DHANALAKSHMI SRINIVASAN

COLLEGE OF ARTS & SCIENCE FOR WOMEN

(AUTONOMOUS)

(Affiliated to Bharathidasan University, Tiruchirappalli)

(Nationally Re-Accredited with 'A++' Grade by NAAC)

PERAMBALUR-621 212

Department of Computer Science

M.Sc., Computer Science – Course Structure under CBCS

(For the candidates admitted from the academic year 2024 -2025 onwards)

COMPUTER SCIENCE								
Programme Pattern								
Course Details				**Scheme of Exams**				
Sem	**COURSE**	**Course Title**	**Course Code**	**Hrs**	**Credit**	**CIA**	**SE**	**Final**
I	Core Course-I	Object Oriented Analysis and Design and C++	24PCS1C1	5	4	25	75	100
	Core Course-II	J2EE Technologies	24PCS1C2	5	4	25	75	100
	Core Course-III	Advanced Operating System	24PCS1C3	5	4	25	75	100
	Core I - Practical	Algorithm and OOPS Lab	24PCS1C1P	4	3	40	60	100
	Core II - Practical	J2EE Lab	24PCS1C2P	4	3	40	60	100
	Core Elective-I	Neural Network / Cryptography and Network Security	24PCS1E1A / 24PCS1E1B	4	3	25	75	100
	VAC-1	Mobile Communication	24PCS1VAC	3	2	25	75	100
				30	**23**	**-**	**-**	**700**
II	Core Course- IV	Advanced Database Management System	24PCS2C4	5	4	25	75	100
	Core Course-V	Advanced Python Programming	24PCS2C5	5	4	25	75	100
	Core Course-VI	Mathematical Foundation of Computer Science	24PCS2C6	5	4	25	75	100
	Core III -Practical	ADBMS Lab	24PCS2C3P	4	3	40	60	100
	Core IV- Practical	Advanced Python Programming Lab	24PCS2C4P	4	3	40	60	100
	Core Elective-II	Cloud Computing / Robotic Process Automation for Business	24PCS2E2A / 24PCS2E2B	4	3	25	75	100
	NME-1	Desktop Publishing/Introduction to Graphic Design	24PCS2N1A / 24PCS2N1B	3	2	25	75	100
	Self-Paced learning	Self-Paced learning-Mooc		-	2*			
				30	**23**	**-**	**-**	**700**

III	Core Course-VII	Artificial Intelligence & Machine Learning	24PCS3C7	5	4	25	75	100
	Core Course-VIII	Digital Image Processing	24PCS3C8	5	4	25	75	100
	Core Course-IX	Compiler Design	24PCS3C9	5	4	25	75	100
	Core V-Practical	AI & ML Lab	24PCS3C5P	4	3	40	60	100
	Core VI-Practical	Digital Image Processing using MATLAB	24PCS3C6P	4	3	40	60	100
	Core Elective-III	Data Mining and Warehousing / Data Science and Analytics	24PCS3E3A 24PCS3E3B	4	3	25	75	100
	NME-II	Web Designing/ E-Commerce	24PCS3N2A 24PCS3N2B	3	2	25	75	100
	Internship/Field Study/ Industrial Visit	Internship/Field Study/ Industrial Visit	24P3IV		1			100
	Employability Skill	Employability Skill-Mooc			2*			
				30	**24**	**-**	**-**	**800**
IV	Core Course-X	Big Data Analytics	24PCS4C10	5	4	25	75	100
	Core Course-XI	Internet Of Things	24PCS4C11	5	4	25	75	100
	Industrial based course	Advanced Software Engineering	24PCS4I	5	4	25	75	100
	Project Work	Project Work	24PCS4PW	15	8	40	60	100
				30	**20**	**-**	**-**	**400**
Total				**120**	**90**			**2600**
Extra Credit Course					**90(4*)**			**2600**

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PROGRAMME OUTCOMES

- Ability to identify, formulate and develop solutions for computational challenges
- Fundamental knowledge in computational methods and tools for solving real time problems.
- Inculcate broad knowledge in core areas of Computer Science and emerging technologies
- Develop Analytical and Technical skills to enhance employment potential.
- Capable of integrating knowledge and to provide a gateway for research.

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CORE COURSE I - OBJECT ORIENTED ANALYSIS AND DESIGN AND C++

Semester : I **Max. Marks : 75**

Course Code : 24PCS1C1 **Credit : 4**

Total Periods : 75 **Exam Hrs. : 3**

Objectives:

1. Present the object model, classes and objects, object orientation, machine view and model management view.
2. Enables the students to learn the basic functions, principles.
3. Enables the students to learn the concepts of object orientedanalysis and design.
4. Enable the students to understand C++ language with respect to OOAD.

UNIT I **(16 Hours)**

The Object Model: The Evolution of the Object Model – Elements of the Object Model – Applying the Object Model. Classes and Objects: The Nature of an Object – Relationship among Objects**.**

UNIT II **(17 Hours)**

Classes and Object: Nature of Class – Relationship Among classes – The Interplay of classes andObjects. Classification: The importance of Proper Classification –identifying classes and objects –Key Abstractions and Mechanism.

UNIT III **(13 Hours)**

Introduction to C++ : Input and output statements in C++ Declarations-control structures– Functionsin C++.

UNIT IV **(14 Hours)**

INHERITANCE AND OVERLOADING: Classes and Objects–Constructors and Destructors– operators over loading–Type Conversion-Inheritance – Pointers and Arrays.

UNIT V **(15 Hours)**

POLYMORPHISM AND FILES: Memory Management Operators-Polymorphism–Virtual functions–Files–Exception Handling –String Handling -Templates.

UNIT VI **CURRENT CONTOURS (for CIA only)**

Expert lectures, online seminars –webinars

TEXT BOOK:

1. “Object Oriented Analysis and Design with Applications”, Grady Booch, Second Edition, Pearson Education.
2. “Object-Oriented Programming with ANSI &Turbo C++”, AshokN. Kamthane, First Indian

Print -2003, Pearson Education.

REFERENCE BOOK:

1. Object Oriented Programming with C++, 8th Edition, E. Balagurusamy, 2020
2. Object-Oriented Programming in C++, 2008
3. C++ Programming Language, Bjarne Stroustrup ,4th Edition, 2022

Related Online Contents

1. https://onlinecourses.nptel.ac.in/noc19_cs48/preview
2. https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs19/

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the concept of Object-Oriented development and modeling techniques	K2
CO2	Gain knowledge about the various steps performed during objected sign	K3
CO3	Abstract object-based views for generic software systems	K4
CO4	Link OOAD with C++ language	K4,K5
CO5	Apply the basic concept of OOPs and familiarize to write C++ program	K5,K6

Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours	Credits			
I	24PCS1C1	CC-I: OBJECT ORIENTED ANALYSIS AND DESIGN AND C++					5	4			
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	3	3	2	2	2.1
CO-3	2	2	1	3	2	2	3	2	3	2	2.2
CO-4	1	2	3	2	2	3	2	2	2	2	2.3
CO-5	2	2	2	2	3	3	2	2	2	2	2.2
Mean overall score											2.2 (High)

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CORE COURSE II - J2EE TECHNOLOGIES

Semester : I **Max. Marks : 75**

Course Code : 24PCS1C2 **Credit : 4**

Total Periods : 75 **Exam Hrs. : 3**

Objectives:

1. To impart knowledge on the various technologies in J2EE and their implementation.
2. J2EE platform is to provide developers with a powerful set of APIs while shortening development time, reducing application complexity, and improving application performance.
3. The J2EE platform services simplify application programming.
4. The J2EE platform services allow components and applications to be customized at deployment time to use resources available in the deployment environment.

UNIT I **(16 Hours)**

J2EE OVERVIEW: Distributed Multi-tiered Applications - J2EE Containers - Web Services Support –Packaging Applications – Development Roles – J2EE APIs . UNDERSTANDING XML: Introduction to XML – Generating XML Data.

UNIT II **(15 Hours)**

JAVA SERVLET TECHNOLOGY: What Is a Servlet? – Servlet Life Cycle – Sharing Information – Creating and Initializing a Servlet – Writing Service Methods – Filtering Requests and Responses – Invoking Other Web Resources – Accessing the Web Context.

UNIT III **(15 Hours)**

JAVASERVER PAGES TECHNOLOGY: What Is a JSP Page? - The Life Cycle of a JSP Page - Creating Static Content - Creating Dynamic Content - Expression Language - JavaBeans Components - Using Custom Tags - Reusing Content in JSP Pages - Transferring Control to Another Web Component - Including an Applet.

UNIT IV **(15 Hours)**

ENTERPRISE BEANS: What Is an Enterprise Bean? - What Is a Session Bean? - What Is an Entity Bean? - What Is a Message-Driven Bean? - Defining Client Access with Interfaces -The Contents of an Enterprise Bean - Naming Conventions for Enterprise Beans - The Life Cycles of Enterprise Beans.

UNIT V **(14 Hours)**

SECURITY: Understanding Login Authentication - HTTP basic authentication - Form-based login authentication - Client certificate authentication - Mutual authentication - Digest authentication. THE JAVA MESSAGESERVICE API: Overview - Basic JMS API concepts - The JMS API programming model.

UNIT VI **CURRENT CONTOURS (for CIA only)**

Present-day changes related to the course during the semester concerned.

TEXT BOOK:

1. The J2EE 1.4 Tutorial for Sun Java System Application Server Platform Edition8.2‖, Eric Armstrong; Jennifer Ball; Stephanie Bodoff; Debbie Bode Carson; Ian Evans; Dale Green; Kim Haase Eric Jendrock, Sun Microsystem, 2006.

REFERENCE BOOK:

1. J2EE: The Complete Reference - Jim Keogh, McGraw Hill Education (India) Private Limited, 2002 Edition
2. The J2EE Architect's Handbook,2004
3. Java Server Programming J2EE Black Book ,2005

Related Online Contents

1. https://www.javatpoint.com
2. https://www.geeksforgeeks.org

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn the graphics and animation on the web pages using Java Applets	**K3**
CO2	Learn Java Data Base Connectivity (JDBC) so as to retrieve and manipulate the information on any relational database through Java programs	**K3**
CO3	Learn the Server-Side Programming using Servlet and JSP	**K4**
CO4	Learn Java Bean so as to make the reusable software components	**K5**
CO5	Learn the invocation of the remote methods in an application using RMI	**K6**

Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours	Credits			
I	24PCS1C2	CC-I: J2EE TECHNOLOGIES					5	4			
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	3	2	2	3	2	2	2	2.3
CO-2	2	3	2	2	2	2	1	2	3	2	2.1
CO-3	2	2	2	1	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	3	2	3	2	2.3
CO-5	2	2	2	3	3	3	2	2	3	2	2.4
Mean overall score											2.3 (High)

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CORE COURSE III – ADVANCED OPERATING SYSTEM

Semester : I **Max. Marks : 75**

Course Code : 24PCS1C3 **Credit : 4**

Total Periods : 75 **Exam Hrs. : 3**

Objectives:

1. Enable the students to learn the different types of operating systems and their functioning.
2. Gain knowledge on Distributed Operating Systems.
3. Gain insight into the components and management aspects of real time and mobile OS.
4. Learn case studies in Linux Operating Systems.

UNIT I **(16 Hours)**

Basics of Operating Systems: What is an Operating System? – Main frame Systems –Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems –Real-Time Systems – Handheld Systems – Feature Migration – Computing Environments -Process Scheduling – Cooperating Processes – Inter Process Communication- Deadlocks –Prevention – Avoidance – Detection – Recovery..

UNIT II **(15 Hours)**

Distributed Operating Systems: Issues – Communication Primitives – Lamport's Logical Clocks – Deadlock handling strategies – Issues in deadlock detection and resolution-distributed file systems– design issues – Case studies – The Sun Network File System-Coda.

UNIT III **(15 Hours)**

Real time Operating Systems: Introduction – Applications of Real Time Systems – Basic Model of Real Time System – Characteristics – Safety and Reliability - Real Time Task Scheduling

UNIT IV **(14 Hours)**

Operating Systems for Hand held Systems: Requirements–Technology Overview–Hand held Operating Systems–Palm OS-Symbian Operating System - Android–Architecture of android - Securing handheld systems

UNIT V **(15 Hours)**

Case Studies : Linux System: Introduction – Memory Management – Process Scheduling – Scheduling Policy - Managing I/O devices – Accessing Files- iOS : Architecture and SDK Framework - Media Layer - Services Layer - Core OS Layer - File System.

UNIT VI **CURRENT CONTOURS (for CIA only)**

Present-day changes related to the course during the semester concerned

TEXT BOOK:

1. Abraham Silbers chatz; PeterBaerGalvin; GregGagne,"Operating System Concepts", Seventh Edition, John Wiley & Sons, 2004.
2. Mukesh Singhal and Niranjan G. Shivaratri, "Advanced Concepts in Operating Systems – Distributed, Database, and Multiprocessor Operating Systems", Tata McGraw-Hill, 2001.

REFERENCE BOOKS:

1. Rajib Mall, "Real-Time Systems: Theory and Practice", Pearson Education India, 2006.
2. Pramod Chandra P.Bhatt, An introduction to operating systems, concept and practice, PHI,Third edition, 2010.
3. Daniel.P.Bovet&MarcoCesati,"UnderstandingtheLinuxkernel",3rdedition,O"Reilly,2005
4. NeilSmyth,"iPhoneiOS4DevelopmentEssentials–Xcode",FourthEdition,Payload media, 2011.

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the design issues associated with operating systems	K2
CO2	Master various process management concepts including scheduling, deadlocks anddistributed file systems	K3
CO3	Prepare Real Time Task Scheduling	K4
CO4	Analyze Operating Systems for Handheld Systems	K5
CO5	Analyze Operating Systems like LINUX and iOS	K5,K6

Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours	Credits			
I	24PCS1C3	CC-I: ADVANCED OPERATING SYSTEM					5	4			
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	3	2	3	2	3	2	2.2
CO-3	2	2	1	2	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	1	3	3	2	2	3	2	2.2
Mean overall score											2.2 (High)

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CORE I - PRACTICAL – ALGORITHM AND OOPS LAB

Semester : I **Max. Marks: 60**

Course Code : 24PCS1C1P **Credit : 3**

Total Periods : 60 **Exam Hrs. : 3**

Objectives:

1. This course covers the basic data structures like Stack, Queue, Tree, and List.
2. This course enables the students to learn the applications of the data structures using various techniques
3. It also enable the students to understand C++ language with respect to OOAD concepts
4. It also enable the students to understand Application of OOPS concepts.

PROGRAMS:

1) Write a program to solve the tower of Hanoi using recursion. **(4 Periods)**
2) Write a program to traverse through binary search tree using traversals. **(4 Periods)**
3) Write a program to perform various operation son stack using linked list. **(4 Periods)**
4) Write a program to perform various operation in circular queue. **(4 Periods)**
5) Write a program to sort an array of an elements using quick sort. **(4 Periods)**
6) Write a program to solve number of elements in ascending order using heap sort. **(4 Periods)**
7) Write a program to solve the knap sack problem using greedy method **(4 Periods)**
8) Write a program to search for an element in a tree using divide& conquer strategy. **(4 Periods)**
9) Write a program to place the 8 queens on an8X8matrixso that no two queens Attack. **(4 Periods)**
10) Write a C++program to perform Virtual Function **(4 Periods)**
11) Write a C++ program to perform Parameterized constructor **(4 Periods)**
12) Write a C++ program to perform Friend Function **(4 Periods)**
13) Write a C++program to perform Function Overloading **(4 Periods)**
14) Write a C++program to perform Single Inheritance **(4 Periods)**
15) Write a C++program to perform Employee Details using files. **(4 Periods)**

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the concepts of object oriented with respect to C++	**K3**
CO2	Able to understand and implement OOPS concepts	**K4**
CO3	Analysis of data structures like Stack, Queue, Tree, List using C++	**K5**
CO4	Implementation of data structures like Stack, Queue, Tree, List using C++. Understand XML and JavaScript in web applications.	**K6**
CO5	Application of the data structures for Sorting, Searching using different techniques.	**K6**

Mapping with Programme Outcomes:

Semester	**Course code**	**Title of the Course**					**Hours**	**Credits**		
I	**24PCS1C1P**	**CC-I-PRACTICAL:** ALGORITHM AND OOPS LAB					**4**	**3**		
Couse outcomes	**Programme outcomes(POs)**					**Programme Specific Outcomes(PSOs)**				**Mean scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	3	2	3	2	2.1
CO-3	2	2	1	2	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	2	3	3	2	2	3	2	2.3
Mean overall score											**2.2 (High)**

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CORE II - PRACTICAL - J2EE LAB

Semester : I **Max. Marks: 60**

Course Code: 24PCS1C2P **Credit : 3**

Total Periods: 60 **Exam Hrs. : 3**

Objectives:

1. To impart knowledge on developing web applications using J2EE technologies.
2. To prepare students to become familiar with the Standard Java technologies of J2EE.
3. To provide Students with a solid foundation to solve programming problems and also to learn Advanced Java topics like J2ME, J2EE, JSP, JavaScript
4. To provide student with an academic environment aware of excellence, written ethical codes and guidelines and lifelong learning needed for a successful professional career

1. Tomcat server installation and creating the work environment.	**(4 Periods)**
2. (i) Welcome Servlet Programs	**(3 Periods)**
(ii) Servlet with Parameters	**(3 Periods)**
3. Session Tracking in Servlet	
(i) Using cookies	**(2 Periods)**
(ii) Using HTTP Session	**(3 Periods)**
(iii) URL rewriting	**(3 Periods)**
4. (i) Hello World Jsp program	**(3 Periods)**
(ii) JSP: declarations, expression and scriplets	**(3 Periods)**
(iii) JSP with Parameter passing	**(3 Periods)**
5. Session tracking in JSP	
(i) Using cookies	**(3 Periods)**
(ii) Using HTTP Session	**(3 Periods)**
(iii) URL rewriting	**(3 Periods)**
6. Online Exam using JSP (jdbc)	**(4 Periods)**
7. Job Portal using JSP (jdbc)	**(4 Periods)**
8. Entity Bean	**(4 Periods)**
9. Session Bean	**(4 Periods)**
10. Message Driven Bean	**(4 Periods)**
11. Simple web service using JSP.	**(4 Periods)**

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand and analyze the concept of HTML in the working of web and web applications	**K3**
CO2	Apply CSS in web applications	**K4**
CO3	Understand XML and Javascript in web applications.	**K5**
CO4	Create and communicate between client and serverusing Java and create a good, effective and dynamic website	**K6**
CO5	Create a dynamic website using HTML, XML and Javascript.	**K6**

Mapping with Programme Outcomes:

Semester	Course code	Title of the Course								Hours	Credits
I	24PCS1C2P	CC-II-PRACTICAL: J2EE LAB								4	3
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	3	2	3	2	2.1
CO-3	2	2	1	2	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	2	3	3	2	2	3	2	2.3
Mean overall score											2.2 (High)

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CORE ELECTIVE COURSE I – NEURAL NETWORK

Semester : I	**Max. Marks : 75**
Course Code :24PCS1E1A	**Credit : 3**
Total Periods : 60	**Exam Hrs. : 3**

Objective:

1. The objective of artificial neural networks is to perform cognitive functions as problem solving and machine learning.
2. To impart knowledge on Neural Network.
3. The original goal of the neural network approach was to create a computational system that could solve problems like a human brain.
4. Neural networks can help computers make intelligent decisions with limited human assistance

UNIT I **(15 Periods)**

Fundamentals of Neural Networks: Basic Concepts of Neural Network-Model of an Artificial Neuron-Neural Network Architectures-Characteristics of Neural Networks- Learning Methods – Taxonomy-History of Neural Network-Early Neural Network Architectures.

UNIT II **(15 Periods)**

Back propagation Networks: Architecture of Back propagation Network-Back propagation Learning – Illustrations – Applications-Effect of Tuning Parameters of the Back propagation Neural Network-Selection of Various Parameters in Back propagation Neural Network-Variations of Standard Back propagation Algorithms.

UNIT III **(10 Periods)**

Adaptive Resonance Theory (ART): Introduction- ART1- ART2-Applications

UNIT IV **(10 Periods)**

Fuzzy Sets and Systems: Fuzzy Sets-Fuzzy Relations-Fuzzy Logic-Fuzzy Rule Based System- Defuzzification Methods-Applications.

UNIT V **(10 Periods)**

Fuzzy Back propagation Networks: LR-Type Fuzzy Numbers-Fuzzy Neuron-Fuzzy Back propagation Architecture- Learning in Fuzzy Back Propagation-Inference in Fuzzy Back Propagation-Applications.

UNIT VI **CURRENT CONTOURS (for CIA only)**

Present-day changes related to the course during the semester concerned.

TEXT BOOK:

1. Rajasekaran. S and VijayalakshmiPai, Neural Networks, Fuzzy Logic and Genetic Algorithms, PHI, 2008 (Chapters: 2.1, 2.3-2.9, 3.1-3.7, 5.1-5.4, 6.3, 6.5, 7.3-7.6, 12.1-12.6)

REFERENCE BOOKS:

1. Neural Networks and Learning Machines, Simon Haykin, 3rd Edition,2016
2. Neural Networks for Beginners, Sebastian Klaas , 2021
3. Fundamental Of Neural Network And Deep Learning, Dr. Sushma Jaiswal,Dr.A. Kumar, Dr.Praveen kumar Rai, Dr. Gunjan chhabra , 2022

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn about soft computing technique and its applications	**K2**
CO2	Analyze various neural network architectures	**K3**
CO3	Understand propagation networks and algorithms	**K4**
CO4	Define the fuzzy systems	**K5**
CO5	Analyze the genetic algorithm and its applications	**K6**

Mapping with Programme Outcomes:

Semester	Course code	Title of the Course								Hours	Credits
I	24PCS1E1A	CEC-I: NEURAL NETWORK								4	3
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	2	2	2	2	2	3	2	3	2	2.2
CO-3	2	2	1	2	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	1	3	3	2	2	3	2	2.2
Mean overall score											2.2 (High)

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CORE ELECTIVE COURSE II – CRYPTOGRAPHY AND NETWORK SECURITY

Semester : I **Max. Marks : 75**

Course Code: 24PCS1E1B **Credit : 3**

Total Periods: 60 **Exam Hrs. : 3**

Objectives:

1. To impart knowledge on various protocols for network security to protect against the threats in the networks.
2. To be able to secure a message over insecure channel by various means.
3. To learn about how to maintain the Confidentiality, Integrity and Availability of a data.
4. To understand various protocols for network security to protect against the threats in the networks.

UNIT I **(14 Periods)**

Computer and Network Security Concepts: Computer Security Concepts – Security Architecture – Security Attacks – Security Services – Security Mechanisms – Fundamentals Security Design Principles – Network Security Models. Symmetric Ciphers: Classical Encryption Techniques: Symmetric Cipher Model – Substitution Techniques – Transposition Techniques – Rotor Machines – Steganography.

UNIT II **(16 Periods)**

Block Ciphers and Data Encryption Standard: Block Cipher Structure – The Data Encryption Standard – Example – The Strength of DES – Block Cipher Design Principles. Public Key Cryptography and RSA: Principles of Public-Key Crypto System – RSA Algorithm. Cryptographic Hash Functions: Applications – Two Sample Hash Functions – Requirements and Security – Cipher Block Chaining – Secure Hash Algorithms.

UNIT III **(10 Periods)**

User Authentication: Remote User – Authentication Principles – Remote User-Authentication Using Symmetric Encryption – Kerberos – Remote User-Authentication Asymmetric Encryption – Federated Identity Management – Personal Identity Verification – Electronic Mail Security.

UNIT IV **(10 Periods)**

Wireless Network Security: Wireless Security – Mobile Device Security – Wireless LAN Overview – Wireless LAN Security. IP Security: Overview – Policy – Encapsulating Security Payload – Combining Security Associations – Internet Key Exchange – Cryptographic Suites.

UNIT V **(10 Periods)**

Emerging Technologies: The Internet of Things – Economics – Electronic Voting – Cyber Warfare.

UNIT VI **CURRENT CONTOURS (for CIA only)**

Present-day changes related to the course during the semester concerned.

TEXT BOOKS:

1. William Stallings, "Cryptography and Network Security: Principles and Practices", 7th Edition, Pearson Education Limited, 2017.
2. Charles P. Pfleeger, Shari Lawrence Pfleeger, Jonathan Margulies, "Security in Computing", 5th Edition, Pearson Education Limited, 2015.

REFERENCE BOOKS:

1. Behrouz A. Ferouzan, "Cryptography & Network Security", Tata Mc Graw Hill, 2015.
2. George K. Kostopoulous, "Cyber Space and Cyber Security", CRC Press, 2013.

COURSE OUTCOMES:

On Completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the concept of network security and classify the symmetric encryption techniques	**K3**
CO2	Illustrate various algorithms used in asymmetric cipher and public key cryptography	**K3**
CO3	Evaluate the authentication and e-mail security	**K4**
CO4	Understand the concept of wireless security and IP security	**K5**
CO5	Able to understand privacy concepts and emerging technologies in cyber security	**K6**

Mapping with Programme Outcomes:

Semester	Course code	Title of the Course								Hours	Credits
I	24PCS1E1B	CEC-II: CRYPTOGRAPHY AND NETWORK SECURITY								4	3
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	2	2	2	2	2	3	2	3	2	2.2
CO-3	2	2	1	2	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	1	3	3	2	2	3	2	2.2
Mean overall score											2.2 (High)

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VALUE ADDED COURSE- 1 – MOBILE COMMUNICATION

Semester : I **Max. Marks : 75**

Course Code : 24PCS1VAC **Credit : 2**

Total Periods : 45 **Exam Hrs. : 3**

Objectives:

1. To impart knowledge on Wireless networks and WAP Architecture.

2. To make students familiar with fundamentals of mobile communication systems.

3. To identify the limitations of 2G and 2.5G wireless mobile communication

4. To learn the design of 3G and beyond mobile communication systems.

UNIT I **(10 Period)**

Introduction: Applications-Mobile and Wireless Devices – Simplified Reference Model – Need for Mobile Computing – Wireless Transmission –Multiplexing – Spread Spectrum and Cellular Systems – Medium Access Control – Comparisons.

UNIT II **(09 Periods)**

Telecommunications System: Telecommunication System– GSM – Architecture – Protocols – Handover-Security – UMTS and IMT 2000 –UMTS System Architecture-UTRAN-Core Network- Handover-Satellite System.

UNIT III **(09 Periods)**

Wireless LAN : IEEE S02.11 –System Architecture- Protocol Architecture-Medium Access Control Layer-MAC Frame-MAC Management—Roaming-Bluetooth: Architecture-Link Manager Protocol- Security and Link Management.

UNIT IV **(09 Periods)**

Mobile IP: Goals – Packet Delivery – Strategies – Registration – Tunneling and Reverse Tunneling – Adhoc Networks – Routing Strategies

UNIT V **(08 Periods)**

WIRELESS APPLICATION PROTOCOL: Wireless Application Protocol (WAP) – Architecture – XML – WML Script – Applications-5G Internet-Security for 5G communication.

TEXT BOOK:

1. J. Schiller, Mobile Communication, 2nd Edition, Addison Wesley, 2008.
2. Fundamentals of 5G Mobile Network, Jonathan Rodriguez,1st Edition, 2015,

   E-book reference- Fundamentals of 5G Mobile Networks (pce-fet.com)

REFERENCE BOOKS:

1. Mobile Communications, Jochen H. Schiller, 2014
2. Mobile and Wireless Communication, Prabhakar Sharma, 2023
3. William Stallings, Wireless Communication and Networks, Pearson Education, 2003.
4. Singhal, WAP-Wireless Application Protocol, Pearson Education, 2003.

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Discuss cellular radio concepts	**K2**
CO2	Identify various propagation effects	**K3**
CO3	To have knowledge of the Telecommunication Architecture	**K3**
CO4	Classify multiple access techniques in mobile communication	**K5**
CO5	Enhance the knowledge on WAP & XML	**K6**

Mapping with Programme Outcomes:

Semester	Course code	Title of the Course							Hours	Credits
I	24PCS1VAC	VAC-1– MOBILE COMMUNICATION							3	2
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)				Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	2	1	2	2	2	3	2	3	2	2.1
CO-3	2	2	1	2	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	2	3	3	1	2	3	2	2.2
Mean overall score											2.2 (High)

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CORE COURSE IV– ADVANCED DATABASE MANAGEMENT SYSTEM

Semester : II **Max. Marks : 75**

Course Code : 24PCS2C4 **Credit : 4**

Total Periods: 75 **Exam Hrs. : 3**

Objectives:

1. To understand advanced DBMS techniques to construct tables and write effective queries, forms, and reports.
2. The primary goal of a DBMS is to provide an environment that is both convenient and efficient for users to retrieve and store information.
3. Master the basics of SQL and construct queries using SQL.
4. Understand the relational database design principles.

UNIT I **(13 Periods)**

Overview of DBMS – Database design – Query processing. Data modeling – ER – EER – Object Oriented Databases – Object Relational Databases, Document oriented Databases – Background of NoSQL – XML document – Structure of XML Data – XML Document Schema – Querying and Transformation – API – Storage of XML Data – XML Applications.

UNIT II **(15 Periods)**

Information Retrieval Systems, Databases – Multidimensional Indexes – Data Cubes, Grid Files, R-trees.

UNIT III **(16 Periods)**

Distributed Databases – Data Distribution – Distributed Transactions, Parallel Databases – Performance measure – Parallel operations for relational operations, Information Integration – Federated Database – Data Warehouses – Mediators – Schema matching methods.

UNIT IV **(16 Periods)**

Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models - Concurrency Control - Transaction Commit Protocols.

UNIT V **(15 Periods)**

Multidimensional Data Structures – Image Databases – Text / Document Databases – Video Databases – Audio Databases – Multimedia Database Design.

UNIT VI **CURRENT CONTOURS (for CIA only)**

Present-day changes related to the course during the semester concerned.

TEXT BOOKS:

1. Silberschatz, Korth and Sudarshan, "Database Concepts", Sixth Edition, Tata McGraw Hill, 2010.
2. Vijay Kumar, ―Mobile Database Systems, John Wiley & Sons, 2006.

REFERENCE BOOK:

1. R. Elmasri, S.B. Navathe, ―Fundamentals of Database Systems‖, Sixth Edition, Pearson Education/Addison Wesley, 2010.
2. Database Management System Concepts, K. Prema,2020
3. Fundamentals of Database Systems, 7th Edition, 2017

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Knowledge about basic concepts and terminology	**K3**
CO2	Create Relational Database Systems	**K4**
CO3	Compare Distributed and Parallel databases	**K4**
CO4	Analyze Multimedia, video and audio databases	**K5**
CO5	Create forms and Reports	**K6**

Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours	Credits			
II	24PCS2C4	**CC-V: ADVANCED DATABASE MANAGEMENT SYSTEM**					**5**	**4**			
Couse outcomes	**Programme outcomes(POs)**					**Programme Specific Outcomes(PSOs)**					**Mean scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	2	2	2	2	2	3	2	3	2	2.2
CO-3	2	2	2	2	3	2	3	2	3	2	2.3
CO-4	2	2	2	2	2	3	2	2	3	2	2.4
CO-5	2	2	2	2	3	3	2	2	3	2	2.3
Mean overall score											**2.3 (High)**

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CORE COURSE V – ADVANCED PYTHON PROGRAMMING

Semester : II **Max. Marks : 75**

Course Code : 24PCS2C5 **Credit : 4**

Total Periods : 75 **Exam Hrs. : 3**

Objectives:

1. To understand why Python is a useful scripting language for developers.
2. To learn how to design and program Python applications.
3. To learn how to use lists, tuples, and dictionaries in Python programs.
4. To learn how to identify Python object types.
5. To learn how to use indexing and slicing to access data in Python programs.

UNIT I **(10 Periods)**

Python Language Basics, IPython and Jupyter Notebooks: The Python Interpreter – IPython Basics – Python Language Basics.

UNIT II **(15 Periods)**

Built-in Data Structures, Functions and Files: Data Structures and Sequences – Functions – Files and Operating System.

UNIT III **(18 Periods)**

NumPy Basics: Arrays and Vectorized Computation: The NumPy ndarray: A Multidimensional Array Object – Universal Functions – Array-Oriented Programming with Arrays – File Input and Output with Arrays – Linear Algebra – Pseudorandom Number Generation – Examples.

UNIT IV **(16 Periods)**

Getting Started with Pandas: Introduction to Panda Data Structures – Essential Functionality – Summarizing and Computing Descriptive Statistics.

UNIT V **(16 Periods)**

Plotting and Visualization: A Brief matplotlib API Primer – Plotting with Pandas and Seaborn – Other Python Visualization Tools.

UNIT VI **(for CIA only)**

Internship Training.

TEXT BOOK:

1. WesMcKinney – Python for Data Analysis-Data Wrangling with Pandas, NumPy and IPython – 2nd Edition – O'REILLY – 2017.

REFERENCE BOOK:

1. Python All-in-One for Dummies, 2020, JohnShovic
2. Core Python Programming : Covers fundamentals to advanced topics like OOPS, Exceptions, Data structures, Files, Threads, R.Nageswara Rao, 2021, 3rd Edition
3. Python-6th Edition, **Aditya Kanetkar Yashavant Kanetka** ,2023
4. Python Deep Learning – 3rd Edition, **Ivan Vasilev,** 2023

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Familiar with the basic concepts of Python	**K2**
CO2	Ability to use conditional loops and list by Python	**K3**
CO3	Basic understanding of NumPy	**K4**
CO4	Able to understand the Pandas	**K6**
CO5	Learn to understand the visualization through vector-based computation	**K6**

Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours	Credits			
II	24PCS2C5	CC-V: ADVANCED PYTHON PROGRAMMING					5	4			
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	2	2	2	2	2	3	2	3	2	2.2
CO-3	2	2	2	2	3	2	3	2	3	2	2.3
CO-4	2	2	2	2	2	3	2	2	3	2	2.4
CO-5	2	2	2	2	3	3	2	2	3	2	2.3
Mean overall score											2.3 (High)

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CORE COURSE VI – MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

Semester : II **Max. Marks : 75**

Course Code : 24PCS2C6 **Credit : 4**

Total Periods : 75 **Exam Hrs. : 3**

Objectives: To acquire skills in solving mathematical and logical problems that are used in most areas of Computer Science.

UNIT I **(15 Periods)**

The Foundation: Logic and Proofs: Propositional Logic – Applications of Propositional Logic – Propositional Equivalence – Predicates and Quantifiers – Nested Quantifiers – Rules of Inference – Introduction to Proofs – Proof Methods and Strategy.

UNIT II **(16 Periods)**

Basic Structure: Sets – Set Operations – Functions – Sequence and Summations – Cardinality of Sets – Matrices.

UNIT III **(16 Periods)**

Counting: The Basics of Counting – The Pigeonhole Principle – Permutations and combinations – Binomial Coefficients and Identities – Generalized Permutations and Combinations – Generating Permutation and Combinations. Discrete Probability: Introduction – Probability Theory – Bayes' Theorem – Expected Value and Variance.

UNIT IV **(14 Periods)**

Graphs: Graphs and Graphs Models – Graph Terminology and Special Types of Graphs – Representing Graphs and Graph Isomorphism – Connectivity – Euler and Hamilton Paths – Shortest Path Problems – Planar Graphs. Trees: Introduction – Application – Tree Traversal – Spanning Trees – Minimum Spanning Trees.

UNIT V **(14 Periods)**

Modeling Computation: Languages and Grammars – Finite State Machines with Output – Finite State Machines with No Output – Language Recognition - Turing Machines.

UNIT VI **CURRENT CONTOURS (for CIA only)**

Present-day changes related to the course during the semester concerned.

TEXT BOOK:

1. Kenneth H. Rosen, "Discrete Mathematics and Its Applications", 7th Edition, McGraw Hill, 2012.

REFERENCE BOOKS:

1. Kolman, Busby and Ross, "Discrete Mathematical Structures", 6th Edition, PHI, 2013.
2. Sheldon M. Ross,"Introduction to Probability and Statistics for Engineers and Scientists", 5th edition, Academic Press; 2014.

COURSE OUTCOMES:

On Completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand and evaluate mathematical arguments revolving around computation.	**K3**
CO2	Examine the applicability of Sets in Computers	**K3**
CO3	Understand the basics of Combinations and Probability.	**K4**
CO4	Apply the acquaintance on Graphs and Trees to real world applications.	**K5**
CO5	Determine the working of Grammars and Languages.	**K6**

Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours	Credits			
II	24PCS2C6	CC-VI: MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE					5	4			
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	2	2	2	2	2	3	2	3	2	2.2
CO-3	2	2	2	2	3	2	3	2	3	2	2.3
CO-4	2	2	2	2	2	3	2	2	3	2	2.4
CO-5	2	2	2	2	3	3	2	2	3	2	2.3
Mean overall score											2.3 (High)

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CORE III - PRACTICAL – ADBMS LAB

Semester : II **Max. Marks : 60**

Course Code :24PCS2C3P **Credit : 3**

Total Periods: 60 **Exam Hrs. : 3**

Objectives:

1. To be able to understand and apply advanced concepts of PL/SQL like cursors, procedures and triggers.
2. To understand the basic concepts and the applications of database systems.
3. To master the basics of SQL and construct queries using SQL.
4. To understand the relational database design principles.
5. To become familiar with the basic issues of transaction

List of Experiments

1. SQL data types, Operators, Literals, Constraints **(6 Periods)**
2. DDL, DML, TCL, DCL Commands **(6 Periods)**
3. Queries: Select / From / Where/ Group By/Having Clause/ Order By Clause/SQL Operators **(6 Periods)**
4. Functions: Aggregate / Numeric / String / Date & Time / Logical **(6 Periods)**
5. Unions / Intersection / Minus **(6 Periods)**
6. Sub queries or Nested Queries **(6 Periods)**

PL/SQL Block Structure

7. Conditional Statements **(6 Periods)**
8. Database Programming with record variables **(6 Periods)**
9. Cursors **(6 Periods)**
10. Procedures & Functions **(6 Periods)**

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Create SQL Queries	**K2**
CO2	Create DDL, DML, TCL, DCL Commands	**K3**
CO3	Knowledge about PL / SQL	**K4**
CO4	Create Iterations	**K5**
CO5	Create packages	**K6**

Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours	Credits			
II	24PCS2C3P	CC-III-PRACTICAL- ADVANCED DBMS LAB					4	3			
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	3	2	3	2	2.1
CO-3	2	2	1	2	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	1	3	3	2	2	3	2	2.2
Mean overall score											2.2 (High)

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CORE IV – PRACTICAL - ADVANCED PYTHON PROGRAMMING LAB

Semester : II **Max. Marks : 60**

Course Code : 24PCS2C4P **Credit : 3**

Total Periods: 60 **Exam Hrs. : 3**

Objectives: To be able to understand and apply advanced concepts of PL/SQL like cursors, procedures and triggers.

Implement the following in Python:

1. Programs using elementary data items, lists, dictionaries and tuples **(6 Periods)**
2. Programs using conditional branches, **(6 Periods)**
3. Programs using loops. **(6 Periods)**
4. Programs using functions **(6 Periods)**
5. Programs using exception handling **(6 Periods)**
6. Programs using inheritance **(6 Periods)**
7. Programs using polymorphism **(6 Periods)**
8. Programs to implement file operations. **(6 Periods)**
9. Programs using modules. **(6Periods)**
10. Programs for creating dynamic and interactive web pages using forms. **(6 Periods)**

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Able to write programs in Python using OOPS concepts	**K2**
CO2	To understand the concepts of File operations and Modules in Python	**K3**
CO3	Implementation of lists, dictionaries ,sets and tuples as programs	**K4**
CO4	Accessing of lists, dictionaries ,sets and tuples as programs	**K5**
CO5	To develop web applications using Python	**K6**

Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours	Credits
II	24PCS2C4P	CC-IV- PRACTICAL-ADVANCED PYTHON PROGRAMMING LAB					4	3
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	3	2	3	2	2.1
CO-3	2	2	1	2	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	1	3	3	2	2	3	2	2.2
Mean overall score											2.2 (High)

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CORE ELECTIVE II - CLOUD COMPUTING

Semester : II **Max. Marks : 75**

Course Code : 24PCS2E2A **Credit : 3**

Total Periods : 60 **Exam Hrs. : 3**

Objectives:

1. To impart knowledge on Cloud Computing basics.
2. To impart knowledge on various Cloud Computing Architectures, infrastructure models and the Fundamental Concepts cloud services.
3. The primary objectives of cloud computing include increasing efficiency, scalability, and flexibility of IT resources, while reducing costs and complexity.
4. By leveraging cloud services, Students learn how the organizations can access computing resources on-demand, easily scale up or down based on their needs.

UNIT I **(15 Periods)**

DEFINING CLOUD COMPUTING- Cloud Types - The NIST Model - The Cloud Cube Model - Deployment Models - Service Models - Examining the Characteristics of Cloud Computing - Paradigm Shift - Benefits of Cloud Computing - Disadvantages of Cloud Computing - Assessing the Role of Open Standards. ASSESSING THE VALUE PROPOSITION: Early Adopters and New Applications - The Laws of Cloudonomics - Cloud Computing Obstacles - Behavioral Factors Relating to Cloud Adoption.

UNIT II **(15 Periods)**

UNDERSTANDING CLOUD ARCHITECTURE: Exploring the Cloud Computing Stack–Composability Infrastructure – Platforms - Virtual Appliances - Communication Protocols – Applications. UNDERSTANDING SERVICES AND APPLICATIONS BY TYPE: Defining Infrastructure as a Service (IaaS) - Defining Platform as a Service (PaaS) - Defining Software as a Service (SaaS) - SaaS characteristics - Open SaaS and SOA.

UNIT III **(12 Periods)**

UNDERSTANDING ABSTRACTION AND VIRTUALIZATION: Using Virtualization Technologies - Load Balancing and Virtualization - Advanced Load Balancing - The Google Cloud - Understanding Hypervisors - Virtual Machine Types - VMware vSphere - Understanding Machine Imaging - Porting Applications - The Simple Cloud API - AppZero Virtual Application Appliance. CAPACITY PLANNING - Load testing - Resource Ceilings - Server and Instance Types.

UNIT IV **(10 Periods)**

USING MICROSOFT CLOUD SERVICES: Administrating the Clouds - Management Responsibilities - Lifecycle Management - Emerging Cloud Management Standards. UNDERSTANDING CLOUD SECURITY: Securing the Cloud – Securing Data – Establishing Identity and Presence.

UNIT V **(08 Periods)**

USING THE MOBILE CLOUD: Working with Mobile Devices – Defining the Mobile Market – Using Smartphones with the Cloud. WORKING WITH MOBILE WEB SERVICES: Understanding Service Types – Performing Service Discovery – Using AWS - Using SMS – Defining WAP and Other Protocols – Performing Synchronization.

UNIT VI **CURRENT CONTOURS (for CIA only)**

Present-day changes related to the course during the semester concerned.

TEXT BOOK:

1. Cloud Computing Bible - Barrie Sosinsky, Wiley Publishing Inc., 2011.

REFERENCE BOOKS:

1. Cloud Computing - Michael Miller, Pearson Education Inc., 7th Edition, 2012.
2. Cloud Computing Principles and Paradigms – Rajkumar Buyya & Co., John Wiley & Sons Publications, 2011.
3. Cloud Computing: A Practical Approach for Learning and Implementation, Srinivasan , 2014
4. Cloud and Distributed Computing: Algorithms and Systems- Rajiv-Misra, 2020.

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc	**K2**
CO2	Understand the core issues of cloud computing such as security, privacy, and interoperability	**K3**
CO3	Discuss the appropriate technologies, algorithms, and approaches for the related issues	**K4**
CO4	Identify problems, and explain, analyze, and evaluate various cloud computing solutions	**K6**
CO5	Understand the Mobile Web Services	**K6**

Mapping with Programme Outcomes:

Semester	Course code	Title of the Course								Hours	Credits
II	24PCS2E2A	CE II - CLOUD COMPUTING								4	3
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	2	2	2	2	2	3	2	3	2	2.2
CO-3	2	2	2	2	3	2	3	2	3	2	2.3
CO-4	2	2	2	2	2	3	2	2	3	2	2.4
CO-5	2	2	2	2	3	3	2	2	3	2	2.3
Mean overall score											2.3 (High)

Prepared by **Verified by** **Signature of the HOD**

CORE ELECTIVE II – ROBOTIC PROCSS AUTOMATION FOR BUSINESS

Semester : II **Max. Marks : 75**

Course Code : 24PCS2E2B **Credit : 3**

Total Periods : 60 **Exam Hrs. : 3**

Objectives:

1. Robotics is a branch of engineering and computer science that involves the conception, design, manufacture and operation of robots.
2. Learn the concepts of RPA, its benefits, types and models.
3. Gain the knowledge in application of RPA in Business Scenarios.
4. Identify measures and skills required for RPA

UNIT I **(15 Periods)**

INTRODUCTION : Introduction to RPA –Over view of RPA –Benefits of RPA in a business environment -Industries & domains fit for RPA - Identification of process for automation - Types of Robots - Ethics of RPA & Best Practices - Automation and RPA Concepts - Different business models for implementing RPA –Centre of Excellence –Types and their applications –Building an RPA team -Approach for implementing RPA initiatives..

UNIT II **(15 Periods)**

AUTOMATION : Role of a Business Manager in Automation initiatives -Skills required by a Business Manager for successful automation - The importance of a Business Manager in automation - Analyzingdifferent business processes - Process Mapping frameworks - Role of a Business Manager insuccessful implementation – Part 1 - Understanding the Automation cycle – First 3 automationstages and activities performed by different people.

UNIT III **(12 Periods)**

AUTOMATION IMPLEMENTATION**:** Evaluating the Automation Implementation Detailed description of last 3 stages and activities performed by different people - Role of a Business Manager in successful completion – Part 2 - Activities to be performed post-implementation - Guidelines for tracking the implementation success - Metrics/Parameters to be considered for gauging success - Choosing the right licensing option - Sending emails - Publishing and Running Workflows.

UNIT IV **(10 Periods)**

ROBOT : Ability to process information through scopes/systems - Understand the skill of information processing and its use in business - Leveraging automation - Creating a Robot - New Processes. Establish causality by variable behavior - Understand the skill of drawing inference or establishing causality by tracking the behavior of a variable as it varies across time/referenced variable - Leveraging automation for this skill - Robot & new process creation.

UNIT V **(08 Periods)**

ROBOTSKILL: Inference from snapshots of curated terms – Omni-source data curation - Multisource trend tracking - Understand the skill of drawing inference from the behavior of curated terms by taking snapshots across systems in reference to time/variable(s) - Leveraging automation for this skill – Robot creation and new process creation for this skill.

UNIT VI **CURRENT CONTOURS (for CIA only)**

Present-day changes related to the course during the semester concerned.

TEXT BOOK:

1. Alok Mani Tripathi" Learning Robotic Process Automation: Create Software robots and automatebusiness processes with the leading RPA tool" Packt Publishing Limited March 2018.
2. TomTaulli "The Robotic Process Automation Handbook" A press, February2020.

REFERENCE BOOKS:

1. Steve Kaelble "Robotic Process Automation" John Wiley & Sons, Ltd., 2018.
2. Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool - UiPath - Alok-Mani-Tripathi -2018
3. Essentials of Robotics Process Automation, **S.Muhkerjee** , 2019
4. Robotics: 43 (Intelligent Systems, Control and Automation: Science and Engineering), Tadej Bajd, 2010

Related Online Contents

1. https://www.javatpoint.com/rpa
2. https://onlinecourses.nptel.ac.in/noc19_me74/preview

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate the benefits and ethics of RPA	**K2**
CO2	Understand the Automation cycle and its techniques	**K3**
CO3	Draw inferences and information processing of RPA	**K4**
CO4	Implement & Apply RPA in Business Scenarios	**K6**
CO5	Analyze on Robots & leveraging automation	**K6**

Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours	Credits			
II	24PCS2E2B	CE II - ROBOTIC PROCSS AUTOMATION FOR BUSINESS					4	3			
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	3	2	3	2	2.1
CO-3	2	2	1	2	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	1	3	3	2	2	3	2	2.2
Mean overall score											2.2 (High)

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NME I – DESKTOP PUBLISHING

Semester : II **Max. Marks : 75**

Course Code :24PCS2N1A **Credit : 2**

Total Periods : 45 **Exam Hrs. : 3**

Objectives:

1. To impart knowledge on Basics of computers.
2. For understanding the basic notions of computer manipulation.
3. To know Managing computer files, word processing, using spreadsheets and databases;
4. To understand how to Create presentations and impart knowledge on internet

UNIT I **(8 Periods)**

Introduction to Computers – History of Computers – Basic Anatomy of Computers – MS-DOS – What is MS-DOS? – What MS-Dos Does? – DOS Commands.

UNIT II **(10 Periods)**

Word Basics – Formatting Features – Menus, Commands, Toolbars and their Icons – Exercises – Mail Merge – Macros.

UNIT III **(9 Periods)**

Excel Basics – Introduction – Menus, Commands, Toolbars and their Icons – Exercises – Data Sort – Functions.

UNIT IV **(9 Periods)**

PowerPoint Basics – Introduction – Toolbar, their Icons & Commands – Navigating in PowerPoint – Working with PowerPoint – Exercises.

UNIT V **(9 Periods)**

Ms Access – Introduction – Toolbars & their Icons – Creating a Table - Creating Table through Design View – Relationship – Query – Forms – Reports.

UNIT VI **CURRENT CONTOURS (for CIA only)**

Present-day changes related to the course during the semester concerned.

TEXT BOOK:

1. Sanjay Saxena – A First Course in Computers – Vikas Publishing House Pvt., Ltd., 2008.

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Able to understand Computer Basics	**K3**
CO2	Familiarize the tools in MS word	**K3**
CO3	Able to understand MS Excel	**K4**
CO4	Understand the MS PowerPoint	**K5**
CO5	Familiarize to design the table using MS Access	**K6**

Mapping with Programme Outcomes:

Semester	Course code	Title of the Course								Hours	Credits
II	**24PCS2N1A**	**NME I – DESKTOP PUBLISHING**								**3**	**3**
Couse outcomes	**Programme outcomes(POs)**					**Programme Specific Outcomes(PSOs)**					**Mean scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	3	2	3	2	2.1
CO-3	2	2	1	2	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	1	3	3	2	2	3	2	2.2
Mean overall score											**2.2 (High)**

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NME I – INTRODUCTION TO GRAPHIC DESIGN

Semester : II **Max. Marks : 75**

Course Code :24PCS2N1B **Credit : 2**

Total Periods : 45 **Exam Hrs. : 3**

Objectives:

1. To develop basic skills using tools and theory used in Graphic Design.
2. To impart knowledge on Photoshop workspace.
3. To analysis the students creativity.

UNIT I **(8 Periods)**

Understanding the Photoshop Workspace: Workspace Overview – Cruising the Main Menus – Understanding the Panel – Understanding the Tools in the Toolbox – Setting Preferences.

UNIT II **(9 Periods)**

Image Basics: Exploring File Types – Creating and Opening Images – Resizing Files and Adjusting Resolution – Cropping and Straightening Images.

UNIT III **(10 Periods)**

Understanding Colors, Histograms, Levels and Curves: Color Basics – Understanding Channels and Levels – Adjusting with Histograms – Working in Different Color Modes – Choosing Colors.

UNIT IV **(8 Periods)**

History and Actions: Using the History Panel – Creating and Using Automated Actions.

UNIT V **(10 Periods)**

Using Bridge to Organize and Process Photos: Working in Bridge Workspaces – Organizing Files in Bridge – Processing Images Using Bridge and Photoshop – Using the Min-Bridge Tool in Photoshop.

UNIT VI **CURRENT CONTOURS (for CIA only)**

Present-day changes related to the course during the semester concerned.

TEXT BOOK:

1. Lisa DaNae Dayley and Brad Day ―Adobe Photoshop CS5 Bible, Wiley India Pvt. Ltd., 2010.

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Familiar with the concepts of Photoshop and understand the tools.	**K2**
CO2	Familiar with the file types and image resolution	**K3**
CO3	Able to understand the colors and histograms	**K4**
CO4	Able to understand the panel	**K6**
CO5	Understand to organize the files using bridge and photoshop.	**K6**

Mapping with Programme Outcomes:

Semester	Course code	Title of the Course								Hours	Credits
II	24PCS2N1B	NME I – INTRODUCTION TO GRAPHIC DESIGN								3	3
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	3	2	3	2	2.1
CO-3	2	2	1	2	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	1	3	3	2	2	3	2	2.2
Mean overall score											2.2 (High)

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CORE COURSE VII - ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Semester : III	**Max. Marks : 75**
Course Code :24PCS3C7	**Credit : 4**
Total Periods : 75	**Exam Hrs. : 3**

Objectives:

1. To understand the concept of machine learning algorithms and also to develop web application using machine learning techniques.
2. Identify appropriate AI methods to solve a given problem.
3. Examine the useful search techniques, knowledge representation techniques, Inference methods; learn their advantages, disadvantages and comparison.
4. Understand important concepts like Expert Systems, AI applications.

UNIT I **(15 Periods)**

Introduction: AI Problems - Al Techniques - Criteria for Success. Problems, Problem Spaces, Search: State Space Search - Production Systems, Heuristic Search techniques: Generate and Test - Hill Climbing- Best-First - Means- End Analysis. Machine Learning: Introduction-Algorithm - Training Three different types of Machine Learning Algorithms-Predictions with supervised learning- Predicting with Class labels-Regression for predicting continuous outcomes-Introduction to basic terminology and notations used in Machine Learning.

UNIT II **(15 Periods)**

Building Machine Learning Systems: Preprocessing, Training, Selection and Evaluation of Model-Installing Python Package, Artificial Neurons: A glimpse into the early history of Machine Learning-Implementation of Perceptron learning algorithm in Python-Adaptive linear neurons and the Convergence of Learning-Implementation of Adaptive linear neuron in Python. Machine Learning Classifier: Training a perceptron via Scikit-Learn-Modeling class probabilities through logistic regression Support vector machine for maximum margin classification-Solving Non- Linear problems using a kernel SVM Learning Decision Tree-A Lazy learning Algorithms – K- Nearest Neighbors.

UNIT III **(15 Periods)**

Data Preprocessing: Dealing with missed and Categorical data-Data Preprocessing: Dealing with Data set Testing and Training-Selection of Meaningful features-Selection of meaningful sparse solutions with L1 regularization. Dimensionality Reduction and Model Evaluation : Unsupervised Dimensionality reduction using P.C.A [Principal Component Analysis]-Supervised data compression via Linear Discriminant analysis.

UNIT IV **(15 Periods)**

Using Kernel principal component analysis for N-L-M-Streamlining workflows with pipeline-Using K-Fold cross-validation to assets model performance Debugging algorithms with learning and validation-Different performance evaluation metrics-Implementing simple majority vote classifier-Tuning the ensemble classifier-Weak Learners Vs Adaptive Boosting. Cluster Analysis : Grouping objects by similarity using K-Means-Organizing Clusters as a hierarchical tree. -Training Artificial Neural Network for image recognition.

UNIT V **(15 Periods)**

Modeling Complex functions with Artificial Neural Network-Classifying Hand Written Digits Training an Artificial Neural Network-Developing initiation for Back Propagation-Debugging Neural Network with Gradient Checking-Convergence in Neural Network- Architecture of Neural Network. Embedding a Machine Learning Model into a Web Application : Serializing fitted Scikit-learn estimators-Setting up SQL-LITE database for data storage.

UNIT VI **CURRENT CONTOURS (for CIA only)**

Present-day changes related to the course during the semester concerned.

TEXT BOOKS:

1. Elaine Rich and Kevin Knight," Artificial Intelligence", Tata McGraw Hill Publishers company Pvt Ltd, Second Edition
2. Sebastian Raschka, “Python Machine Learning”, First Edition, [PACKT] , 2015.

REFERENCE BOOKS:

1. Joel Grus, “Data Science from Scratch”, First Edition, O’Reilly,2015
2. Gavin hacekling, “Mastering machine learning with scikit-learn”, First Edition, [PACKT] , 2014
3. Artificial Intelligence and Machine Learning: Theory and Practice, Lyla B.Das -2023
4. Machine Learning with PyTorch and Scikit-Learn, Sebastian-Raschka, 2022

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Preprocess syntactic data and real data sets	**K3**
CO2	Create ML models for the target data sets	**K4**
CO3	Evaluate the performance of ML models	**K4**
CO4	Compare the performance of ML models	**K5**
CO5	Embed ML models into web application	**K6**

Mapping with Programme Outcomes:

Semester	Course code	Title of the Course								Hours	Credits
III	24PCS3C7	CC VII - ARTIFICIAL INTELLIGENCE & MACHINE LEARNING								5	4
Course outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	2	2	2	2	2	3	2	3	2	2.2
CO-3	2	2	2	2	3	2	3	2	3	2	2.3
CO-4	2	2	2	2	2	3	2	2	3	2	2.4
CO-5	2	2	2	2	3	3	2	2	3	2	2.3
Mean overall score											2.3 (High)

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CORE COURSE VIII – DIGITAL IMAGE PROCESSING

Semester : III	**Max. Marks : 75**
Course Code :24PCS3C8	**Credit : 4**
Total Periods : 75	**Exam Hrs. : 3**

Objectives:

1. Learn basic image processing techniques for solving real problems.
2. Gain knowledge in image transformation and Image enhancement techniques.
3. Learn Image compression and Segmentation procedures.
4. To introduce the concepts of image processing and basic analytical methods to be used in image processing.
5. To familiarize students with image enhancement and restoration techniques,

UNIT I (15 Periods)

Introduction: What is Digital image processing – the origin of DIP – Examples of fields that use DIP – Fundamentals steps in DIP – Components of an image processing system. Digital Image Fundamentals: Elements of Visual perception – Light and the electromagnetic spectrum – Image sensing and acquisition – Image sampling and Quantization – Some Basic relationship between Pixels – Linear & Nonlinear operations.

UNIT II (15 Periods)

Image Enhancement in the spatial domain: - Background – some basic Gray level Transformations – Histogram Processing – Enhancement using Arithmetic / Logic operations – Basics of spatial filtering – Smoothing spatial filters – Sharpening spatial filters – Combining spatial enhancement methods.

UNIT III (15 Periods)

Image Restoration: A model of the Image Degradation / Restoration Process – Noise models – Restoration is the process of noise only – Spatial Filtering – Periodic Noise reduction by frequency domain filtering – Linear, Portion – Invariant Degradations – Estimating the degradation function – Inverse filtering – Minimum mean square Error Filtering – Constrained least squares filtering – Geometric mean filter – Geometric Transformations.

UNIT IV (15 Periods)

Image Compression: Fundamentals–Image compression models–Elements of Information Theory –Error Free compression – Lossy compression – Image compression standards.

UNIT V (15 Periods)

Image Segmentation: Detection and Discontinuities – Edge Linking and Boundary deduction – Thresholding – Region-Based segmentation – Segmentation by Morphological watersheds – The use of motion in segmentation.

UNIT VI **CURRENT CONTOURS (for CIA only)**

Present-day changes related to the course during the semester concerned.

TEXT BOOKS:

1. Rafael C.Gonzalez, Richard E.Woods,"Digital Image Processing", Second Edition, PHI/Pearson Education.
2. B.Chanda, D.Dutta Majumder, "Digital Image Processing and Analysis", PHI, 2003.

REFERENCE BOOKS:

1. NickEfford,"Digital Image Processing a practical introducing using Java", Pearson Education,2004.

Related Online Contents

1. https://nptel.ac.in/courses/117/105/117105135/
2. https://www.tutorialspoint.com/dip/index.htm

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamentals of Digital Image Processing	**K3**
CO2	Understand the mathematical foundations for digital image representation, imageacquisition, image transformation, and image enhancement	**K4**
CO3	Apply, Design and Implement and get solutions for digital image processingproblems	**K4**
CO4	Applytheconceptsoffilteringandsegmentationfordigitalimageretrieval	**K5**
CO5	Explore the concepts of Multi-resolution process and recognize the objects inan efficient manner	**K6**

Mapping with Programme Outcomes:

Semester	Course code	Title of the Course						Hours	Credits
III	24PCS3C8	CC VIII-DIGITAL IMAGE PROCESSING						5	4
Course outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	2	2	2	2	2	3	2	3	2	2.2
CO-3	2	2	2	2	3	2	3	2	3	2	2.3
CO-4	2	2	2	2	2	3	2	2	3	2	2.4
CO-5	2	2	2	2	3	3	2	2	3	2	2.3
Mean overall score											2.3 (High)

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CORE COURSE IX – COMPILER DESIGN

Semester : III **Max. Marks : 75**

Course Code :24PCS3C9 **Credit : 4**

Total Periods : 75 **Exam Hrs. : 3**

Objectives:

1. To teach concepts of language translation and phases of compiler design
2. To describe the common forms of parsers
3. To inculcate knowledge of parser by parsing LL parser and LR parser
4. To demonstrate intermediate code using technique of syntax directed translation
5. To illustrate the various optimization techniques for designing various optimizing compilers.

UNIT I **(15 Periods)**

INTRODUCTION: Different Phases of Compiler - Finite State Automation and Lexical Analysis - A Simple Approach to the Design of Lexical Analyzers- Regular Expressions - A Language for Specifying Lexical Analyzers.

UNIT II **(15 Periods)**

SYNTAX SPECIFICATION: Context Free Grammars - Parsers – Derivation and Parse Trees- Shift Reduce Parsing - Operator Precedence Parsing - Top-Down Parsing – Predictive Parsers.

UNIT III **(15 Periods)**

CODE GENERATION: Intermediate Code Generation - Translation -Implementation of Syntax - Directed Translators - Intermediate Code – Postfix Notation - Parse Trees and Syntax Trees - Three Address Codes, Quadruples and Triples.

UNIT IV **(15 Periods)**

SYMBOL TABLES: Contents of a Symbol Table - Data Structures for Symbol Tables - Implementation of a Simple Stack Allocation Scheme -Implementation of Block Structured Languages - Storage Allocation in BlockStructured Languages - Errors - Lexical Phase Error.

UNIT V **(15 Periods)**

CODE OPTIMIZATION AND CODE GENERATION: Elementary Code Optimization technique - Loop Optimization - DAG Representation of Basic Blocks - Value Numbers and Algebraic Laws - Object Programs - Problems in Code Generation - A Machine Model - A Simple Code Generator.

UNIT VI **CURRENT CONTOURS (for CIA only)**

Present-day changes related to the course during the semester concerned.

TEXT BOOK:

1. Alfred V. Aho, Jeffery D.Ullman, ―Principles of Compiler Design‖, Narosa,New Delhi 2002. Ch:1.1-1.11,3.1-3.7,4.1,4.2,5.1-5.5,7.1-7.6,9.1,9.2 ,10.1,10.2,11.1, 11.2,12.1-12.4,15.1-15.4

REFERENCE BOOKS:

1. Dick Grune, Henri E. Bal, CerielJ.H.Jacobs, Koen G. Langondeon,―Modern Compiler Design‖, Wiley, Singapore, 2003.
2. Louden K., ―Compiler Construction, Principles and Practice‖, Thomson,New Delhi, 2003.

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Design and develop a comprehensive Compiler for a given language	**K2**
CO2	Implement various parsing, conversion, optimization and code generation algorithms for the design of a compiler	**K3**
CO3	Understand the concept parsing techniques	**K5**
CO4	Able to understand the memory allocation	**K5**
CO5	Understand the Loop Optimization and DAG	**K6**

Mapping with Programme Outcomes:

Semester	Course code	Title of the Course						Hours	Credits
III	24PCS3C9	CC IX- COMPILER DESIGN						5	4
Course outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	3	2	3	2	2.1
CO-3	2	2	1	2	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	1	3	3	2	2	3	2	2.2
Mean overall score											2.2 (High)

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CORE V - PRACTICAL– AI & ML LAB

Semester : III **Max. Marks : 60**

Course Code :24PCS3C5P **Credit : 3**

Total Periods : 60 **Exam Hrs. : 3**

Objectives:

1. To impart knowledge on Machine Learning Algorithms and solve Machine Learning real world problems using Scikit-Learn Library.
2. Learn techniques for reasoning under uncertainty
3. Learn the basis of deep learning using neural networks

List of Experiments:

1. [Data preprocessing]: Installation of Python libraries. Create dataset in CSV file with 10 rows and 5 columns (name, age, height, eight, BP). Load the CSV file and do the following preprocessing to the data. **(5 Periods)**

2. [Linear Regression]: Generate random numbers for input features and target. Divide the data into training and testing set[100 iterations]. **(5 Periods)**

3. [Multiple Linear Regression]: Load the boston house price prediction dataset. Divide the data into training and testing set [500 iterations]. **(5 Periods)**

4. [Logistic Regression]: Load the Iris classification dataset. Divide the data into training and testing set. Print the training and testing data[500 iterations]. **(5 Periods)**

5. [Support Vector Machine]: Load the Digits classification dataset. Divide the data into training and testing set. Print the training and testing data. Create a Linear SVM model [500 iterations]. **(5 Periods)**

6. [Decision Tree Classifier]: Load the Wine classification dataset. Divide the data into training and testing set. Print the training and testing data. Create a Decision Tree model for the dataset and run the model for 500 iterations. **(5 Periods)**

7. [K-Means Clustering]: Populate clustering dataset with 2 features using sklearn built-in functions. Divide the data into training and testing set [500 iterations]. **(10 Periods)**

8. [Spectral Clustering]: Visualize the clustering results using 2D plots. Visually compare the results with plots of the K-means in terms of speed and clustering validity. **(10 Periods)**

9. [Simple Neural Networks]: Load the Digits classification dataset. Divide the data into training and testing set. Print the training and testing data. Create a Neural Network with 2 layers and 100 nodes each for the dataset and run the model for 500 iterations. Apply logistic regression, SVM, decision tree to the dataset and print the results. Print the evaluation results and learned model weights. Compare the results in terms of speed and accuracy. **(10 Periods)**

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Generate synthetic datasets	**K2**
CO2	Preprocess synthetic data and real use case data sets	**K3**
CO3	Create ML models for the target data sets	**K4**
CO4	Evaluate the performance of ML model	**K5**
CO5	Compare the performance of ML models	**K6**

Mapping with Programme Outcomes:

Semester	**Course code**	**Title of the Course**							**Hours**	**Credits**
III	**24PCS3C5P**	**CC V-PRACTICAL- AI & ML LAB**							**4**	**3**
Course outcomes	**Programme outcomes(POs)**					**Programme Specific Outcomes(PSOs)**					**Mean scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	2	2	2	2	2	3	2	3	2	2.2
CO-3	2	2	2	2	3	2	3	2	3	2	2.3
CO-4	2	2	2	2	2	3	2	2	3	2	2.4
CO-5	2	2	2	2	3	3	2	2	3	2	2.3
Mean overall score											**2.3 (High)**

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CORE VI – PRACTICAL -

DIGITAL IMAGE PROCESSING USING MATLAB

Semester : III	**Max. Marks : 60**
Course Code :24PCS3C6P	**Credit : 3**
Total Periods : 60	**Exam Hrs. : 3**

Objectives:

1. To understand the basics of Digital Image Processing fundamentals, image enhancement and image restoration techniques
2. To enablethestudentstolearnthefundamentalsofimagecompressionandsegmentation
3. To understand Image Restoration & Filtering Techniques
4. Implementation of the above using MATLAB

List of Experiments:

1. Implement Image enhancement Technique. **(7 Periods)**
2. Histogram Equalization **(7 Periods)**
3. Image Restoration. **(7 Periods)**
4. Implement Image Filtering. **(6 Periods)**
5. Edge detection using Operators(Roberts, Prewitts and Sobel soperators) **(7 Periods)**
6. Implement image compression. **(6 Periods)**
7. Image Subtraction **(7 Periods)**
8. Boundary Extraction using morphology. **(6 Periods)**
9. Implement Image enhancement Technique. **(7 Periods)**

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To write programs in MATLAB for image processing using the techniques	**K2**
CO2	To able to implement Image Enhancements & Restoration techniques	**K3**
CO3	Capable of using Compression techniques in an Image	**K4**
CO4	Implement the image and Segment it	**K5**
CO5	Must be able to manipulate the image and Segment it	**K6**

Mapping with Programme Outcomes:

Semester	**Course code**	**Title of the Course**							**Hours**	**Credits**
III	**24PCS3C6P**	**CC VI – PRACTICAL- DIGITAL IMAGE PROCESSING LAB USING MATLAB**							**4**	**3**
Course outcomes	**Programme outcomes(POs)**					**Programme Specific Outcomes(PSOs)**				**Mean scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	3	2	3	2	2.1
CO-3	2	2	1	2	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	1	3	3	2	2	3	2	2.2
Mean overall score											**2.2 (High)**

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CORE ELECTIVE- III - DATA MINING AND WAREHOUSING

Semester : III **Max. Marks : 75**

Course Code :24PCS3E3A **Credit : 3**

Total Periods : 60 **Exam Hrs. : 3**

Objectives:

1. In this course students shall learn the mathematical & algorithmic details of various data association techniques to discover patterns in underlying data (namely mining data)
2. To understand Data Mining and Data Warehousing Applications.
3. They also learn how to consolidate huge volume of data in one place efficiently

UNIT I **(15 Periods)**

Introduction to Data Mining – Association Rule Mining.

UNIT II **(10 Periods)**

Classification – Cluster Analysis.

UNIT III **(15 Periods)**

Web Data Mining – Search Engines.

UNIT IV (SELF STUDY) **(10 Periods)**

Data warehousing – Introduction – Operational Data Stores – Data Warehouses – Data Warehouse Design – Guidelines for Data Warehouse Implementation – Data Warehouse Metadata - Software for ODS and Data Warehousing.

UNIT V (SELF STUDY) **(10 Periods)**

Online Analytical Processing – Information Privacy.

UNIT VI CURRENT CONTOURS (for CIA only)

Present-day changes related to the course during the semester concerned.

TEXT BOOK:

1. G.K. Gupta, Introduction to Data mining with case studies, Prentice Hall India , 2006 (ISBN 81-203-3053-6) [Unit-1 :(Chapters 1,2); Unit-2 :(Chapters 3,4); Unit-3 (Chapters 5,6); Unit-4 (Chapters 7), Unit-5(Chapters 8,9)].

REFERENCE BOOKS:

1. K.P.Soman & ShyamDiwakar and V. Ajay, Insight to Data Mining Theory and Practice,Prentice Hall of India, 2006. (ISBN -81-203- 2897-3)
2. Jiawei Han and Micheline amber, Data Mining Concepts and Techniques, Elsevier, Second Edition, 2007 (ISBN: 81-312-0535-5)

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To understand the basic principles, concepts and applications of data warehousing and data mining	**K3**
CO2	Ability to do Conceptual, Logical, and Physical design of Data Warehouses OLAP applications and OLAP deployment	**K3**
CO3	Have a good knowledge of the fundamental concepts that provide the foundation of data mining	**K4**
CO4	Describe different methodologies used in data mining and data ware housing	**K5**
CO5	Compare different approaches of data ware housing and data mining with various technologies	**K6**

MAPPING WITH PROGRAMME OUTCOMES:

Semester	Course code	Title of the Course							Hours	Credits
III	24PCS3E3A	CE- III - DATA MINING AND WAREHOUSING							4	3
Course outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	3	2	3	2	2.1
CO-3	2	2	1	2	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	1	3	3	2	2	3	2	2.2
Mean overall score											2.2 (High)

Prepared by **Verified by** **Signature of the HOD**

CORE ELECTIVE- III – DATA SCIENCE AND ANALYTICS

Semester : III	**Max. Marks : 75**
Course Code :24PCS3E3B	**Credit : 3**
Total Periods : 60	**Exam Hrs. : 3**

Objectives:

The main objectives of this course are to:

1. Introduce the students to data science, big data & its ecosystem.
2. Learn data analytics &its life cycle.
3. To explore the programming language R, with respect to the data mining algorithms.
4. Relate the relationship between artificial intelligence, machine learning and data science.

UNIT I **(15 Periods)**

Introduction of Data Science: data science and big data–facets of data-data science process-Ecosystem-The Data Science process – six steps- Machine Learning

UNIT II **(10 Periods)**

DataAnalyticslifecycle-reviewofdataanalytics-AdvanceddataAnalytics-technologyand tools.

UNIT III **(15 Periods)**

Basic Data Analytics using R : R Graphical User Interfaces – Data Import and Export – Attribute and Data Types –Descriptive Statistics – Exploratory Data Analysis –Visualization Before Analysis – Dirty Data – Visualizing a Single Variable – Examining Multiple Variables – Data Exploration Versus Presentation

UNIT IV (SELF STUDY) **(10 Periods)**

Overview of Clustering : K-means – Use Cases – Overview of the Method – Perform a K-means Analysis using R –Classification – Decision Trees – Overview of a Decision Tree – Decision Tree Algorithms – Evaluating a Decision Tree – Decision Tree in R – Bayes' Theorem – Naïve Bayes Classifier – Smoothing – Naïve Bayes in R.

UNIT V (SELF STUDY) **(10 Periods)**

Artificial intelligence: Machine Learning and deep learning in data science-Clustering, association rules. Linear regression-logistic regression-Additional regression methods.

UNIT VI **CURRENT CONTOURS (for CIA only)**

Present-day changes related to the course during the semester concerned.

TEXT BOOK:

1. Introducing-Data-Science-Big-Data-Machine-Learning-and-more-using-Python-tools-2016. Pdf
2. Data science in big data analytics-Wiley2015JohnWiley&Sons

REFERENCE BOOKS:

1. A simple introduction to DataScience-LarsNielson 2015
2. Introducing Data Science Davy Cielen, Arno D.B.Meysman, Mohamed Ali 2016 ManningPublication
3. R Programming for Data Science-Roger D.Peng 2015LeanPublication
4. DataScience & Big Data Analytics:Discovering,Analyzing,VisualizingandPresenting Data

Related Online Content

1. https://www.tutorialspoint.com/python_data_science/index.htm
2. https://www.javatpoint.com/data-science
3. https://nptel.ac.in/courses/106/106/106106179/

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the concept of data science and its techniques	**K3**
CO2	Review data analytics	**K3**
CO3	ApplyanddetermineappropriateDataMiningtechniquesusingRtorealtimeapplications	**K4**
CO4	Analyze on clustering algorithms	**K5**
CO5	Analyze on regression methods in AI	**K6**

MAPPING WITH PROGRAMME OUTCOMES:

Semester	Course code	Title of the Course								Hours	Credits
III	24PCS3E3B	CE- III – DATA SCIENCE & ANALYTICS								4	3
Course outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	3	2	3	2	2.1
CO-3	2	2	1	2	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	1	3	3	2	2	3	2	2.2
Mean overall score											2.2 (High)

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NME II – WEB DESIGNING

Semester : III **Max. Marks : 75**

Course Code : 24PCS3N2A **Credit : 2**

Total Periods : 45 **Exam Hrs. : 3**

Objectives:

1. To impart knowledge on How to design a website
2. To impart knowledge on Creating different themes for different layouts
3. To impart knowledge on How to design the look and feel of a website
4. To impart knowledge on Learning about the tools and techniques of web design covers using software applications

UNIT I **(8 Periods)**

Fundamentals: A Brief Introduction to the Internet – The World Wide Web – Web Browser – Web Servers – Uniform Resource Locators – Multiple Internet Mail Extensions - The Hypertext Transfer Protocol – The Web Programmers Tool Box.

UNIT II **(10 Periods)**

Introduction to HTML: Designing a Home Page – HTML Document – Anchor Tag – Hyperlinks – Head and Body Sections – Header Section – Title – Prologue – Links – Colorful Pages – Comments – Body Section – Heading – Horizontal Ruler – Paragraph – Tabs – Images and Pictures – Lists and their Types – Nested Lists – Table Handling.

UNIT III **(8 Periods)**

Frames: Frameset Definition – Frame Definition – Nested Framesets – Forms : Forms and their Elements

UNIT IV **(9 Periods)**

DHTML and Style Sheets – Defining Styles – Elements of Styles – Linking a Style Sheet to a HTML Document – Inline Styles – External Style Sheets – Internal Style Sheets – Multiple Styles – Web Page Designing.

UNIT V **(10 Periods)**

Introduction to XML : Introduction – The Syntax of XML – XML Document Structure – Document Type Definitions – Namespaces – XML Schemas – Displaying Raw XML Documents – Displaying XML Documents with CSS – XML Processors.

UNIT VI CURRENT CONTOURS (for CIA only)

Present-day changes related to the course during the semester concerned.

TEXT BOOK:

1. Robert W. Sebesta - Programming the World Wide Web, Pearson Education, Third Edition, 2007. For Units I and Unit V.
2. C. Xavier - World Wide Web Designing, Tata McGraw Hill, 2000. For Units II, III and IV.

REFERENCE BOOK:

1. Web Design – A Beginners Guide, Wendy Willard, Tata McGraw Hill.

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the concept of internet and browser.	**K3**
CO2	Familiar with the HTML tag.	**K3**
CO3	Learn and implement the concept of frames and forms in HTML.	**K4**
CO4	Understand the concept of Style sheets.	**K5**
CO5	Able to understand the XML	**K6**

MAPPING WITH PROGRAMME OUTCOMES:

Semester	Course code	Title of the Course								Hours	Credits
III	24PCS3N2A	NME II – WEB DESIGNING								3	2
Course outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	3	2	3	2	2.1
CO-3	2	2	1	2	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	1	3	3	2	2	3	2	2.2
Mean overall score											2.2 (High)

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NME II – E-COMMERCE

Semester : III **Max. Marks : 75**

Course Code :24PCS3N2B **Credit : 2**

Total Periods : 45 **Exam Hrs. : 3**

Objective: To impart knowledge on the concept of Web Applications and WAP Fundamentals.

UNIT I **(8 Periods)**

Introduction to E-Commerce: Introduction – What is E-commerce? – E-business – Categories of E-commerce Applications – Global Trading Environment & Adoption of E-commerce – Comparison between Traditional & E-commerce – Advantages & Disadvantages of E-commerce. Business Models of E-commerce: Introduction – Models – Business to Consumer.

UNIT II **(9 Periods)**

Business to Business – B2B E-commerce and EDI: Introduction – Need for B2B – Electronic Data Exchange – Paperless Transactions – EDI Standards – Data Standards Used in EDI – Cost of EDI – Reasons for Slow Acceptability of EDI for Trading – Electronic Funds Transfer – XML and its Application – Comparison of HTML and XML – Advantages of XML as a Technology – Design Goals of XML – Using DTD with XML Document – E- Marketing.

UNIT III **(10 Periods)**

Business Applications of E-Commerce: Introduction – Trade Cycle – Supply Chain – E-procurment – Implementation – Competitive Advantage – E-commerce Application in Manufacturing, Wholesale, Retail and Service Sector. E-Commerce Technology: Introduction – IT Infrastructure – Internet.

UNIT IV **(9 Periods)**

Middleware – Intranet – Extranet – VPN – Firewall – Cryptography – Digital Signature – Digital Envelope – Digital Certificates – Contents. Electronic Payment Systems: Introduction – Electronic Payment Mechanism – Types – Risks – Payment Gateway – issues of Electronic Payment Technology – Security of E-payment Systems – Internet Banking.

UNIT V **(9 Periods)**

Security Requirement of E-payment System – Secure Socket Layer – Biometrics. Security Issues in E-Commerce: Introduction – Issues – Risks – Protecting E-commerce System – Security Tools – Client Server Network Security – Data and Message Security.

UNIT VI **CURRENT CONTOURS (for CIA only)**

Present-day changes related to the course during the semester concerned.

TEXT BOOK:

1. Dr. U. S. Pandey, Er. Saurabh Shukla – E-Commerce and Mobile Commerce Technologies, S. Chand & Company Ltd., 2011.

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concepts of E-commerce.	**K2**
CO2	Able to understand the concept of EDI	**K3**
CO3	Familiar with the E-commerce applications	**K4**
CO4	Familiar with the concept of E-payment	**K5**
CO5	Understand the security issues in E-commerce	**K6**

MAPPING WITH PROGRAMME OUTCOMES:

Semester	Course code	Title of the Course							Hours	Credits
III	24PCS3N2B	NME II – E-COMMERCE							3	2
Course outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)				Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	3	2	3	2	2.1
CO-3	2	2	1	2	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	1	3	3	2	2	3	2	2.2
Mean overall score											2.2 (High)

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CORE COURSE X–BIG DATA ANALYTICS

Semester : IV **Max. Marks : 75**

Course Code :24PCS4C10 **Credit : 4**

Total Periods : 75 **Exam Hrs. : 3**

Objective:

1. To impart knowledge on Fundamentals of Big Data Analytics.
2. To impart knowledge on Technologies and databases.
3. To impart knowledge on Hadoop and Map Reduce Fundamentals.
4. Apply analytics on Structured, Unstructured Data.

UNIT I **(15 Periods)**

Introduction to Big Data: Data, Characteristics of Data and Types of digital data: Unstructured - Semi-structured and Structure - 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 **(15 Periods)**

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 **(15 Periods)**

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 **(15 Periods)**

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 **(15 Periods)**

Hadoop MapReduce 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

UNIT VI **CURRENT CONTOURS (for CIA only)**

Present-day changes related to the course during the semester concerned.

TEXT BOOK:

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. ―Hadoop: The definitive Guide‖, Tom White, O'Reilly Media, 2010.

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the concept and challenge of big data and why existing technology is inadequate to analyze the Big Data	**K3**
CO2	Collect, manage, store, query, and analyze various form of Big Data	**K3**
CO3	Understand the impact of big data for business decisions and strategy	**K4**
CO4	Address the limitations and challenges of working in a Big Data environment and thus utilize the opportunities for commercial and/or social benefit	**K5**
CO5	Understand the workings of various tools using Big Data	**K6**

MAPPING WITH PROGRAMME OUTCOMES:

Semester	Course code	Title of the Course								Hours	Credits
IV	24PCS4C10	CC X–BIG DATA ANALYTICS								5	4
Course outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	2	2	2	2	2	3	2	3	2	2.2
CO-3	2	2	2	2	3	2	3	2	3	2	2.3
CO-4	2	2	2	2	2	3	2	2	3	2	2.4
CO-5	2	2	2	2	3	3	2	2	3	2	2.3
Mean overall score											2.3 (High)

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CORE COURSE XI – INTERNET OF THINGS

Semester : IV **Max. Marks : 75**

Course Code :24PCS4C11 **Credit : 4**

Total Periods : 75 **Exam Hrs. : 3**

Objectives:

1. About Internet of Things where various communicating entities are controlled and managed for decision making in the application domain.
2. Enable students to learn the Architecture of IoT and IoT Technologies
3. Developing IoT applications and Security in IoT, Basic Electronics for IoT, Arduino IDE, Sensors and Actuators Programming NODEMCU using Arduino IDE.

UNIT I **(15 Periods)**

Introduction to IoT: Evolution of IoT – Definition & Characteristics of IoT - Architecture of IoT–Technologies for IoT – Developing IoT Applications – Applications of IoT – Industrial IoT – Security in IoT.

UNIT II **(15 Periods)**

Basic Electronics for IoT: Electric Charge, Resistance, Current and Voltage – Binary Calculations – Logic Chips – Microcontrollers – Multipurpose Computers – Electronic Signals – A/D and D/A Conversion – Pulse Width Modulation.

UNIT III **(15 Periods)**

Programming Fundamentals with C using Arduino IDE: Installing and Setting up the Arduino IDE – Basic Syntax – Data Types/ Variables/ Constant – Operators – Conditional Statements and Loops – Using Arduino C Library Functions for Serial, delay and other invoking Functions – Strings and Mathematics Library Functions.

UNIT IV **(15 Periods)**

Sensors and Actuators :Analog and Digital Sensors Interfacing temperature sensor, ultra sound - Sensor and infrared (IR) sensor with Arduino– Interfacing LED and Buzzer with Arduino.

UNIT V **(15 Periods)**

Sending Sensor Data Over Internet: Introduction to ESP8266 NODEMCU WiFi Module – Programming NODEMCU using Arduino IDE – Using WiFi and NODEMCU to transmit data from temperature sensor to Open Source IoT cloud platform (Thing Speak).

UNIT VI **CURRENT CONTOURS (for CIA only)**

Present-day changes related to the course during the semester concerned.

TEXT BOOK:

1. Arshdeep Bahga, Vijay Madisetti,"InternetofThings:AHands-OnApproach",2014. ISBN: 978-0996025515.
2. Boris Adryan, Dominik Obermaier, Paul Fremantle, "The Technical Foundations of IoT",Artech Houser Publishers, 2017.

REFERENCE BOOK:

1. MichaelMargolis,"ArduinoCookbook",O"Reilly,2011
2. Marco Schwartz, "InternetofThingswithESP8266",Packt Publishing, 2016.
3. DhivyaBala,"ESP8266:StepbyStepTutorialforESP8266IoT,ArduinoNODEMCU Dev. Kit",2018.

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand about IoT, its Architecture and its Applications	**K2**
CO2	Understand basic electronics used in IoT & its role	**K3**
CO3	Develop applications with C using Arduino IDE	**K4**
CO4	Analyze about sensors and actuators	**K6**
CO5	Design IoT in real time applications using today's internet & wirelesstechnologies	**K6**

MAPPING WITH PROGRAMME OUTCOMES:

Semester	Course code	Title of the Course								Hours	Credits
IV	24PCS4C11	CC XI – INTERNET OF THINGS								5	4
Course outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	2	2	2	2	2	3	2	3	2	2.2
CO-3	2	2	2	2	3	2	3	2	3	2	2.3
CO-4	2	2	2	2	2	3	2	2	3	2	2.4
CO-5	2	2	2	2	3	3	2	2	3	2	2.3
Mean overall score											2.3 (High)

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INDUSTRIAL BASED COURSE – ADVANCED SOFTWARE ENGINEERING

Semester : IV **Max. Marks : 75**

Course Code :24PCS4I **Credit : 4**

Total Periods : 75 **Exam Hrs. : 3**

Objectives: To impart knowledge on Software Engineering.

UNIT I **(15 Periods)**

Introductions: Evolving Role of Software – Software Characteristics, Components and Its Applications – Generic View of Software Engineering – Software Process Models.

UNIT II **(15 Periods)**

Systems Analysis: Requirements Analysis – Analysis Principles – Prototyping Software Requirement Specification – Data Modeling, Functional Modeling and Behavioral Modeling.

UNIT III **(15 Periods)**

Design Concepts: Design and Software Quality, Design Concepts: Abstraction – Refinement - Modularity and Software Architecture Control Hierarchy - Structural Partitioning and Information Hiding - Effective Modular Design: Functional Independence - Cohesion and Coupling – Design Documentation.

UNIT IV **(15 Periods)**

Design Methods: Data Design – Architectural Design Process: Transform Mapping and Transaction Mapping – Interface Design – Procedural Design. Design for Real – Time Systems: System Considerations – Real Time Systems – Analysis and Simulation of Real Time Systems.

UNIT V **(15 Periods)**

Software Testing Methods: Software Testing Fundamentals. White Box Testing: Basis Path Testing and Control Structure Testing – Black Box Testing – Testing for Specialized Environments. Software Testing Strategies: A strategic Approach to Software Testing – Unit Testing – Integration Testing – Validation Testing – System Testing.

UNIT VI **CURRENT CONTOURS (for CIA only)**

Present-day changes related to the course during the semester concerned.

TEXT BOOK:

1. R.S. Pressman "Software Engineering- A Practitioner's Approach", (9th edition) Tata McGraw Hill, 2023

REFERENCE BOOK:

1. Software Engineering: Principles and Practices- Deepak Jain, Oxford Publication, 2008
2. Fundamentals of Software Engineering- Rajib Mall, 5th Edition, 2018
3. Software Engineering – A precise Approach- Pankaj Jalote, 2010

E-Content Reference

1. Software Engineering - Course (nptel.ac.in)

COURSE OUTCOMES:

On completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Analyze the software life cycle models	**K3**
CO2	Identify the importance of the software development process	**K3**
CO3	Analyze the importance of CASE tools	**K4**
CO4	Design and develop correct and robust software products using advanced software engineering Techniques	**K5**
CO5	Able to understand the testing techniques	**K6**

MAPPING WITH PROGRAMME OUTCOMES:

Semester	Course code	Title of the Course								Hours	Credits
IV	24PCS4I	IBC – ADVANCED SOFTWARE ENGINEERING								5	4
Course outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	3	2	3	2	2.1
CO-3	2	2	1	2	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	1	3	3	2	2	3	2	2.2
Mean overall score											2.2 (High)

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PROJECT

Semester : IV	**Max. Marks :100**
Course Code : 24PCS4PW	**Credit :8**
Total Periods : 225	**Exam Hrs. : 3**

Students to do the Project. The objective of the Project is to enable the students to work in Latest Software.

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INTRODUCTION TO ACCOUNTING

Semester: II **Max.Marks:75**
Course Code: 24PCO2N1A **Credit: 2**
Total Periods: 45 **Periods: 3**

OBJECTIVE

1. To enhance the understanding of basic concepts of accounting.
2. To explain students about the Preparation of Ledger Accounts.
3. To facilitate the students in the Preparation of Trial Balance.
4. To express to students to about various classification of Error.
5. To let to know students to know the Balance Sheet with simple Adjustments.

Unit-1: - **Introduction of Accounting Teaching Hours: (10 Hours)**

Accounting-Meaning-Definition-Objectives-Double Entry System-Meanin g of Debit and Credit – Advantages- Limitations-Types of Accounts - Accounting Rules - Accounting Terminology -Accounting Concepts and Conventions

Unit-2: - Preparation of Journal and Ledger Account Teaching Hours: (5 Hours)

Journal -Meaning-Preparation of Journal-Ledger Accounts-Meaning-Preparation of LedgerAccounts-Advantages over Journal-Ledger Accounts

Unit-3: - Preparation of Trail Balance and Subsidiary Book Teaching Hours: (8 Hours)

Trial Balance-Meaning-Advantages-Preparation of Trial Balance-Subsidiary Books-Meaning-Types

Unit-4: - Error and Rectification Teaching Hours: (10 Hours)

Errors-Classification-Rectification (Rectification after the preparation of final account is excluded) – Suspense Account-Meaning and Need

Unit-5: - Final Accounting Teaching Hours: (10 Hours)

Preparation of Final Accounts-Trading Account-Profit and Loss Account-Balance Sheet withsimple Adjustments

Unit-6: - Latest Learning's (For CIA Purpose Only) **(02 Hours)**

Text book:

1. Jain, S.P. & Narang, N.L. Advanced Accounting, Kalyani Publications.

2. Jaya Charulatha and Baskar, Introduction to Accountancy, Vijay Nicholes Imprint Pvt. Ltd.Chennai.

Reference Book:

1. Gupta, R.L &Radhaswamy, M. Advanced Accounts, Sulthan Chand, New Delhi.

2. Shukla & Grewal & Gupta, Advanced Accounting S. Chand & Co, New Delhi.

COURSE OUTCOMES:		
CO NUMBER	**COSTATEMENT**	**KNOWLEDGE LEVEL**
CO1	Student will be able to understand the basic account concept and double entry system	**K3**
CO2	Student will be able to Pass Journal Entries, Prepare Ledger Accounts.	**K4**
CO3	Student will be able to know the Preparation Trial Balance.	**K4**
CO4	Student will be able to know the Rectification after the preparation of final account is excluded.	**K5**
CO5	Student will be able to know the Preparation Trading a/c, Profit & Loss a/c and Balance Sheet.	**K5**

MAPPING WITH PROGRAM OUTCOMES:

Semester	**Course code**		**Title of the Course**							**Hours**	**Credits**
II	**24PCO2N1A**		**INTRODUCTION TOACCOUNTING**							**5**	**4**
Course outcomes	**Programme outcomes(POs)**					**Programme Specific Outcomes(PSOs)**					**Mean scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	3	2	3	2	2.1
CO-3	2	2	1	2	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	1	3	3	2	2	3	2	2.2
Mean overall score											**2.2 (High)**

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PRINCIPLES OF MANAGEMENT

Semester	**: III**	**Max. Marks**	**: 75**
Course Code	**: 22PCO3N2A**	**Credit**	**: 02**
Total Periods	**: 45**	**Exam Hrs**	**: 03**

OBJECTIVES

1. To enhance the understanding of the Principles of Management.
2. To extent the knowledge of steps involved in the process of Planning and decision making.
3. To impact knowledge in Principles of Organization.
4. To provide the students the knowledge about the Authority to delegation.
5. To extend the knowledge on Need of Co–ordination and Control Process.

UNIT I **(10 Periods)**

Management. Definition–Importance–Principles of Management–Functions of a Manager–Role of a Manager–Skills of a Manager.

UNIT II **(10 Periods)**

Planning Meaning–Nature–Objective–Steps in Planning–Limitation of Planning–Decision Making–Process of decision making–Types of decisions.

UNIT III **(8 Periods)**

Organisation Meaning–Nature–Importance–Informal Organization–Principles of Organization.

UNIT IV **(10 Periods)**

Authority Meaning–Responsibility–Difference between Authority & Responsibility Accountability. Delegation: Meaning–Advantages–Reasons of non–delegation–How to make Delegation effective.

UNIT V **(5 Periods)**

Co–Ordination: Need of Co–ordination–Types–Techniques–Controlling–Meaning and Importance of Controlling–Control Process.

UNIT VI **(02 Periods)**

Latest Learning's (For CIA Purpose Only).

TEXT BOOK(S)

1. P.C. Tripathi & P.N. Reddy–Principles of Management – Tata McGraw–Hill.
2. Gupta C.B. Business Management.

REFERENCE BOOK(S)

1. Hanagan–Management Concepts & Practices–McMillan India Ltd.
2. Dr. N. Prema– Business Management.
3. Massie–Essentials of Management–Prentice–Hall of India.
4. J. Jayasankar–Principles of Management–Margham Publications.
5. R.N. Gupta–Principles of Management–S. Chand Publications

COURSE OUTCOMES:		
CO NUMBER	**COSTATEMENT**	**KNOWLEDGE LEVEL**
CO1	Student will be able to understand the Principles & Functions of Management.	**K3**
CO2	Student will be able to understand the Planning and its importance.	**K4**
CO3	Student will be able to understand the Organization and its importance.	**K4**
CO4	Student will be able to understand the Authority, Responsibility & Delegation.	**K5**
CO5	Student will be able to understand the Need for Co–ordination and importance of Control.	**K5**

MAPPING WITH PROGRAMME OUTCOMES:

Semester	**Course code**		**Title of the Course**							**Hours**	**Credits**
III	**22PCO3N2A**		**PRINCIPLES OF MANAGEMENT**							**5**	**4**
Course outcomes	**Programme outcomes(POs)**					**Programme Specific Outcomes(PSOs)**					**Mean scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO 4**	**PSO5**	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	3	2	3	2	2.1
CO-3	2	2	1	2	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	1	3	3	2	2	3	2	2.2
Mean overall score											**2.2 (High)**

Prepared by **Verified by** **Signature of the HOD**