
3. Cloud Computing Bible, Barrie Sosinsky, Wiley Publishing, Inc.

SEMESTER-VI

MSU/ 2020-21 / UG-Colleges /Part-III (B.Sc. Computer Science) / Semester – VI /Core

OPERATING SYSTEM

L T P C

5 0 0 4

Objectives:

- To acquire the fundamental knowledge of the operating system architecture and components and to know the various operations performed by the operating system.
- Understand the basic working process of an operating system.
- Understand the importance of process and scheduling.
- Understand the issues in synchronization and memory management.

Unit I

Introduction: What Operating system do? – Computer System Organization – Computer System Architecture – Operating System Structures- Operating System Operation. **System Structures:** Operating System Services – System Calls – System Programs – Operating System Design and Implementation- Operation System Generation- System Boot. (12L)

Unit II

Process Concept: Process Concept- Process Scheduling –Operation on Processes- Inter Process Communication- Example of IPC System – Communication in Client – Server system. **Process Scheduling :** Basic concept-Scheduling criteria- Scheduling algorithm-Thread scheduling-Multiple Processor Scheduling-Real Time CPU Scheduling-Operating system example- Algorithm evaluation. (12L)

Unit III

Synchronization: Background - The Critical section problem-Peterson’s solution - Semaphores – Classic problems of Synchronization. **DeadLocks:** System model-Deadlock Characterization- Methods for handling deadlocks- Deadlock Prevention-Deadlock Avoidance-Deadlock detection - Recovery from deadlock. (12L)

Unit IV

Memory Management: Background – Swapping - Contiguous Memory allocation – Segmentation – paging. **Virtual Memory Management :** Background - Demand paging - and Write-page replacement-Allocation of Frames - Thrashing. (12L)

Copy

Unit V

File System : File Concept-Access Method-Directory and Disk Structure--File Sharing- Protection. **Implementing File System:** File System Structure - File System implementation- Directory implementation-Allocation Methods - Free Space Management. **Mass Storage**

Structure: Overview of Mass Storage Structure-Disk Structure - Disk Scheduling - Disk Management. (12L)

Text Book:

Operating System Concepts – Abraham Silberscartz, Peter Baer Galvin, and Greg Gange.
Addision Wesley Publishing Company – Ninth Edition.

Reference Books:

1. Operating System: Internal and Design Principles – Fifth Edition, William Stalling ,PHI Learning Private Limited.
2. Understanding Operating Sysytes: Ida M.Flynn ,Ann MclverMcHoes.

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SOFTWARE ENGINEERING AND TESTING

L T P C

4 0 0 4

Objectives:

- To acquire the fundamental knowledge of Software Engineering and to know the various testings performed

Unit-I

Introduction:- Evolution – From an Art form on Engineering Discipline: Evolution of an Art into an Engineering Discipline. – Software Development of Projects: Program versus Product – Emergence of Software Engineering: Early Computer Programming – High Level Language

Programming – Control Flow-based Design – Data Structure Oriented Design – Object Oriented Design.

Software Life Cycle Models:- A few Basic Concepts – Waterfall Model and its Extension: Classical Waterfall Model – Iterative Waterfall Model – Prototyping Model – Evolutionary Model. – Rapid Application Development (RAD): Working of RAD. –Spiral Model.(12L)

Unit-II -II

Software Project Management:- Responsibilities of a Software Project Manager-

Project Planning- Project Estimation Techniques-Risk Management. **Requirements Analysis and Specification:-** Requirements Gathering and Analysis – Software Requirements Specifications (SRS):Users of SRS Document – Characteristics of a Good SRS Document – Important Categories of Customer Requirements – Functional Requirements – How to Identify the Functional Requirements? – Organisation of the SRS Document.(12L)

Unit-III

Software Design:- Overview of the Design Process: Outcome of the Design Process – Classification of Design Activities. – How to Characterize a good Software Design? **Function-Oriented Software Design:-** Overview of SA/SD Methodology – Structured Analysis – Developing the DFD Model of a System: Context Diagram – Structured Design – Detailed Design.(12L)

Unit-IV

User Interface Design:- Characteristics of a good User Interface - Basic Concepts – Types of User Interfaces – Fundamentals of Components based GUI Development: Window System. **Coding and Testing:-** Coding – Software Documentation – Testing: Basic Concepts and Terminologies – Testing Activities. – Unit Testing – Black-box Testing: Equivalence Class Partitioning – Boundary Value Analysis-White-box Testing.(12L)

Unit-V

Software Reliability and Quality Management:- Software Reliability: Hardware versus Software Reliability. – Software Quality – Software Quality Management System – ISO 9000: What is ISO 9000 Certification? – ISO 9000 for Software Industry – Shortcomings of ISO 9000 Certification. – SEI Capability Maturity Model: Level 1 to Level 5. **Software Maintenance:-** Characteristics of Software

Maintenance: Characteristics of Software Evolution – Software Reverse Engineering.(12L)

Text Book

Fundamentals of Software Engineering Fifth Edition by Rajib Mall – PHI Learning Private Limited 2018.

Reference Books

1. Software Engineering 2nd Edition by K L James PHI.
2. Software Engineering 9th Edition by Ian Sommerville - Pearson Education Asia.

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COMPUTER GRAPHICS AND VISUALIZATION

L T P C

4 1 0 4

Objectives:

- To acquire the fundamental knowledge of Computer Graphics and Visualization.
- To understand the Algorithms in Computer Graphics

Unit I

Overview of Graphics System: Video Display Devices – Input Devices - Hard Copy Devices – Graphics Software. **Output Primitives:** Points and Lines –Line drawing algorithms – DDA algorithm- Bresenham’s line algorithm- Circle drawing algorithms: properties of circles – Midpoint Circle algorithm – Filled Area primitives.

Unit II

Attributes of Output Primitives: Line attributes – Curve attributes – Character attributes. **Two-Dimensional Geometric Transformation:** Basic Transformations – Matrix Representations and homogenous coordinates – Composite and other Transformations.

Unit III

Two-Dimensional Viewing: The viewing pipeline, Viewing co-ordinate reference frame – Window to view port co-ordinate transformation – Two-dimensional viewing function. **Clipping Operations:** Point clipping – Line clipping (only Cohen-Sutherland line clipping) – Polygon Clipping (only Sutherland-Hodgeman polygon clipping).

Unit-IV

Interactive Input Methods: Input of graphical data – Input functions – Three dimensional display methods.

Three Dimensional Geometric and Modeling Transformations: Translation - Rotation - Scaling

Unit-V

Three Dimensional Viewing: Viewing Pipeline, Projections. **Visible-surface deduction methods:** Back-face Detection - Depth buffer method. **Color Models and Color Applications** – RGB color model – YIQ color model – CMY color model – HSV color model.

Text Book:

Computer Graphics C version, Second Edition, Donald Hearn, M.Pauline Baker, Pearson Publications

Reference Books

1. Computer Graphics, Multimedia and Animation - Malay K. Pakhira – PHI.
2. Computer Graphics - Udit Agarwal - S. K. Kataria & Sons, 2009.
3. Express Learning - Computer Graphics and Multimedia-ITL Education Solution Ltd.
4. Computer Graphics-A programming Approach 2/e-Steven Harrington-Mc Graw

Hill Education Private Limited.

MSU/ 2020-21 / UG-Colleges /Part-III (B.Sc. Computer Science) / Semester – VI/Core

INTRODUCTION TO DIGITAL IMAGE PROCESSING

L T P C

4 0 0 4

Objectives:

- To acquire the fundamental knowledge of introduction to Digital Image Processing.
- To understand the features present in Digital Image Processing.

Unit – I

Introduction & Fundamentals : Definition of Image and Digital Image Processing - Examples of Digital Image Processing - Fundamental Steps in Digital Image Processing - Components of an Image Processing System - Visual Perception - Image Acquisition - A Simple Image Model - Zooming and Shrinking of Digital Image(12L)

Unit – II

Image Enhancement in Spatial Domain : Introduction - Mathematical Analysis of Enhancement in Spatial Domain - Basic Gray Level Transformation - Histogram Processing - Histogram Equalization - Histogram Matching - Image Enhancement using Arithmetic and Logical Operation - Basic Transformations - Basics of Spatial Filtering(12L)

Image Enhancement in Frequency Domain : One Dimensional Fourier Transform and its Inverse - Two Dimensional Fourier Transform and its Inverse - Basics of Filtering in Frequency Domain - Basic Frequency Domain Filters - Homomorphic Filtering.(12L)

Unit – III

Color Image Processing : Introduction - Advantages of Color Image Processing - Categories of Color Image Processing - Color Fundamentals - Primary Colors - Secondary Color - Primary and Secondary Colors for Pigments - Characteristics that are Used for Differentiating Different Colors - Color Models - Conversions between Color Models - Pseudo Color Image Processing - Color Transformation - Color Image Smoothing and Sharpening - Color Segmentation (12L)

Unit – IV

Image Compression : Introduction - Mathematical Analysis - Types of Data Redundancies - Image Compression Model - Compression Strategies.

Morphological Image Processing : Introduction - Basic Concept of Set Theory - Logic Operations Involving Binary Images - Dilation and Erosion - Opening and Closing – (12L)

Unit – V

Features and Image Segmentation - Introduction - Classification of Features - Features of an Image - Attributes of Features - Process of Feature Extraction - Image Segmentation - Thresholding - Region Based Segmentation (12L)

Text Book:

Digital Image Processing - Abhishak Yadav and Poonam Yadav - University Science Press

Reference Books:

1. Digital Image Processing, S Jayaraman, S Esakkirajan, T Veerakumar, McGraw-Hill Education Pvt. Ltd., 2e, 2020
2. Digital Image Processing, 4e, Rafael C Gonzalez, Richard E Woods, Pearson, 2018
3. Digital Image Processing – Sridhar S – 2e – Oxford University Press, 2016

COMPUTER GRAPHICS LAB

L T P C
4 0 0 2

Objectives:

1. To acquire skills in programming computer graphics
2. To acquire skills in multimedia concepts

Each exercise should be completed within two hours.

It is compulsory to complete all the exercises given in the list in the stipulated time.

1. Write a program to draw a line using DDA algorithm
2. Write a program to draw a circle using Bresenham's algorithm.
3. Write a program to draw a line using Bresenham's algorithm.
4. Write a program to scale an image.
5. Write a program to rotate an image.
6. Write a program to translate an image.
7. Write a program for bouncing a ball and moving with sound effect.
8. Write a program to display as many balls in the frame in random position.
9. Write a program to display an image as tiled and cascaded according to the user's option.
10. Write a program so that it should first display the image as the size of applet then it should be reduced and again it should reduced and so on and finally the image should disappear

DIGITAL IMAGE PROCESSING USING SCILAB / MatLab

L T P C

4 0 0 4

Objective:

- To get knowledge about the basic programs on Digital Image Processing
- 1) Perform 2D Linear Convolution, Circular Convolution between two 2D matrices.
- 2) Perform Discrete Fourier Transform(DFT), Discrete Cosine Transform(DCT) of 4x4 gray scale image.
- 3) Perform Brightness enhancement, Contrast Manipulation, Image negative of an image.
- 4) Perform threshold operation on an image.
- 5) Perform Edge detection using different edge detectors.
- 6) Perform Dilation and Erosion operation.
- 7) Perform Opening and closing operations
- 8) Read a colour image and separate the image into red, blue and green planes.

Reference:

- 1) Scilab Textbook Companion for Digital Image Processing, S. Jayaraman, S. Esakkirajan And T. Veerakumar, 2016 (https://scilab.in/textbook_companion/generate_book/125)

MSU/ 2020-21 / UG-Colleges /Part-III (B.Sc. Computer Science) / Semester – VI /Major Elective - II

1. INTERNET OF THINGS

L T P C

4 0 0 4

Objective:

- To give a brief idea about IOT working
- To make the students understand the Architecture of IOT

UNIT I:

Fundamentals of Internet of Things: Introduction – Characteristics of IoT – The Physical Design of IoT – IoT Architecture and Components – Logical design of IoT – Communication Models – IoT Communication API – IoT Architecture and Protocols – Introduction – Fog based Architecture of IoT – Near Field Communication – Wireless Sensor Networks – IoT Network protocol stack – IoT technology stack – Blue tooth – Zig Bee – and 6LowPAN.(12L)

UNIT II:

Programming Framework for IoT: Interoperability – Programming Paradigm – Assembly – Introduction to Arduino Programming – Introduction to Python Programming – Introduction to Raspberry Pi . Virtualization: Introduction – Types – Virtualization and IoT – Embedded Virtualization.(12L)

UNIT III:

IoT Application Area: Introduction – Homes – Health care – Agriculture – Military applications – Politics – Constructions – Other application areas . Cloud and IoT : Introduction – Cloud – IoT – Difference between cloud and IoT – Cloud IoT architecture –challenges.(12L)

UNIT IV:

Smart City using IoT: Introduction – Concept – The emergence – Dimensions and Components – Design strategies – Factors affecting automation – IoT applications in smart cities – Education – E-governance – Industry . IoT Use Cases: Industrial IoT Use Case – IoT and smart energy – Smart transportation – Smart health – Smart home – Smart Education system – Governance use case – Smart cities.(12L)

UNIT V:

Network Security for IoT and M2M communications: Introduction – Network Technologies for IoT and M2M – Security for IoT and M2M Technologies – Security in IETF M2M network Technologies – Security in ETSI M2M Network Technologies – Other M2M standard Efforts.(12L)

Text Books:

1. Internet of Things – Principles, Paradigms and Applications of IoT by Dr.Kamlesh Lakhwani, Dr.Hemant Kumar Gianey, Joseph Kofi Wireko, Kamal Kant Hiran (BPB publication First Edition 2020)
2. Internet of Things(IoT) Systems and Applications By Jamil Y . Khan & Mehmet R.Yuce Jenny

Stanford Publishing.

Reference Book

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014

2.INFORMATION TECHNOLOGY SERVICE MANAGEMENT

L T P C
4 0 0 4

Objectives:

- To make the students understand about the various Information Technology Services
- To make them understand the working principles

Unit I

Information Technology – System model Layers – Networks, Hardware, Operating System - Software, Software Tools- Database- Business Process. Service Desk - Omni-channel ticket management - email, social media, live chat, phone - Ticket Workflow (12L)

Unit II

Infrastructure layer and Software Layer – Key Infrastructure management activities – Asset Management - Network – Servers – Operating System -Unix / Windows- Software Tools / platforms- Desktop / Workstation support – Mobile handheld device support License management – Licensing models – Warranty management – Hardware Life cycle management- Remote Infrastructure management – Cloud Infrastructure maintenance(12L)

Unit III

Incident Management – Priority and Severity – L1 – L2- L3- L4 Tickets– Ticket management system – Incident Workflow– Customer Feedback for incident resolution. Root cause analysis (RCA) – Documentation of RCA – Five-Why Analysis – Corrective and Preventive Actions – Tracking the preventive and corrective actions for closure – Managing critical incidents (P1/P2 incidents) – Lessons Learned – Success Stories(12L)

Unit IV

Problem Management – Problem Definition – Problem ticket – Problem ticket workflow - RCA and tracking – scheduling the closure. Change Management – Ticket Workflow – Release management – Maintenance release – minor release – major release. Knowledge Management – Success Stories – Lessons Learned – Documentation – Sharing of the knowledge – Ticket Analysis and Reporting – Incident Reduction – Training the user community and Service Desk L1 support – Automation of mundane jobs(12L)

Unit V

ITIL (Infrastructure Technology Information Library) ITIL v3/ 4 Framework – Service Strategy – Service Design – Service Transition – Service Operations – (Continual) Service Improvement – Ticket Management Tools in the market – Role of Artificial Intelligence in ITSM(12L)

Reference Books:

1. ITSM QuickStart Guide: The Simplified Beginner's Guide to IT Service Management, by ClydeBank Technology, Amazon Books (2016)
2. Measuring ITIL, Randy A. Steinberg, Google Books (2006)
3. Implementing Itsm: From Silos to Services: Transforming the It Organization to an It Service Management Valued Partner, Randy A. Steinberg, Amazon Books (2014)
4. Foundations of IT Service Management based on ITIL Google Books (2005)

3.NEURAL NETWORKS

L T P C
4 0 0 4

OBJECTIVES:

- Basic neuron models: McCulloch-Pitts model and the generalized one, distance or similarity based neuron model, radial basis function model, etc.
- Basic neural network models: multilayer perceptron, distance or similarity based neural networks, associative memory and self-organizing feature map, radial basis function based multilayer perceptron, neural network decision trees, etc.
- Basic learning algorithms: the delta learning rule, the back propagation algorithm, self-organization learning
- Applications: pattern recognition, function approximation, information visualization, etc.

UNIT I

Introduction to Neural networks: Neural processing- Neural networks- an overview – the rise of neuro computing – introduction to artificial neural networks : introduction- artificial neural networks – historical development of neural networks – biological neural networks – comparison between the brain and the computer – artificial and biological neural networks – basic building blocks of artificial neural networks – artificial neural network terminologies. (12L)

UNIT II

Fundamental models of artificial neural networks: McCulloch-Pits neuron Model-Learning rules. Perceptron networks: Introduction –single layer perceptron –brief introduction to multi layer perceptron networks. (12L)

UNIT III

Feedback networks: Introduction- discrete Hopfield net-continuous Hopfield net-relation between BAM and Hopfield nets. Feed forward networks: introduction-back propagation networks. (12L)

UNIT IV

Kohonen self - organizing feature maps - counter propagation network: introduction-Full counter propagation network-Forward only propagation network. (12L)

UNIT V

Applications of Neural Networks: Applications of neural networks in Arts-Bioinformatics - Knowledge Extraction – Forecasting - Bankruptcy forecasting-Healthcare-Intrusion - Detection. (12L)

TEXT BOOK

Introduction to Neural Networks using MATLAB 6.0., S N Sivanandam S Sumathi S N Deepa , McGraw Hill, 2006.

REFERENCE BOOKS

1. Artificial neural Networks B. Yegnanarayana, Prentice Hall India, 2005.
2. Neural Networks Algorithms, Applications and programming Techniques, James A Freeman David M Skapura, Pearson Education.
3. Neural Networks for Pattern Recognition, Christopher M. Bishop, Indian Edition, OXFORD University Press.