THIRUVALLUVAR UNIVERSITY
MASTER OF COMPUTER SCIENCE
(CBCS PATTERN)
(With effect from 2020 - 2021)

The course of Study and scheme of Examination

S.No	Study Components	Course Title	Ins. Hrs./ week	Credit	Title of the Paper	Maximum Marks		
						CIA	Uni. Exam	Total
SEMESTER 1								
1.	Core	Paper -1	5	3	Relational Database Management System	25	75	100
2.	Core	Paper -2	5	3	Enterprise Java Programming	25	75	100
3.	Core	Paper -3	5	3	Programming using C#.NET	25	75	100
4.	Practical	Paper -1	3	2	Practical 1:Relational Database Management System	25	75	100
5.	Practical	Paper -2	3	2	Practical 2: Enterprise Java Programming	25	75	100
6.	Practical	Paper -3	3	2	Practical 3: Programming using C#.NET	25	75	100
Internal Elective for same major students								
7.	Core Elective	Paper-1	3	3	**(to choose one out of 3)** A. Computer Organization B. Parallel Computing C. Embedded System	25	75	100
External Major for other major Students (Inter/multi-disciplinary papers)								
8.	Open Elective	Paper - 1	3	3	**(to choose one out of 3)** A. E-Commerce B. Introduction to Computer Applications C. Principles of Internet	25	75	100
			30	21				800
SEMESTER II						CIA	Uni. Exam	Total
9.	Core	Paper -4	5	3	Advanced Enterprise Java Programming	25	75	100
10.	Core	Paper -5	4	3	Design and Analysis of Algorithm	25	75	100
11.	Core	Paper -6	4	3	Web Application using C#.NET	25	75	100
12.	Practical	Paper -4	3	2	Practical 4: Advanced Enterprises Java Programming	25	75	100
13.	Practical	Paper -5	3	2	Practical 5: Design and Analysis of Algorithm	25	75	100
14.	Practical	Paper -6	3	2	Practical 6: Web Application using c#.NET	25	75	100
Internal Elective for same major students (Choose any one)								
15.	Core Elective	Paper -2	3	3	**(To choose one out of 3)** A. Human Computer Interaction B. Social Information N/W C. Cloud Computing	25	75	100
External Major for other major Students (Inter/multi-disciplinary papers)								
16.	Open Elective	Paper – 2	3	3	**(To choose one out of 3)** A. Principles of Web Design B. Open Source Applications C. Problem Solving Techniques	25	75	100

17.	*Field Study		-	2		100	-	100
18.	Compulsory Paper		2	2	Human Rights	25	75	100
			30	25				1000

SEMESTER III						CIA	Uni. Exam	Total
19.	Core	Paper -7	5	4	Distributed Operating System	25	75	100
20.	Core	Paper -8	5	4	XML and Web Services	25	75	100
21.	Core	Paper -9	5	3	Programming using Python	25	75	100
22.	Practical	Paper -7	3	2	Practical 7: Distributed Operating System	25	75	100
23.	Practical	Paper -8	3	2	Practical 8: XML and Web Services	25	75	100
24.	Practical	Paper -9	3	2	Practical 9: Programming using Python	25	75	100
Internal Elective for same major students								
25.	Core Elective	Paper -3	3	3	**(To choose one out of 3)** A. Block chain Technology B. Internet of Things C. Network Security	25	75	100
External Major for other major Students (Inter/multi-disciplinary papers)								
26.	Open Elective	Paper - 3	3	3	**(To choose one out of 3)** A. Programming using C B. Programming using C++ C. Programming using Python	25	75	100
27.	**MOOC Courses		-	-				100
			30	23		200	600	900

SEMESTER IV						CIA	Uni. Exam	Total
28.	Core	Paper-10	5	4	Mobile Application Development	25	75	100
29.	Core	Paper-11	6	4	Software Project Management	25	75	100
30.	Practical	Paper-10	3	2	Practical 1: Mobile Application Development	25	75	100
31.	Core	Project	10	5	Project with viva voce (Compulsory)	100 (75 Project + 25 viva)		100
Internal Elective for same major students (Choose any one)								
32.	Core Elective	Paper - 4	3	3	**(To choose one out of 3)** A. Big Data Analysis B. Artificial Intelligence C. Machine Learning	25	75	100
External Major for other major Students (Inter/multi-disciplinary papers)								
33.	Open Elective	Paper - 4	3	3	**(To choose one out of 3)** A. Cyber Security B. Decision Support system C. Research Methods & Ethics	25	75	100
			30	21		125	375	600
			120	90				3300

* Field Study

There will be field study which is compulsory in the first semester of all PG courses with 2 credits. This field study should be related to the subject concerned with social impact. Field and Topic should be registred by the students in the first semester of their study along with the name of a mentor before the end of the month of August. The report with problem identification and proposed solution should be written in not less than 25 pages in a standard format and it should be submitted at the end of second semester. The period

for undergoing the field study is 30 hours beyond the instructional hours of the respective programme. Students shall consult their mentors within campus and experts outside the campus for selecting the field and topic of the field study. The following members may be nominated for confirming the topic and evaluating the field study report.

(i). Head of the respective department
(ii). Mentor
(iii). One faculty from other department

**Mooc Courses
Inclusion of the Massive Open Online Courses (MOOCs) with zero credits available on SWAYAM, NPTEL and other such portals approved by the University Authorities.

SEMESTER III

PAPER - 7

DISTRIBUTED OPERATING SYSTEM

COURSE OBJECTIVES
- To understand foundations of Distributed Systems.
- To introduce the idea of memory management
- To understand in detail the system level and support required for distributed system.
- To understand the shell script commands of Unix

COURSE OUTCOMES

CO1 - Students are able to understand foundations of Distributed Systems.

CO2 - Students are able to get the idea of memory management

CO3 - Students are able to comprehend in detail the system level and support required for distributed system.

CO4 - Students are able to recognize the shell script commands of Unix

UNIT-I: INTRODUCTION

Operating system concepts - System Calls - OS Structure - Process and Threads: Process - Threads - Inter Process Communication - Scheduling - Classical IPC Problems.

UNIT-II: MEMORY MANAGEMENT

Memory abstraction - Virtual Memory - Page Replacement Algorithm - Design issues for paging systems - implementation issues - Segmentation. File Systems: Files - Directories - File System Implementation - File System Management and Optimization.

UNIT-III: INPUT/OUTPUT

Principles of I/O hardware - Principles of I/O software - I/O Software Layers - Disks - Clocks - User Interface - Thin Clients - Power Management. Deadlocks: Resources - Introduction - The Ostrich Algorithm - Deadlock Avoidance - Deadlock Prevention - Other issues.

UNIT-IV: MULTIMEDIA OPERATING SYSTEM

Introduction - Multimedia Files - Video & Audio compression - Multimedia Process Scheduling - Multimedia File System Paradigms - File placement - Caching - Disk scheduling for Multimedia - Multiple Processor system: Multiprocessor - Multicomputers - Virtualization - Distributed systems.

UNIT-V: SECURITY

Security Environment - Basics of Cryptography - Protection Mechanisms - Authentication - Insider Attacks - Exploiting Code Bugs - Malware – Defenses - Case Study: LINUX.

TEXT

1. Andrew S. Tanenbaum - Modern Operating System - Prentice Hall of India Pvt Limited, 2001

REFERENCES

1. Pradeep K. Sinha. - Distributed Operating Systems Concepts and Design - Prentice Hall of India Pvt Limited, 2008
2. Andrew S. Tanenbaum and Maarten Van Steen - Distributed Systems - Prentice Hall of India Pvt Limited, 2002.

WEB REFERENCES

https://en.wikipedia.org/wiki/Distributed_operating_system
https://www.tutorialspoint.com/distributed-operating-system
https://lasr.cs.ucla.edu/classes/188_winter15/readings/distributed_os_notes.html

PAPER - 8

XML AND WEB SERVICES

COURSE OBJECTIVE
- To examine fundamental XML technology
- To understand the use of JSON
- To gain an understanding about the role of web services in commercial applications
- To learn the emerging standard protocols like SOAP, WSDL and UDDI.
- To introduce the role of web services in CMS

COURSE OUTCOMES
CO1 - Students are able to understand the use of web services in B2C and B2B applications.

CO2 - Students are able to understand the design principles and application of SOAP and REST based web services.

CO3 - Students are able to design collaborating web services according to a specification.

CO4 - Students are able to implement an application that uses multiple web services in a realistic business scenario.

UNIT - I: XML TECHNOLOGY FAMILY
XML – benefits – Advantages of XML over HTML, EDI, Databases – XML based standards –DTD – XML Schemas – X-Files – XML processing – DOM – SAX – presentation technologies– XSL – XHTML – voiceXML – Transformation – XSLT – XLINK – XPATH.

UNIT - II: JSON AND JSON SCHEMA
Introduction to JSON – JSON Comparison with XML – JSON syntax, Datatypes, Objects – Examples – JSON Schema: Hello World! – The type Keyword – Declaring a JSON schema – JSON schema reference: Type specific keywords – Generic Keywords – Combining schemas – The $schema Keyword – Regular Expression – Structuring a complex schema: Reuse.

UNIT - III: ARCHITECTING WEB SERVICES
Business motivations for web services – B2B – B2C – Technical motivations – limitations of CORBA and DCOM – Service-oriented Architecture (SOA) – Architecting web services – Implementation view – web services technology stack – logical view – composition of web services – deployment view – from application server to peer to peer – process view – life in the runtime.

UNIT - IV: WEB SERVICE BUILDING BLOCKS: SOAP, WSDL AND UDDI
Introduction to SOAP – Basic SOAP syntax – Sending SOAP messages – Future of SOAP – Introduction to WSDL – Basic WSDL syntax- SOAP binding – Introduction of UDDI – UDDI API – Future of UDDI.

UNIT - V: XML-E-BUSINESS & XML-CONTENT MANAGEMENT SYSTEM
Business to Business – Business to Customer – Different types of B2B Interaction – Components of E-business XML Systems – Enterprise Integration – ebXML – RosettaNet – Introduction of Web Content Management – Components of Content Management System – Role of XML in Web Content Management – Role of metadata (RDF and PRISM) in Web Content Management.

TEXTS

1. Ron Schmelzer et al. "XML and Web Services", Pearson Education, 2002.
2. MichealDroettboom, "Understanding JSON Schema Release 1.0", 2013.

REFERENCES

1. Ethan Cerami, "Web Services Essentials", O'Reilly, Shroff Publishers & Distributors Pvt.Ltd, Fourth Edition, 2002.
2. Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall Edition, 2004.

WEB REFERENCES

www.w3schools.com/xml/
https://www.tutorialspoint.com/xml/
www.xmlmaster.org/en/article/d01/
www.quackit.com/xml/tutorial/
www.tutorialspoint.com/webservices/
www.javatpoint.com/web-services-tutorial
tutorials.jenkov.com/web-services/

PAPER - 9

PROGRAMMING USING PYTHON

COURSE OBJECTIVES
- To know the basics of algorithmic problem solving
- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures – lists, tuples, dictionaries.
- To do input/output with files in Python.

COURSE OUTCOMES
CO1 - Students are able to explore the fundamental concepts of Python
CO2 - Students are able to understand Basics of Python programming language
CO3 - Students are able to solve simple problems using Python
CO4 - Students are able to acquire fundamental knowledge and skills on Python Programming
CO5 - Students are able to understand the nuances of this language.
CO6 - Students are able to know the usage of modules and packages in Python
CO7 - Students are able to familiarize with file concepts in Python
CO8 - Students are able to familiarize with web concepts using Python.

UNIT - I: OVERVIEW
Introduction to Python: Features of Python - How to Run Python – Identifiers - Reserved Keywords - Variables - Comments in Python - Indentation in Python - Multi-Line Statements - Multiple Statement Group (Suite) – Quotes in Python - Input, Output and Import Functions - Operators. Data Types and Operations: Numbers-Strings-List-Tuple-Set-Dictionary-Data type conversion.

UNIT - II: FLOW CONTROL & FUNCTIONS
Flow Control: Decision Making-Loops-Nested Loops-Types of Loops. Functions: Function Definition-Function Calling - Function Arguments - Recursive Functions - Function with more than one return value.

UNIT - III: MODULES, PACKAGES AND FILE HANDLING
Modules and Packages: Built-in Modules - Creating Modules - import Statement - Locating Modules - Namespaces and Scope - The dir() function - The reload() function - Packages in Python - Date and Time Modules. File Handling: Opening a File - Closing a File - Writing to a File – Reading from a File - File Methods - Renaming a File - Deleting a File - Directories in Python.

UNIT - IV: OBJECT ORIENTED PROGRAMMING
Class Definition - Creating Objects - Built-in Attribute Methods - Built-in Class Attributes - Destructors in Python Encapsulation - Data Hiding- Inheritance - Method Overriding Polymorphism. Exception Handling: Built-in Exceptions - Handling Exceptions - Exception with Arguments- Raising Exception - User-defined Exception - Assertions in Python

UNIT - V: REGULAR EXPRESSIONS & WEB APPLICATIONS

Regular Expressions: The match() function - The search() function - Search and Replace - Regular Expression Modifiers: Option Flags - Regular Expression Patterns - Character Classes - Special Character Classes - Repetition Cases - findall() method - compile() method. Web Application Framework- Django Architecture- Starting development- Case Study: Blogging App.

TEXTS

1. Jeeva Jose and P. SojanLal, "Introduction to Computing and Problem Solving with Python", Khanna Book Publising Co. (P) Ltd., 2016.
2. ArshdeepBahga, Vijay Madisetti, "Cloud Computing: A Hands – On Approach" Universities press (India) Pvt. limited 2016.

REFERENCES

1. Wesley J. Chun, "Core Python Programming", Second Edition, Prentice Hall Publication, 2006.
2. Timothy A Budd, "Exploring Python", Tata McGraw Hill, New Delhi, ISBN: 780071321228

WEB REFERENCES

www.learnpython.org/
https://www.codecademy.com/learn/python
https://www.Codementor.io
https://www.Python.org

PRACTICAL - 7

DISTRIBUTED OPERATING SYSTEM

1. Write a shell script to copy, rename and print multiple files using choice menus.

2. Write a shell script to display logged in users who are using high CPU percentage.

3. Write a shell script to list processes based on CPU percentage and memory un usage.

4. Write a shell script to display total used and free memory space.

5. Write a shell script that takes as command-line input a number n and a word. The program should then print the word n times, one word per line.

6. Write a shell scripts using the following statements. a) While-loop b) For-loop c) If-then-else d) Switch

7. Write a shell script using grep statement.

8. Write a shell script that can search all immediate sub-directories of the currentdirectory for a given file and then quit if it finds one.

PRACTICAL-8

XML AND WEB SERVICES

1. Simple XML file
2. Validating XML document using Internal DTD, External DTD
3. Validating an XML document using XSD
4. Validating an XML document with attributes using XSD
5. XML with mixed contents
6. Validating an XML document using XSD that implements user defined data type
7. Presenting an XML file using XSLT elements
8. Transforming XML using XSLT and implementing XPath – Nodeset functions
9. Transforming XML using XSLT and implementing XPath – number functions
10. Creating a Web Service and Creating and invoking a Web Service

PRACTICAL-9

PROGRAMMING USING PYTHON

1. Working with numbers
2. Implementing String operations
3. Working with Tuples and Set
4. Implementation of Dictionaries
5. Demonstrating List Operations.
6. Flow Control and Functions
7. Modules and Packages
8. File handling
9. Object Oriented Programming
10. Exception Handling and Regular Expressions

PAPER - 3

(to choose one out of 3)

A. BLOCKCHAIN TECHNOLOGY

COURSE OBJECTIVES
- To understand the functions of Blockchain
- To have clarity in the Concepts, challenges, solutions with respect to Blockchain
- To understand the facts and myths related to cryptocurrencies.
- To apply the concept of Blockchain for various applications.
- To correlate current Indian scenario in governing cryptocurrencies in India with Global standard.

COURSE OUTCOMES

CO1 - Students are able to understand the functions of Blockchains
CO2 - Students are able to have clarity in the Concepts, challenges, solutions with respect to blockchain
CO3 - Students are able to understand the facts and myths related to cryptocurrencies.
CO4 - Students are able to apply the concept of Blockchain for various applications.
CO5 - Students are able to correlate Current Indian scenario in governing cryptocurrencies in India with Global standard.

UNIT – I: BLOCKCHAIN 1.0
Currency, Technology Stack: Blockchain, Protocol, Currency, the Double-Spend and Byzantine Generals' Computing Problems, How a Cryptocurrency Works, Summary: Blockchain 1.0 in Practical Use, The Blockchain Is an Information Technology.

UNIT – II: BLOCKCHAIN 2.0
Contracts, Financial Services, Crowdfunding, Bitcoin Prediction Markets, Smart Property, Smart Contracts, Blockchain 2.0 Protocol Projects, Wallet Development Projects, Blockchain Development Platforms and APIs, Blockchain Ecosystem: Decentralized Storage, Communication, and Computation, Ethereum: Turing-Complete Virtual Machine, Dapps, DAOs, DACs, and DASs: Increasingly Autonomous Smart Contracts, The Blockchain as a Path to Artificial Intelligence.

UNIT – III: BLOCKCHAIN 3.0
Justice Applications Beyond Currency, Economics, and Markets, Blockchain Technology Is a New and Highly Effective Model for Organizing Activity, Distributed Censorship-Resistant Organizational Models, Namecoin: Decentralized Domain Name System, Digital Identity Verification, Digital Art: Blockchain Attestation Services (Notary, Intellectual Property Protection), Blockchain Government.

UNIT – IV: BLOCKCHAIN 3.0
Efficiency and Coordination Applications Beyond Currency, Economics, and Markets, Blockchain Science: Gridcoin, Foldingcoin, Blockchain Genomics, Blockchain Health, Blockchain Learning: Bitcoin MOOCs and Smart Contract Literacy, Blockchain Academic

Publishing: Journalcoin, The Blockchain Is Not for Every Situation, Centralization-Decentralization Tension and Equilibrium.

UNIT – V: ADVANCED CONCEPTS

Terminology and Concepts, Currency, Token, Tokenizing, Currency Multiplicity: Monetary and Nonmonetary Currencies, Demurrage Currencies: Potentially Inventory and Redistributable, Limitations: Technical Challenges, Business Model Challenges, Scandals and Public Perception, Government Regulation, Privacy Challenges for Personal Records, Overall: Decentralization Trends Likely to Persist.

TEXT

1. Melanie. Swan. Blockchain: Blueprint for a new economy. " O'Reilly Media, Inc.", 2015.

REFERENCES

1. Colm Gordon, "Blockchain Simplified", 2017.
2. Melanie Swan "Blockchain", O'Reilly Media, Inc., 2015.
3. Imran basher, "Mastering Blockchain" Packt publication, 2nd Edition, 2018.

WEB REFERENCES

https://www.udemy.com/course/blockchain-and-bitcoin-fundamentals
https://www.tutorialspoint.com/blockchain/index.htm

CORE ELECTIVE

PAPER - 3

B. INTERNET OF THINGS

COURSE OBJECTIVES
- To design and Develop IOT based solution for real world applications
- To realize the evolution of Internet in Mobile Devices, Cloud & Sensor Networks
- To understand the building blocks of Internet of Things and its characteristics.
- To understand the concepts of IOT and its application.

COURSE OUTCOMES
CO1 - Students are able to design and develop IOT based solution for real world applications
CO2 - Students are able to realize the evolution of Internet in Mobile Devices, Cloud & Sensor Networks
CO3 - Students are able to understand the building blocks of Internet of Things and its characteristics.
CO4 - Students are able to understand the concept of IOT and its application.

UNIT - I: INTRODUCTION
Introduction and Definition of Internet of Things, IoT Growth – A Statistical View, Application Areas of IoT, Characteristics of IoT, Things in IoT, IoT Stack, Enabling Technologies, IoT Challenges, IoT Levels, Is Cyber Physical System the same as IoT? Is WSN the same as IoT?

UNIT - II: INTRODUCTION TO SENSORS, MICROCONTROLLERS, AND THEIR INTERFACING
Introduction to Sensor Interfacing, Types of Sensors, Controlling Sensors through Webpages, Microcontrollers: A Quick Walkthrough, ARM. Protocols for IoT – Messaging and Transport Protocols, Messaging Protocols (MQTT, CoAP, AMQP), Transport Protocols (Li-Fi, BLE).

UNIT - III: PROTOCOLS FOR IOT
Addressing and Identification, Internet Protocol Version 4 (IPv4), Internet Protocol Version 6 (IPv6), Uniform Resource Identifier (URI). Cloud for IoT - Introduction, IoT with Cloud – Challenges, Selection of Cloud Service Provider for IoT Applications: An Overview, Introduction to Fog Computing, Cloud Computing: Security Aspects, Case Study: How to use Adafruit Cloud? Application of Data Analytics in IOT.

UNIT - IV: APPLICATION BUILDING WITH IOT
Introduction, Smart Perishable Tracking with IoT and Sensors, Smart Healthcare – Elderly Fall Detection with IoT and Sensors, Smart Inflight Lavatory Maintenance with IoT, IoT–Based Application to Monitor Water Quality, Smart Warehouse Monitoring – Let the Drone Fly for You, Smart Retail – IoT Possibilities in the Retail Sector, Prevention of Drowsiness of Drivers by IoT-Based Smart Driver Assistance Systems, System to Measure Collision Impact in an Accident with IoT.

UNIT - V: GETTING FAMILIARIZED WITH ARDUINO IDE

Architecture, Arduino Programming, A Simple Application, Arduino Playground. Getting Familiarized with Raspberry Pi - Story behind Raspberry Pi, Architecture, Compatible Peripherals, Add-Ons, and Accessories, Operating System for Raspberry Pi, Setting up Raspberry Pi, Initial Configuration for Raspberry Pi, Linux Based Softwares in Raspberry Pi, Application Development with Raspberry-Pi – A Quick Walk Through.

TEXT

1. Shriram K Vasudevan, Abhishek S Nagarajan, RMD Sundaram, Internet of Things, Wiley, India, 2019.

REFERENCES

1. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on Approach)", 1stEdition, VPT, 2014.
2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.

WEB REFERENCES

https://www.coursera.org/courses?query=iot
https://online.stanford.edu/courses/xee100-introduction-internet-things
https://www.tutorialspoint.com/internet_of_things/index.htm

PAPER - 3

C. NETWORK SECURITY

COURSE OBJECTIVES
- Identify some of the driving factors needed for network security
- Identify and classify attacks and threats
- Compare and contrast symmetric and asymmetric encryption systems.
- Identify the web systems vulnerable to attack.
- Use appropriate secure mail applications and security protocols

COURSE OUTCOMES
CO1 - Students are able to identify some of the driving factors needed for network security
CO2 - Students are able to Identify and classify attacks and threats
CO3 - Students are able tocompare and contrast symmetric and asymmetric encryption systems.
CO4 - Students are able toidentify the web systems vulnerable to attack.
CO5 - Students are able touse appropriate secure mail applications and security protocols

UNIT- I: SECURITY IN COMPUTING ENVIRONMENT
Need for Security - Security Attack - Security Services - Information Security - Methods of Protection. Basics of Cryptography: Terminologies used in Cryptography - Substitution Techniques- Transposition Techniques. Encryption and Decryption: Characteristics of Good Encryption Technique -Properties of Trustworthy Encryption Systems - Types of Encryption Systems - Confusion and Diffusion -Cryptanalysis**.**

UNIT-II: SYMMETRIC KEY ENCRYPTION
Data Encryption Standard (DES) Algorithm - Double and Triple DES - Security of the DES - Advanced Encryption Standard (AES) Algorithm - DES and AES Comparison. Public Key Encryption: Characteristics of Public Key System - RSA Technique - Key Exchange -Diffie-Hellman Scheme - Cryptographic Hash Functions - Digital Signature – Certificates - Certificate Authorities.

UNIT - III: IP SECURITY
Overview of IP Security (IPSec) - IP Security Architecture - Modes of Operation - Security Associations (SA) - Authentication Header (AH) - Encapsulating Security Payload (ESP) - Internet Key Exchange. Web Security: Web Security Requirements - Secure Socket Layer (SSL) - Transport Layer Security (TLS) - Secure Electronic Transaction (SET).

UNIT - IV: ELECTRONIC MAIL SECURITY
Pretty Good Privacy - Threats to E-Mail - Requirements and Solutions - Encryption for Secure E-Mail - Secure E-Mail System. Firewalls: Firewalls – Types - Comparison of Firewall Types - Firewall Configurations - Planning and Enforcing Security Policies: Planning Security Policies - Risk Analysis - Security Policies for an Organization - External Security.

UNIT-V: PROTECTION OF COMPUTING RESOURCES

Secure Programs - Non-malicious Program Errors - Viruses and Other Malicious Code - Targeted Malicious Code - Methods of Control. Security Features in Operating System: Objects to be Protected - Protection Methods of Operating Systems - Memory Protection - File Protection - User Authentication.

TEXT

1. William Stallings. Cryptography and network security, 4/E. Pearson Education India, 2006.

REFERENCE

2. Singh,"Network Security and Management", 2nd ed., PHI.

WEB REFERENCES

https://alison.com/course/introduction-to-computer-network-security
https://www.udemy.com/course/certified-secure-netizen/

PAPER - 3

(to choose one out of 3)

A. PROGRAMMING USING C

COURSE OBJECTIVES

- To identifysituations where computational methods and computers would be useful.
- To enhance their analyzing and problem-solving skills and use the same for writing programs in C.
- To develop logics and that will help them to create programs, applications in C.
- To identify programming task involvedin a given computational problem.
- To approachthe programming tasks using techniques learned and writepseudo-code.
- To choosethe right data representation formats based on the requirements of the problem.
- To usethe comparisons and limitations of the various programming constructs and choosethe right one for the task in hand.
- To enter the program on a computer, edit, compile, debug, correct, recompile and run it.
- To identify tasks in which the numerical techniques learned are applicable and apply them to write programs.

COURSE OUTCOMES

CO1 - Students are able to understand a functional hierarchical code organization.

CO2 - Students are able to define and manage data structures based on problem subject domain.

CO3 - Students are able to work with textual information, characters and strings.

CO4 - Students are able to work with arrays, structures, pointers and files.

UNIT – I: DATA TYPES, OPERATORS AND STRUCTURES

Structure of a C program – Basic data types (int, float, char, double, void) – constants and variables (variable declaration, integer, real,float, character, variables) – operators and expressions (arithmetic operators, relational operators, logical operators, bitwise operators, type casting, type conversion, enumerated data type, typedef) – Control Constructs (if, switch, while, do…while, for, break and continue, exit() function, goto and label).

UNIT – II: ARRAYS AND FUNCTIONS

Arrays (declaration, one and two dimensional arrays) - Character Arrays and Strings. Function Fundamentals (General form, Function Definition, Function arguments, return value) – Parameter passing: call-by-value and call-by-reference – Recursion – Passing Arrays to Function – Passing Strings to Function.

UNIT – III: POINTERS

Understanding Pointers – Accessing the Address of a Variable – Declaring the Pointer Variables – Initialization of Pointer Variables – Accessing a Variable through its Pointer –

Pointer Expressions – Pointers and Arrays – Pointers and Character Strings – Array of Pointers – Pointers as Function Arguments – Functions returning Pointers – Pointers to Functions.

UNIT – IV: STORAGE CLASSES, STRUCTURES AND UNIONS

Scope rules (Local variables and global variables, scope rules of functions) -Type modifiers and storage class specifier.

Structures – Basics of Structure – Declaring of Structure – Referencing Structure elements - Array of Structures – Nesting of Structures - Passing Structures to function – Pointers and Structures - Unions.

UNIT – V: FILE MANAGEMENT IN C

Introduction – Defining and Opening a File – Closing a File – Input / Output Operations on Files – Command Line Arguments.

TEXT

1. E.Balagurusamy, "Programming in ANSI C", Seventh Edition, McGraw Hill Education Private Limited, NewDelhi: 2017.

REFERENCES

1. YashavantKanetkar, "Let us C", BPB Publications, Tenth Edition - New Delhi: 2010
2. Ashok N.Kamthane, "Programming in C", Second Impression, Pearson: 2012.

WEB REFERENCES

http://www.c4learn.com/?gclid=COK1y6nHk7wCFcUA4godmlgAKA/
http://www.cprogramming.com/tutorial/c-tutorial.html/
http://www.tutorialspoint.com/cprogramming/

PAPER - 3

B. PROGRAMMING USING C++

COURSE OBJECTIVES

- To understand object oriented programming and advanced C++ concepts.
- To understand the various functions and arguments in object oriented programming.
- To understand the classes and objects in C++.
- To be familiar with inheritance and polymorphisms.
- To be able to understand the concepts of files and exception handling.

COURSE OUTCOMES

CO1 - Students are able to understand object oriented programming and advanced C++ concepts.

CO2 - Students are able to understand the various functions and arguments in object oriented programming.

CO3 - Students are able to understand the classes and objects in C++.

CO4 - Students are able to familiarize with inheritance and polymorphisms.

CO5 - Students are able to understand the concepts files and exception handling.

UNIT – I: BASIC CONCEPTS

A look at Procedure Oriented Programming – Object Oriented Programming Paradigm – Basic Concepts of Object Oriented Programming – Benefits of OOP – Object Oriented Languages – Beginning With C++ - A Simple C++ Program – Structure of C++ Program – Tokens – Basic Data Types – Scope Resolution Operator – Manipulators – Expressions – Control Structures.

UNIT – II: FUNCTIONS

Functions – Function Prototyping – Call by Value – Call by Reference – Inline Functions – Default Arguments – Passing Arrays to Functions – Passing Structures to Functions – Recursion – Pointers – Function Overloading – Friend Functions.

UNIT – III: CLASSES AND OBJECTS

Defining Member Functions – Private Member Function – Data Members – Member Functions – Arrays of Objects – Objects as Function Arguments – Friendly Functions – Constructors and Destructors – Object Pointers.

UNIT – IV: INHERITANCE AND POLYMORPHISM

Operator Overloading – Inheritance – Single Inheritance – Multilevel Inheritance – Multiple Inheritance – Hierarchical Inheritance – Virtual Base Classes – Abstract Classes – Polymorphism – Virtual Functions.

UNIT – V: EXCEPTION HANDLING AND FILES

Exception Handling – File I/O Stream – File Stream Operations – Opening and Closing a File – Sequential Access.

TEXT

1. E Balagurusamy, "Object Oriented Programming with C++", 5th Edition, McGraw Hill Education India Pvt Ltd. 2012.

REFERENCES

1. Andrew C. Staugaard JR, "Structured and Object-Oriented Problem Solving Using C++", 3rd Edition, Prentice Hall, 2002.
2. Herbert Schildt, "C++: The Complete Reference", 3rd Edition, Tata McGraw Hill, 1999.

WEB REFERENCES

http://www.doc.ic.ac.uk/~wjk/C++Intro/
http://www.ideone.com/
http://www.compilr.com/c-compiler

PAPER - 3

C. PROGRAMMING USING PYTHON

COURSE OBJECTIVES
- To know the basics of algorithmic problem solving
- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures – lists, tuples, dictionaries.
- To do input/output with files in Python.

COURSE OUTCOMES
CO1 - Students are able to explore the fundamental concepts of Python
CO2 - Students are able to understand Basics of Python programming language
CO3 - Students are able to solve simple problems using Python
CO4- Students are able to acquire fundamental knowledge and skills on Python Programming
CO5 - Students are able to understand the nuances of this language.
CO6 - Students are able to know the usage of modules and packages in Python
CO7 - Students are able to familiarize with file concepts in Python
CO8 - Students are able to familiarize with web concepts using Python.

UNIT - I: OVERVIEW
Introduction to Python: Features of Python - How to Run Python – Identifiers - Reserved Keywords - Variables - Comments in Python - Indentation in Python - Multi-Line Statements - Multiple Statement Group (Suite) – Quotes in Python - Input, Output and Import Functions - Operators. Data Types and Operations: Numbers-Strings-List-Tuple-Set-Dictionary-Data type conversion.

UNIT - II: FLOW CONTROL & FUNCTIONS
Flow Control: Decision Making-Loops-Nested Loops-Types of Loops. Functions: Function Definition-Function Calling - Function Arguments - Recursive Functions - Function with more than one return value.

UNIT - III: MODULES, PACKAGES AND FILE HANDLING
Modules and Packages: Built-in Modules - Creating Modules - import Statement - Locating Modules - Namespaces and Scope - The dir() function - The reload() function - Packages in Python - Date and Time Modules. File Handling: Opening a File - Closing a File - Writing to a File – Reading from a File - File Methods - Renaming a File - Deleting a File - Directories in Python.

UNIT - IV: OBJECT ORIENTED PROGRAMMING
Class Definition - Creating Objects - Built-in Attribute Methods - Built-in Class Attributes - Destructors in Python Encapsulation - Data Hiding- Inheritance - Method Overriding Polymorphism. Exception Handling: Built-in Exceptions - Handling Exceptions - Exception with Arguments- Raising Exception - User-defined Exception - Assertions in Python

UNIT - V: REGULAR EXPRESSIONS & WEB APPLICATIONS

Regular Expressions: The match() function - The search() function - Search and Replace - Regular Expression Modifiers: Option Flags - Regular Expression Patterns - Character Classes - Special Character Classes - Repetition Cases - findall() method - compile() method. Web Application Framework- Django Architecture- Starting development- Case Study: Blogging App.

TEXTS

1. Jeeva Jose and P. SojanLal, "Introduction to Computing and Problem Solving with Python", Khanna Book Publising Co. (P) Ltd., 2016.

2. ArshdeepBahga, Vijay Madisetti, "Cloud Computing: A Hands – On Approach" Universities press (India) Pvt. limited 2016.

REFERENCES

1. Wesley J. Chun, "Core Python Programming", Second Edition, Prentice Hall Publication, 2006.

2. Timothy A Budd, "Exploring Python", Tata McGraw Hill, New Delhi, ISBN: 780071321228

WEB REFERENCES

www.learnpython.org/
https://www.codecademy.com/learn/python
https://www.Codementor.io
https://www.Python.org

SEMESTER IV

PAPER - 10

MOBILE APPLICATION DEVELOPMENT

COURSE OBJECTIVES
- To know the basis of Android application and development environment
- To able to develop simple and professional application
- To get ready for the job opportunity in mobile application development

COURSE OUTCOMES
CO1 - Students are able to know about the mobile application development environment
CO2 - Students are able to develop interface and design
CO3 - Students are able to use the techniques in Mobile Applications

UNIT - I: INTRODUCTION TO ANDROID
History of Android Platform- Android APIs- Android Architecture Application Framework- Features of Android- Android Applications- Application Components - Manifest File- Downloading and Installing Android and Android SDK - Setting up Android Virtual and physical Device - Exploring the Development Environment - The Java Perspective Using Eclipse - DDMS Perspective - Command-Line Tools- Developing and Executing the First Android Application - Using Eclipse IDE to Create an Application - Running Your Application - Exploring the Application - Using Command - Line Tools.

UNIT – II: ACTIVITIES, INTENTS AND FRAGMENTS
Working with Activities- Creating an Activity- Starting an Activity – Managing the Life cycle of an Activity - Applying Themes and Styles to an Activity- Displaying a Dialog in the Activity - Hiding the title of the activity- Using Intents-Exploring Intent Objects- Exploring Intent Resolution- Exploring Intent Filters - Resolving Intent Filter Collision - Linking the Activities Using Intent - Obtaining Results from Intent – Passing Data Using an Intent Object- Fragments - Hiding Title Bar and Screen Orientation - Fragment Implementation - Finding Fragments - Adding, Removing and Replacing Fragments - Finding Activity Using Fragment - Using the Intent Object to Invoke Built-in Application..

UNIT - III: UI USING VIEWS AND VIEW - GROUPS
Working with View Groups – Linear Layout – Relative Layout – Scroll Layout – Table Layout – Frame Layout – Tab Layout using the Action Bar – Working with Views – Text – Edit Text – Button – Radio Button – Check Box – Image Button – Toggle Button – Rating Bar – Binding Data with Adapter View Class – List View – Spinner – Gallery – Designing the Auto Text Complete View – Screen Orientation – Anchoring the Views of Current Activity – Handling UI Events – Handling User Interaction with Activities and Views – Specialized Fragments – List Fragment – Dialog Fragment – Preference Fragment – Creating Menus, Option Menus, Context Menu and Sub Menu.

UNIT - IV: HANDLING PICTURES AND MENUS WITH VIEWS AND STROING THE DATA
Working with Image Views – Displaying Images in the Gallery View – Displaying Images in the Grid View – Using the Image Switcher View- Designing Context Menu for Image View- Using the Analog-Clock and Digital Clock Views – Embedding Web Browser in an Activity - Notifying the User Creating the Toast Notification - Creating the Status Bar Notification-

Creating the Dialog Notification - Introducing the Data Storage Options - Using Preferences - Using the SQLite Database Creating the Database - Executing the Database Operations.

UNIT - V: EMAILING, TELEPHONY AND SMS IN ANDROID

Building an Application to Send Email - Handling Telephony - Displaying Phone InformationApplication Receiving Phone Calls – Making Outgoing Phone Calls Application - Handling SMS Sending SMS Using SMS Manager - Sending SMS Using Intent - Receiving SMS Using the Broadcast Receiver Object- Role of Default SMS Providers - . Publishing Android Application: Export android application – Google play store registration.
Supplementary Learming: Building Mobile Applications using Xamarin

TEXTS
1. Pradeep Kothari, "Android Application Development (with kitkat support) Black Book", Kogent Learning Solution Inc., Dreamtech Press India Pvt. Ltd, Wiley Publications.
2. Sayed Y. Hashimi, SatyaKomatineni, Dave MacLean, "Pro Android 2", 2010 Edition, Wiley publications.

REFERENCES
1. Reto Meier ,"Professional Android Application Development",2009 Edition, Willy Publication.
2. ZigurdMednieks, Laird Dornin, G. Blake Meike,and Masumi Nakamura, "Programming Android", OReilly publications.

WEB REFERENCES
www.tutorialspoint.com
www.javatpoint.net
www.mkyong.com
www.java2s.com

PAPER - 11

SOFTWARE PROJECT MANAGEMENT

COURSE OBJECTIVES
- To provide sound knowledge in Project Management.
- To understand the importance of requirement gathering
- To explore different models in Software Development
- To know the workflow of a Project
- To identify various actors in the activity

COURSE OUTCOMES

CO1 - Students are able to understand the activities during the project scheduling of any software application.

CO2 - Students are able tolearn the risk management activities and the resource allocation for the projects.

CO3 - Students are able toapply the software estimation and recent quality standards for evaluation of the software Projects.

CO4 - Students are able toacquire knowledge and skills needed for the construction of highly reliable software project.

CO5 - Students are able to able to create reliable, replicable cost estimation that links to the requirements of project planning and managing.

UNIT I: INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT

Introduction:Project – Software Projects vs other types of Project – Activities Covered by SPM – Some Ways of Categorizing Software Projects – Stakeholders, Setting Objectives – The Business Case - Project Success and Failure - Management and Management Control. Project Evaluation:A Business Case – Project Portfolio Management – Evaluation of Individual Projects – Cost Benefit Evaluation – Risk Evaluation.

UNIT II: PROJECT PLANNING AND SELECTION OF PROJECT APPROACH

Project Planning - Introduction to Step Wise Project Planning – Step 0 to Step 10. Selection of an Appropriate Project Approach -Introduction – Build or Buy – Choosing Methodologies and Technologies – Software Processes and Process Models – Choice of Process Models – The Waterfall Model– Prototyping – other ways of categorizing prototype- Agile Methods – Extreme Programming - Selecting the Most Appropriate Process Model.

UNIT III: EFFORT ESTIMATION AND ACTIVITY PLANNING

Effort Estimation – Introduction –Estimates – Problems with Over and Under-estimate – Basis for Software Estimating – Effort Estimation Techniques – Bottom-up Estimating – Top-down Approach and Parametric Models – Expert Judgment - Estimating by Analogy – Albrecht Function Point Analysis – Function Mark II – COCOMO & COCOMO II – Cost Estimation – Staffing Pattern. Activity Planning –Introduction – Objectives of Activity Planning – When to plan – Project Schedules – Project and Activities – Sequencing and Scheduling Activities – Networking Planning Models – Formulating a Network Model– Activity on Arrow Networks.

UNIT IV: RISK MANAGEMENT, RESOURCE ALLOCATION AND MONITORING

Risk Management –Risk – Categories of Risk – A Framework for Dealing with Risk – Risk Identification – Risk Assessment – Risk Planning – Risk Management. Resource Allocation – Introduction – The Nature of Resources – Identifying Resource Requirements – Scheduling Resources. Monitoring –Creating the Framework – Collecting the Data – Review and Project Termination Review – Visualizing Progress – Cost Monitoring and Earned Value Analysis – Getting the Project Back to Target – Change Control – SCM.

UNIT V: MANAGING PEOPLE AND WORKING IN TEAMS

Managing People –Understanding Behavior – Organizational Behavior – Selecting the Right Person for the Job – Instruction in the Best Methods – Motivation – The Oldham-Hackman Job Characteristics Model – Stress – Health and Safety. Working in Teams –Introduction – Becoming a Team – Decision Making – Organization and Team Structures – Coordination Dependencies – Dispersed and Virtual Teams – Communication Genres – Communication Plans – Leadership.

TEXT

1. BOB Huges, Mike Cotterell, Rajib Mall "Software Project Management", McGraw Hill, Fifth Edition,2011.

REFERENCES

1. Futrell, "Quality software Project management", Pearson Education India.
2. Royce, "Software Project Management", Pearson Education India.

WEB REFERENCES

https://www.lynda.com/Project-Management-training-tutorials/39-0.html
www.rspa.com/spi/project-mgmt.html

PRACTICAL - 10
MOBILE APPLICATION DEVELOPMENT

1. Simple Android Application.
2. Working with Activity
3. Working with Fragments
4. UI Controls (Text, Edit Text, Button, Radio Button)
5. UI Controls (Check Box, and Layout, Image Button, Toggle Button)
6. UI Controls (Rating Bar, List View, Gallery)
7. CRUD Operations Using SQLite DB
8. Emailing
9. Telephony
10. SMS

A. BIG DATA ANALYTSIS

COURSE OBJECTIVES
- To understand the needs for Big Data and its environments.
- To learn the basic requirements of Big Data Technologies.
- To expose the knowledge of MapReduce programming framework(Hadoop).
- To be familiar with with NoSQL DB's Cassandra and MongoDB
- To understand Hive and Pig technologies for analyzing the Big Data.

COURSE OUTCOMES
CO1 - Students are able to learn about types of digital data and big data
CO2 - Students are able to gain knowledge of various Big data analtics and its Technologies
CO3 - Students are able to study about various NoSQL databases and management techniques
CO4 - Students are able to work with NoSQL databases such as MongoDB and Cassendra
CO5 - Students are able to design Big data queries using Hive and Pig.

UNIT – I: INTRODUCTION TO BIG DATA
Data, Characteristics of data and Types of digital data: Unstructured, Semi-structured and Structured, Sources of data, Working with unstructured data, Evolution and Definition of big data, Characteristics and Need of big data, Challenges of big data, Data environment versus big data environment

UNIT – II: BIG DATA ANALYTICS
Overview of business intelligence, Data science and Analytics, Meaning and Characteristics of big data analytics, Need of big data analytics, Classification of analytics, Challenges to big data analytics, Importance of big data analytics, Basic terminologies in big data environment

UNIT – III: BIG DATA TECHNOLOGIES AND DATABASES
Introduction to NoSQL, Uses, Features and Types, Need, Advantages, Disadvantages and Application of NoSQL, Overview of NewSQL, Comparing SQL, NoSQL and NewSQL, Introduction to MongoDB and its needs, Characteristics of MongoDB, Introduction of apache cassandra and its needs, Characteristics of Cassandra

UNIT – IV: HADOOP FOUNDATION FOR ANALYTICS

History, Needs, Features, Key advantage and Versions of Hadoop, Essential of Hadoop ecosystems, RDBMS versus Hadoop, Key aspects and Components of Hadoop, Hadoop architectures

UNIT – V: HADOOPMAPREDUCE AND YARN FRAMEWORK:
Introduction to MapReduce, Processing data with Hadoop using MapReduce, Introduction to YARN, Components, Need and Challenges of YARN, Dissecting YARN, MapReduce application, Data serialization and Working with common serialization formats, Big data serialization formats

TEXT

1. Seema Acharya and Subhashini Chellappan, "Big Data and Analytics", Wiley India Pvt. Ltd., 2016

REFERENCE BOOKS

1. "Big Data" by Judith Hurwitz, Alan Nugent, Dr. Fern Halper and Marcia Kaufman, Wiley Publications, 2014.
2. "Big Data Imperatives : Enterprise Big Data Warehouse, BI Implementations and Analytics" by Soumendra Mohanty, Madhu Jagadeesh and Harsha Srivatsa, Apress Media, Springer Science + Business Media New York, 2013
3. "Mining of Massive Datasets", Anand Rajaraman, Jure Leskovec, Jeffery D. Ullman, Springer, July 2013.
4. "Hadoop: The definitive Guide", Tom White, O'Reilly Media, 2010.

WEB REFERENCES

http://strata.oreilly.com/2010/09/the-smaq-stack-for-big-data.html
http://blogs.computerworld.com/18840/big_data_smaq_down_storage_mapreduce_and_query

B. ARTIFICIAL INTELLIGENCE

COURSE OBJECTIVES
- To provide a strong foundation of fundamental concepts in Artificial Intelligence
- To provide a basic exposition to the goals and methods of Artificial Intelligence
- To enable the student to apply these techniques in applications which involve perception, reasoning and learning

COURSE OUTCOMES

CO1 - Students are able to understand the various searching techniques, constraint satisfaction problem and example problems- game playing techniques.

CO2 - Students are able toapply these techniques in applications which involve perception, reasoning and learning.

CO3 - Students are able toexplain the role of agents and how it is related to environment and the way of evaluating it and how agents can act by establishing goals.

CO4 - Students are able toacquire the knowledge of real world Knowledge representation.

CO5 - Students are able toanalyze and design a real world problem for implementation and understand the dynamic behavior of a system.

CO6 - Students are able touse different machine learning techniques to design AI machine and enveloping applications for real world problems

UNIT – I: INTRODUCTION

AI Problems - Al techniques - Criteria for success. Problems, Problem Spaces, Search: State space search - Production Systems

UNIT – II: HEURISTIC SEARCH TECHNIQUES

Generate and Test - Hill Climbing- Best-First - Means-end analysis. Knowledge representation issues: Representations and mappings -Approaches to Knowledge representations -Issues in Knowledge representations - Frame Problem.

UNIT – III: USING PREDICATE LOGIC

Representing simple facts in logic - Representing Instance and Is a relationships - Computable functions and predicates - Resolution.

UNIT – IV: REPRESENTING KNOWLEDGE USING RULES

Procedural Vs Declarative knowledge – Logic programming - Forward Vs Backward reasoning - Matching - Control knowledge.

UNIT – V: GAME PLAYING

The minimax search procedure – Expert System - Perception and Action

TEXT

1. Elaine Rich and Kevin Knight," Artificial Intelligence", Tata McGraw Hill Publishers company Pvt Ltd, Second Edition, 1991.

REFERENCES

1. Nils J. Nilsson, "Artificial Intelligence: A new Synthesis", Harcourt Asia Pvt. Ltd., 2000.
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", 2nd Edition, Tata McGraw-Hill, 2003.
3. George F. Luger, "Artificial Intelligence-Structures and Strategies For Complex Problem Solving", Pearson Education / PHI, 2002.

WEB REFERENCES

https://www.tutorialspoint.com/artificial_intelligence/
https://learn.saylor.org/course/view.php?id=96
https://in.udacity.com/course/intro-to-artificial-intelligence--cs271

PAPER - 4

C. MACHINE LEARNING

COURSE OBJECTIVES

To introduce the concepts like

- conceptualization and summarization of big data and machine learning
- Introduction to the course, recap of linear algebra and probability theory basics.
- Bayesian Classification: Naive Bayes, Parameter Estimation (ML, MAP), Sequential Pattern Classification.
- Non-parametric Methods: k-Nearest Neighbours Discriminative Learning models: Logistic Regression, Perceptrons, Artificial Neural Networks, Support Vector Machines

COURSE OUTCOMES

CO1 - Students are able to design and implement machine learning solutions to classification, regression, and clustering problems;

CO2 - Students are able to evaluate and interpret the results of the algorithms.

CO3 - Students are able to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.

CO4 - Students are able to solve problems associated with batch learning and online learning, and the big data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues.

CO5 - Students are able to understand and apply scaling up machine learning techniques and associated computing techniques and technologies.

CO6 - Students are able to recognize and implement various ways of selecting suitable model parameters for different machine learning techniques.

UNIT – I: INTRODUCTION TO MACHINE LEARNING

Learning Systems- Goals and Applications- Aspects of developing a learning system- Training data- Linear Perceptrons as Neurons- Neural Nets- Working- Layers- Activation Functions- Feed Forward Neural Networks- Limitations- DBNs- Deep learning for Bigdata- Local minima- rearranging neurons- Spurious local minima- Comparison of AI- Machine learning & Deep learning.

UNIT – II: TYPES OF LEARNING

Supervised Learning- Unsupervised Learning- Case Study- Classification- MLP in Practice- Overfitting-Linear and non-linear discriminative- decision trees- Probabilistic- K-nearest neighbor learning algorithm- curse of dimensionality.

UNIT – III: LEARNING ALGORITHMS

Logistic Regression- Perceptron- Exponential Family- Generative Learning algorithms- Gaussian Discriminant Analysis- Naïve Bayes- SVM-Kernels- Model Selection- Bagging- Boosting- Evaluating and debugging- Classification errors.

UNIT – IV: UNSUPERVISED AND LEARNING ALGORITHMS

Clustering- K-means Clustering- EM algorithm- Mixture of Gaussians- Factor Analysis-Principal and Independent Component Analysis- latent Semantic Indexing- Spectral or sub-space clustering.

UNIT – V:REINFORCEMENT LEARNING, IOT AND MACHINE LEARNING

Markov Decision Processes- Bellman Equations- Value Iteration and Policy Iteration- Linear quadratic regulation- LQG Q-Learning- Policy versus value learning- POMDPS- IoT- Recent trends- various models. Case Study: Object Detection and smudging using gradient Descent, Spam Filtering based on Text Classification.

TEXTS

1. Rajiv Chopra, "Machine Learning", Khanna Publications, New Delhi, 2018.
2. V.K. Jain, "Machine Learning", Khanna Publications, New Delhi, 2018.

REFERENCES

1. Introduction to Statistical Learning, Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, Springer, 2013.
2. Pattern Classification, 2nd Ed., Richard Duda, Peter Hart, David Stork, John Wiley & Sons, 2001.
3. Pattern Recognition and Machine Learning, Christopher Bishop, Springer 2006.

WEB REFERENCES

https://www.datacamp.com/courses/introduction-to-machine-learning-with-r
https://elitedatascience.com/learn-machine-learning
https://www.analyticsvidhya.com/learning-path-learn-machine-learning/

COURSE OBJECTIVES
- To understand the cyber threats and their Impact
- To have an awareness towards cybercrimes and legal impact against them
- To avoid becoming a Victim to cyber threats
- To assess risks and weakness in security policies
- To respond to security alerts and identify flaws in systems and networks

COURSE OUTCOMES
CO1 - Students are able to understand the cyber threats and their Impact
CO2 - Students are able to have an awareness towards cybercrimes and legal impact against them
CO3 - Students are able to avoid becoming a Victim to cyber threats
CO4 - Students are able to assess risks and weakness in security policies
CO5 - Students are able to respond to security alerts and identify flaws in systems and networks

UNIT - I: INTRODUCTION TO CYBERCRIME AND CYBEROFFENSES
Introduction, Cybercrime - Definition and Origins of the Word - Cybercrime and Information Security - Cybercriminals - Classifications of Cybercrimes - The Legal Perspectives - Cybercrimes: An Indian Perspective - Cybercrime and the Indian ITA 2000 - A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens. Cyberoffenses: How Criminals Plan Them – Introduction - How Criminals Plan the Attacks - Social Engineering – Cyberstalking - Cybercafe and Cybercrimes - Botnets: The Fuel for Cybercrime - Attack Vector - Basics of Cloud Computing.

UNIT - II: TOOLS AND METHODS USED IN CYBERCRIME
Introduction - Proxy Servers and Anonymizers – Phishing - Password Cracking - Keyloggers and Spywares - Virus and Worms - Trojan Horses and Backdoors – Steganography - DoS and DDoS Attacks - SQL Injection - Buffer Overflow – Phishing - Identity Theft (ID Theft).

UNIT - III: UNDERSTANDING COMPUTER FORENSICS
Introduction - Historical Background of Cyberforensics - Digital Forensics Science - The Need for Computer Forensics - Cyberforensics and Digital Evidence - Forensics Analysis of E-Mail - Digital Forensics Life Cycle, Chain of Custody Concept - Network Forensics - Approaching a Computer Forensics Investigation - Setting up a Computer Forensics Laboratory: Understanding the Requirements - Computer Forensics and Steganography - Relevance of the OSI 7 Layer Model to Computer Forensics - Forensics and Social Networking Sites: The Security/Privacy Threats - Computer Forensics from Compliance Perspective - Challenges in Computer Forensics - Special Tools and Techniques - Forensics Auditing – Antiforensics.

UNIT - IV: CYBERSECURITY

Organizational Implications – Introduction - Cost of Cybercrimes and IPR Issues: Lessons for Organizations - Web Threats for Organizations: The Evils and Perils - Security and Privacy Implications from Cloud Computing - Social Media Marketing: Security Risks and Perils for Organizations - Social Computing and the Associated Challenges for Organizations - Protecting People's Privacy in the Organization - Organizational Guidelines for Internet Usage - Safe Computing Guidelines and Computer Usage Policy - Incident Handling: An Essential Component of Cybersecurity - Forensics Best Practices for Organizations - Media and Asset Protection: Best Practices for Organizations - Importance of Endpoint Security in Organizations.

UNIT - V: CYBERCRIME AND CYBERTERRORISM

Social, Political, Ethical and Psychological Dimensions – Introduction - Intellectual Property in the Cyberspace - The Ethical Dimension of Cybercrimes - The Psychology - Mindset and Skills of Hackers and Other Cybercriminals - Sociology of Cybercriminals - Information Warfare: Perception or An Eminent Reality? Cybercrime: Illustrations - Examples and Mini-Cases - Real-Life Examples - Mini-Cases - Illustrations of Financial Frauds in Cyber Domain - Digital Signature-Related Crime Scenarios - Digital Forensics Case Illustrations - Online Scams. Cybercrimes - Legal Perspectives - Why Do We Need Cyberlaws: The Indian Context - The Indian IT Act - Challenges to Indian Law and Cybercrime Scenario in India - Consequences of Not Addressing the Weakness in Information Technology Act - Digital Signatures and the Indian IT Act - Amendments to the Indian IT Act - Cybercrime and and Punishment, Cyberlaw, Technology and Students: Indian Scenario.

TEXT

1. Jennifer L, Bayuk J, Heale P, Rohmeyer, Marcus Sachs, Jeffrey Schmidt and Joseph Weiss "Cyber Security Policy Guidebook", John Wiley & Sons ,2012.

REFERENCES

1. Rick Howard, "Cyber Security Essentials", Auerbach Publications, 2011.
2. Richard A, Clarke, Robert Knake, "Cyber war: The Ne xt Threat to National Security & What to Do About It", Ecco, 2010. 3. Dan Shoemaker, "Cyber security The Essential Body of Knowledge", Cengage Learning, 2011.

WEB REFERENCES

https://www.javatpoint.com/cyber-security-tutorial
https://www.pewresearch.org/internet/quiz/cybersecurity-knowledge/

B. DECISION SUPPORT SYSTEM

COURSE OBJECTIVES
- To introduce the decision making system, models and support
- To appraise the general nature and range of decision support and group support systems
- To impart about knowledge based system and advanced intelligent systems

COURSE OUTCOMES
CO1 - Students are able to recognize the relationship between business information needs and decision making
CO2 - Students are able to appraise the general nature and range of decision support systems
CO3 - Students are able to appraise issues related to the development of DSS
CO4 - Students are able to select appropriate modeling techniques
CO5 - Students are able to analyze, design and implement a DSS

UNIT - I: DECISION-MAKING SYSTEMS, MODELING, AND SUPPORT
Decision-Making: Introduction and Definitions, Systems, Models, Phases of the Decision-Making Process, Decision-Making: The Intelligence Phase, The Design Phase, The Choice Phase, The Implementation Phase, How Decisions Are Supported, Personality Types, Gender, Human Cognition, and Decision Styles, The Decision Makers

UNIT – II: DECISION SUPPORT AND GROUP SUPPORT SYSTEM
DSS Configurations, What Is a DSS?, Characteristics and Capabilities of DSS, Components of DSS, The Data Management Subsystem, The Model Management Subsystem, The User Interface (Dialog) Subsystem, The Knowledge-Based Management Subsystem, The User, DSS Hardware, DSS Classifications. **Group Support System:** Group Decision-Making, Communication, and Collaboration, Communication Support, Collaboration Support: Computer-Supported Cooperative Work, Group Support Systems, Group Support Systems Technologies, Group systems Meeting room and Online, The GSS Meeting Process, Distance Learning, Creativity and Idea Generation.

UNIT - III: KNOWLEDGE-BASED SYSTEMS
Concepts and Definitions of Artificial Intelligence, Evolution of Artificial Intelligence, The Artificial Intelligence Field, Basic Concepts of Expert Systems, Applications of Expert Systems, Structure of Expert Systems, How Expert Systems Work, Problem Areas Suitable for Expert Systems, Benefits and Capabilities of Expert Systems, Problems and Limitations of Expert Systems, Expert System Success Factors, Types of Expert Systems, Expert Systems on the Web.

UNIT- IV: KNOWLEDGE ACQUISITION, REPRESENTATION, AND REASONING

Concepts of Knowledge Engineering, Scope and Types of Knowledge, Methods of Knowledge Acquisition from Experts, Knowledge Acquisition from Multiple Experts, Automated Knowledge Acquisition from Data and Documents, Knowledge Verification and Validation, Representation of Knowledge, Reasoning in Rule-Based Systems, Explanation and Meta knowledge, Inferencing with Uncertainty, Expert Systems Development, Knowledge Acquisition and the Internet.

UNIT – V: ADVANCED INTELLIGENT SYSTEMS

Machine-Learning Techniques, Case-Based Reasoning, Basic Concept of Neural Computing , Learning in Artificial Neural Networks, Developing Neural Network-Based Systems, Genetic Algorithms Fundamentals, Developing Genetic Algorithm Applications, Fuzzy Logic Fundamentals, Developing Integrated Advanced Systems.

TEXT

1. Efraim Turban and Jay E. Aronson, Decision Support System and Intelligent Systems, Prentice Hall International, 7th Edition 2007.

REFERENCES

1. Janakiraman V. S and Sarukesi K, Decision Support Systems, Prentice Hall of India, 6th Printing 2006.
2. Lofti, Decision Support System and Management, McGraw Hill Inc, International Edition, New Delhi 1996.
3. Marakas, Decision Support System, Prentice Hall International, Paperback Edition, New Delhi, 2003

WEB REFERENCES

ndwrcdp.werf.org/documents/WU-HT-03-35/DSS%20Tutorial.pdf
www.slideshare.net/sursayantan92/decision-support-systemdss
www.uky.edu/BusinessEconomics/dssakba/instmat.htm
https://ceit.aut.ac.ir/~shiry/lecture/DSS/Introduction.ppt

PAPER - 4

C. RESEARCH METHODS AND ETHICS

COURSE OBJECTIVES
- To demonstrate the knowledge of research processes (reading, evaluating, and developing);
- To perform literature reviews using print and online databases;
- To identify, explain, compare, and prepare the key elements of a researchproposal/report;
- To compare and contrast quantitative and qualitative research

COURSE OUTCOMES

CO1 - Students are able to demonstrate knowledge of research processes (reading, evaluating, and developing);

CO2 - Students are able to perform literature reviews using print and online databases;

CO3 - Students are able to identify, explain, compare, and prepare the key elements of a research proposal/report;

CO4 - Students are able to compare and contrast quantitative and qualitative research

UNIT I: FOUNDATIONS OF RESEARCH

Meaning – Objectives – Motivation - Utility. Concept of theory – empiricism - deductive and inductive theory. Characteristics of scientific method –Understanding the language of research –Concept – Construct – Definition –Variable - Research Process.

UNIT II: PROBLEM IDENTIFICATION & FORMULATION

Research Question–Investigation Question –Measurement Issues –Hypothesis –Qualities of a good Hypothesis –Null Hypothesis & Alternative Hypothesis. Hypothesis Testing –Logic & Importance.

UNIT III: RESEARCH DESIGN

Concept and Importance in Research –Features of a good research design –Exploratory Research Design –concept, types and uses, Descriptive Research Designs –concept,types and uses. Experimental Design: Concept of Independent & Dependent variables.

UNIT IV: QUALITATIVE AND QUANTITATIVE RESEARCH

Qualitative research –Quantitative research –Concept of measurement, causality, generalization, replication. Merging the two approaches.

UNIT V: MEASUREMENT

Concept of measurement–what is measured? Problems in measurement in research –Validity and Reliability. Levels of measurement –Nominal, Ordinal, Interval, Ratio.

TEXT BOOK

1. C. R. Kothari: Research Methodology: Methods & Technology, New Age Int. Publ.

REFERENCES

1. Gupta Gupta : Research Methodology: Texts and cases with SPSS Application (2011 edn.), International Book House, New Delhi.
2. A.K.P.C.Swain : A Text Book of Research Methodology, Kalyani Publishers.

WEB REFERENCES

https://libguides.wits.ac.za/c.php?g=693518&p=4914913

https://www.scribbr.com/dissertation/methodology/

https://www.intechopen.com/online-first/research-design-and-methodology

****