

MASTER OF COMPUTER APPLICATIONS

SYLLABUS

(Under Choice Based Credit System)
Applicable for the students admitted
from 2023 – 2024 onwards



PG DEPARTMENT OF COMPUTER APPLICATIONS

Bishop Heber College (Autonomous)

(Nationally Reaccredited at the A+ Level by NAAC)
(Recognized by UGC as “College with Potential for Excellence”)

Tiruchirappalli-620 017

**MCA OUTCOME BASED EDUCATION
2023 -2024 ONWARDS BISHOP HEBER COLLEGE**

VISION

Develop next generation software professionals of high calibre to cater to the various needs of the IT Industry through effective teaching and learning process and to involve in advanced research by imbining ethical values in order to provide solutions to the problems of our society.

MISSION

1. Enrich the students with a deep insight on the latest technologies by providing globally competent curriculum.
2. Develop, evaluate, synthesize and apply the acquired computing knowledge to cater to the needs of the society by collaborating with industries and corporate sectors.
3. Enable the students to become experts, researchers, academicians, entrepreneurs in the field of computer applications with a commitment to lifelong learning.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)

1. Graduates shall become a successful professional in the field of computer applications and in various multi-disciplinary industries either as an employee or an entrepreneur.

Related to M1 & M2

2. Graduates shall become effective researchers and academicians, leading or participating in efforts to address social, technical and business challenges in an ethical manner.

Related to M2 & M3

3. Graduates shall be engaged in lifelong learning and professional development through self-study and by updating new technologies.

Related to M1,M2 &M3

PROGRAMME OUTCOMES (POs)

On completion of Masters in Computer Applications, students would have acquired the following competencies to:

- **PO1: Computational Knowledge:** Apply the knowledge of computer applications to design, develop, test and maintain the software using the latest technologies.
- **PO2: Problem Analysis:** Identify and analyze complex problems and formulate appropriate solutions.
- **PO3: Design and Development of Solutions:** Design and develop customized frameworks for small to large enterprises.
- **PO4: Conduct Investigations of Complex Computing problems:** Utilize the research-based knowledge and research methods for the analysis and interpretation of data to provide valid conclusions in real-time applications.

- **PO5: Modern Tool Usage:** Identify and apply the appropriate techniques necessary for innovative software solutions, resources and modern computing tools to perform complex computing activities.
- **PO6: Project Management and Finance:** Manage multidisciplinary projects and assess societal, environmental, health, safety, legal and cultural issues.
- **PO7: Professional Ethics:** Function efficiently both as a member and team leader exhibiting professional skills with human values and ethics.
- **PO8: Communication Efficacy:** Communicate effectively with the computing community Covered and the society to enhance documentations, presentations and to use appropriate opportunity Covered according to their intelligence.
- **PO9: Life-long Learning:** Engage in independent and continuous learning as a computing professional and able to upgrade the skill sets for the lifelong betterment of the individual and society at large.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

On successful completion of the program learners would have acquired the following competencies:

- **PSO1:** Apply the acquired knowledge to design Graphical User Interfaces, develop websites, design new operating systems and manage databases.
- **PSO2:** Analyze the real-time data and predict the future outcome by using Machine Learning, Deep learning and Analytical tools.
- **PSO3:** Exhibit the programming skills to provide solutions to meet the needs of the industry.
- **PSO4:** Use the managerial skills and financial knowledge to become a successful entrepreneur and provide employability to the needed community Covered.

MCA COURSE STRUCTURE 2023 – 2024

(For the candidates admitted from the academic year 2023-2024 onwards)

Eligibility:

Passed BCA/ Bachelor Degree in Computer Science Engineering or equivalent Degree OR passed B.Sc./ B.Com./ B.A. with Mathematics at 10+2 Level or at Graduation Level (with additional bridge Courses as per the norms of the concerned University). Obtained at least 50% marks (45% marks in case of candidates belonging to reserved category) in the qualifying Examination.

(Applicable to Candidates admitted from the Academic Year 2023-2024 onwards)

Computer Science Stream

Sem	Course	Course Title	Course Code	Hours / Week	Credits	Marks		
						CIA	ESE	Total
I	Core I	Programming in .NET Technology	P23CA101	4	4	25	75	100
	Core II	Operating Systems	P23CA102	4	4	25	75	100
	Core III	Resource Management Techniques	P23CA103	4	3	25	75	100
	Core IV	Accounting and Financial Management	P23CA104	4	3	25	75	100
	Elective I	Software Engineering/ Microprocessor and Micro Controllers/ Computer Graphics	P23CA1:A/ P23CA1:B/ P23CA1:C	4	3	25	75	100
	Core Practical I	Programming in .NET Technology Lab	P23CA1P1	4	2	40	60	100
	Core Practical II	Operating System Programming Lab	P23CA1P2	4	2	40	60	100
	SBC	Communication and Life Skills	P23CA1S1	2	1	---	---	100
II	Core V	Programming in Java	P23CA205	5	4	25	75	100
	Core VI	Database Management Systems	P23CA206	5	4	25	75	100
	Core VII	Data Structures and Algorithms	P23CA207	4	4	25	75	100
	Elective II	Soft Computing Data Warehousing and Data Mining Artificial Intelligence	P23CA2:A/ P23CA2:B/ P23CA2:C	4	3	25	75	100
	Elective III	Customer Relationship Management Enterprise Resource Planning Management Information Systems	P23CA2:D/ P23CA2:E/ P23CA2:F	4	3	25	75	100
	Core Practical III	Programming in Java Lab	P23CA2P3	4	2	40	60	100
	Core Practical IV	Database Management Systems Lab	P23CA2P4	4	2	40	60	100
	Core Project I	Summer Project	P23CA2PJ	---	2	---	---	100
III	Core VIII	Smart Devices Programming	P23CA308	4	4	25	75	100
	Core IX	Programming in Python	P23CA309	4	4	25	75	100
	Core X	Computer Network and Network Security	P23CA310	5	4	25	75	100
	Elective IV	Organizational Behavior/ Decision Support and Business Intelligence/ Human Resource Management	P23CA3:A/ P23CA3:B/ P23CA3:C	4	3	25	75	100
	Elective V	Big Data Analytics And Cloud Computing/ Block Chain and Crypto-Currencies/ Parallel Computing	P23CA3:D/ P23CA3:E/ P23CA3:F	4	3	25	75	100
	Core Practical V	Smart Devices Programming Lab	P23CA3P5	4	2	40	60	100
	Core Practical VI	Programming in Python Lab	P23CA3P6	4	2	40	60	100
	Generic Course	Project Preparation and Research Ethics	P23CA3G1	1	1	100	---	100
IV	Core XI	Machine Learning for Data Science	P23CA411	5	4	25	75	100
	Core XII	Internet of Things	P23CA412	5	4	25	75	100
	Core Practical VII	Machine Learning for Data Science Lab	P23CA4P7	4	3	40	60	100
	VLO	The Big Picture	P23VLO21	2	2	25	75	100
		Social Ethics	P23VLO22					
	Core Project II	Project - II	P23CA4PJ	14	8	20	80	100
	Compulsory	NPTEL			1/2	---	---	---
Total Credits					91/92	930	1770	2770

MCA COURSE STRUCTURE 2022 – 2023

(For the candidates admitted from the academic year 2022-2023 onwards)

Eligibility:

Passed BCA/ Bachelor Degree in Computer Science Engineering or equivalent Degree OR passed B.Sc./ B.Com./ B.A. with Mathematics at 10+2 Level or at Graduation Level (with additional bridge Courses as per the norms of the concerned University). Obtained at least 50% marks (45% marks in case of candidates belonging to reserved category) in the qualifying Examination.

(Applicable to Candidates admitted from the Academic Year 2022-2023 onwards)

Non-Computer Science Stream

Sem	Course	Course Title	Course Code	Hours / Week	Credits	Marks		
						CIA	ESE	Total
I	Core I	Programming in .NET Technology	P23CA101	4	4	25	75	100
	Core II	Operating Systems	P23CA102	4	4	25	75	100
	Core III	Resource Management Techniques	P23CA103	4	3	25	75	100
	Core IV	Accounting and Financial Management	P23CA104	4	3	25	75	100
	Elective I	Software Engineering/ Microprocessor and Microcontrollers/ Computer Graphics	P23CA1:A/ P23CA1:B/ P23CA1:C	4	3	25	75	100
	Core Practical I	Programming in .NET Technology Lab	P23CA1P1	4	2	40	60	100
	Core Practical II	Operating System Programming Lab	P23CA1P2	4	2	40	60	100
	SBC	Communication and Life Skills	P23CA1S1	2	1	---	---	100
	Bridge Course I	Object Oriented Programming	PB23CA11	---	4	25	75	100
	Bridge Course II	Information Technology	PB23CA12	---	4	25	75	100
	Bridge Course III	Object Oriented Programming Lab	PB23CA1P	---	2	40	60	100
II	Core V	Programming in Java	P23CA205	5	4	25	75	100
	Core VI	Database Management Systems	P23CA206	5	4	25	75	100
	Core VII	Data Structures and Algorithms	P23CA207	4	4	25	75	100
	Elective II	Soft Computing Data Warehousing and Data Mining Artificial Intelligence	P23CA2:A/ P23CA2:B/ P23CA2:C	4	3	25	75	100
	Elective III	Customer Relationship Management Enterprise Resource Planning Management Information Systems	P23CA2:D/ P23CA2:E/ P23CA2:F	4	3	25	75	100
	Core Practical III	Programming in Java Lab	P23CA2P3	4	2	40	60	100
	Core Practical IV	Database Management Systems Lab	P23CA2P4	4	2	40	60	100
	Core Project I	Summer Project	P23CA2PJ	---	2	---	---	100
	Bridge Course IV	Internet Programming	PB23CA24	---	4	25	75	100
	Bridge Course V	Linux Programming	PB23CA25	---	4	25	75	100
	Bridge Course VI	Internet Programming Lab	PB23CA2P	---	2	40	60	100

III	Core VIII	Smart Devices Programming	P23CA308	4	4	25	75	100
	Core IX	Programming in Python	P23CA309	4	4	25	75	100
	Core X	Computer Network and Network Security	P23CA310	5	4	25	75	100
	Elective IV	Organizational Behavior/ Decision Support and Business Intelligence/ Human Resource Management	P23CA3:A/ P23CA3:B/ P23CA3:C	4	3	25	75	100
	Elective V	Big Data Analytics And Cloud Computing / Block Chain and Crypto-Currencies/ Parallel Computing	P23CA3:D/ P23CA3:E/ P23CA3:F	4	3	25	75	100
	Core Practical V	Smart Devices Programming Lab	P23CA3P5	4	2	40	60	100
	Core Practical VI	Programming in Python Lab	P23CA3P6	4	2	40	60	100
	Generic Course	Project Preparation and Research Ethics	P23CA3G1	1	1	100	---	100
	Bridge Course VII	Digital Computer Fundamentals and Architecture	PB23CA37	---	4	25	75	100
	Bridge Course VIII	PHP and MySQL	PB23CA38	---	4	25	75	100
	Bridge Course IX	PHP and MySQL Lab	PB23CA3P	---	2	40	60	100
IV	Core XI	Machine Learning for Data Science	P23CA411	5	4	25	75	100
	Core XII	Internet of Things	P23CA412	5	4	25	75	100
	Core Practical VII	Machine Learning for Data Science Lab	P23CA4P7	4	3	40	60	100
	VLO	The Big Picture	P23VLO21	2	2	25	75	100
		Social Ethics	P23VLO22					
	Core Project II	Project - II	P23CA4PJ	14	8	20	80	100
	Compulsory	NPTEL			1/2	---	---	---
			Total Credits		123/ 124	1125	2175	3370

Self-Study Courses

Course	Course Title	Course Code	Credits	Marks		
				CIA	ESE	Total
Self-Study Course I	Information Retrieval Techniques	PX2CAISA	3	--	100	100
Self-Study Course II	Social Network Analytics	PX2CAISB	3	--	100	100
Self-Study Course III	Principles Of Multi Media	PX2CAISC	3	--	100	100
Self-Study Course IV	Software Quality Management	PX2CAISD	3	--	100	100
Self-Study Course V	Deep Learning	PX2CAISE	3	--	100	100

Note: Students are permitted to choose any two Self-Study Courses in either II, III or IV Semesters.

Core I: PROGRAMMING IN .NET TECHNOLOGY

SEMESTER: I
CREDITS: 4

CODE: P23CA101
HOURS/WEEK: 4

UNIT I

12 Hours

Understanding .NET: .NET Framework - Architecture & Components - Building console apps using Visual Studio 2022 - Understanding C# grammar and Vocabulary- Working with Variables - Exploring more about console applications - Controlling Flow, Converting Types and Handling Exceptions- **Writing, Debugging and Testing Functions:** Writing Functions – Unit Testing – Throwing and catching exceptions in functions.

UNIT II

12 Hours

Building your own Types with Object Oriented Programming: Building class libraries -Storing data within fields – Storing multiple values using Collections – Working and calling methods – Controlling access with Properties and Indexes – Pattern matching with objects - Working with records. **Implementing Interfaces and Inheriting Classes:** More about methods – Raising and handling events – Implementing Interfaces – Managing memory with reference and value types – Working with null values – Inheriting from classes – Casting within inheritance hierarchies – Inheriting and extending .NET types.

UNIT III

12 Hours

Working with Common .NET Types: Pattern Matching with regular expressions – Storing multiple objects in collections – Working with spans, indexes and ranges – Working with network resources – Working with reflection and attributes - Working with images – Managing the file system. **Working with Data Using Entity Framework Core :** Understanding modern databases – Setting up EF Core – Defining EF Core models – Querying EF Core models.

UNIT IV

12 Hours

– **Building websites using ASP.NET Core Razor Pages :** Understanding Web development – Understanding ASP.NET Core – Exploring ASP.NET Core Razor Pages – Using Entity Framework Core with ASP.NET Core – Using Razor class libraries. **Building websites using the Model-View-Controller Pattern:** Setting up an ASP.NET Core MVC website – Exploring an ASP.NET Core MVC website – Customizing an ASP.NET Core MVC website.

UNIT V

12 Hours

Building and consuming web services: Building web services using ASP.NET Core Web API – Documenting and testing web services. **Building User Interfaces Using Blazor:** Understanding Blazor – Comparing Blazor project templates - Building components using Blazor server – Abstracting a service for a Blazor component – Building components using Blazor WebAssembly

Text Books:

1. Mark J . Price, “*C# 10 and .NET 6 – Modern Cross-Platform Development*”, Packt Publishing Ltd., 6th Edition, 2021.

Reference Books:

1. Mathew MacDonald, “*Beginning ASP.NET 3.5 in C# 2008: From Novice to Professional*”, Apress Publications, Second Edition, 2008.
2. Mahesh Chand, “*Programming C# 5.0, C#*” Corner Publications, 2014.
3. Freeman, Adam, “*ProASP.NET MVC 5*”, Apress, 2013.

Core I: OPERATING SYSTEMS

SEMESTER: I

CODE: P23CA102

CREDITS: 4

HOURS/WEEK: 4

UNIT I - Operating System Overview

12 Hours

Operating System Objectives and Functions – The Evolution of Operating Systems – Major Achievements – Developments Leading to Modern Operating Systems – Virtual Machines – OS Design Considerations for Multiprocessor and Multicore – Microsoft Windows Overview – Traditional UNIX Systems – Modern UNIX Systems.

UNIT II - Process & Threads

12 Hours

Process Descriptions & Control: What is a Process? Process States – Process Description – Process Control – Execution of the Operating System. **Threads:** Processes and Threads – Types of Threads – Multicore and Multithreading. **Concurrency: Mutual Exclusion and Synchronization – Concurrency: Deadlock and Starvation.**

UNIT III - Memory Management

12 Hours

Memory: Memory Management: Memory Management Requirements – Memory Partitioning – Paging – Segmentation – Security Issues. **Virtual Memory:** Hardware and Control Structures – Operating System Software.

UNIT IV - Uniprocessor, Multiprocessor and Real Time Scheduling

12 Hours

Scheduling: Uniprocessor Scheduling: Types of Scheduling – Scheduling Algorithms. **Multiprocessor and Real Time Scheduling:** Multiprocessor Scheduling – Real time scheduling – Linux Scheduling – Windows Scheduling.

UNIT V - Input/ Output and File Management

12 Hours

Input/Output and Files: I/O Management and Disk Scheduling: I/O Devices – Organization of the I/O Function – Operating System Design Issues – I/O Buffering – Disk Scheduling – RAID – Disk Cache – Linux I/O – Windows I/O. **File Management:** Overview – File Organization and Access – File Directories – File Sharing – Record Blocking – Secondary Storage Management – File System Security – Linux Virtual File Management – Windows File System.

Text Book:

1. Willam Stallings, “*Operating Systems*”, Pearson Education, Seventh Edition, 2003.

Reference Books:

1. Deital H.M, “*An Introduction to Operating Systems*”, Addison Wesley Publishing Co., 1984.
2. Silberschartz A, Peterson J.L., Galvin P, “*Operating System Concepts*”, Addison Wesley publishing co., 1998.

Core III : RESOURCE MANAGEMENT TECHNIQUES

SEMESTER: I

CODE: P23CA103

CREDITS: 3

HOURS/WEEK: 4

UNIT I - The Linear Programming Problem 12 Hours

The Linear Programming Problem – Mathematical Formulation of the Problem – Graphical Solution Method – **The Simplex Method** – **Artificial Variable Techniques** – **Dual Simplex method**.

UNIT II - The Transportation Problem 12 Hours

The Transportation Problem – Matrix Form – The Transportation Table – The Initial Basic Feasible Solution – Degeneracy in Transportation Problems – Optimum Solution – The Assignment and Routing Problems.

UNIT III - Queueing Theory 12 Hours

Queueing Theory – Queueing System – Characteristics of Queueing System – Poisson Process and Exponential Distribution – Classification of Queues – Transient and Steady States – Poisson Queues – Non – Poisson Queueing Systems – Non – Markovian Queues – Probabilistic models.

UNIT IV - Inventory Control 12 Hours

Inventory Control – ABC Analysis – Economic Lot Size Problems – EOQ with Shortage – Multi-Item Deterministic Problem – Uncertain Demand – Inventory Control with Price Breaks. Replacement Problem – Replacement of Items that Deteriorate with time – Replacement of Items that Fail Completely – other Replacement Problems.

UNIT V - Network Scheduling by PERT/CPM 12 Hours

Network Scheduling by PERT/CPM – Basic Concepts – Constraints in Network – Construction of the Network – Time Calculations in Networks – Critical Path Method (CPM) – PERT – PERT Calculations.

Text Book:

1. Kanti Swarup, P.K. Gupta and Man Mohan, “*Operations Research*”, Sultan Chand and Sons, 1992.

Reference Books:

1. Hamdy A Taha, “*Operations Research – An Introduction*”, Macmillan Publishing Company, 1982.
2. Don.T. Phillips, A.Ravindran, James.J.Solberg, “*Operations Research – Principles and Practice*”, John Wiley & Sons, 1976.

Core IV: ACCOUNTING AND FINANCIAL MANAGEMENT

SEMESTER: I
CREDITS: 3

CODE: P23CA104
HOURS/WEEK: 4

UNIT I - Basic Accounting Concepts and Methods

12 Hours

Financial Statements: Accounting Concepts and Conventions - System of Book Keeping – Journal - Ledger - Trail Balance - Preparation of Trading A/c, Profit and Loss A/c and Balance Sheet without Adjustments.

UNIT II - Ratio Analysis

12 Hours

Ratio analysis ratios Introduction - Significance - Limitations - Classification According to Statement: Short-Term Solvency - Current Ratio - Liquidity Ratio - Classification According to Function: Long-Term Solvency - Debt-Equity Ratio - Proprietary Ratio - Profitability Ratio - Gross-Profit Ratio - Net-Profit Ratio - Operating Ratio.

UNIT III - Cost Management

12Hours

Cost Concepts and cost classifications: Cost concepts and various types of cost classifications -Determination of costs -Marginal costing -Break Even Analysis - Contribution approach - Direct costing

UNIT IV - Company Accounts –Shares Capital

12Hours

Company Accounts - Introduction to company accounts - Types of shares - Issue of shares at par, at premium, at discount

UNIT V - Marketing

12 Hours

Introduction to Marketing: Meaning – Objectives - Classification of markets -Recent trends in marketing - Customer relationship Marketing - E-Marketing - Online Marketing - Tele Marketing

Text Book(s):

1. T.S. Reddy and A. Murthy, “*Financial Accounting*”, 6th revised edition, Margam Publications, 2016.
2. M.Sheik Mohamed, E.Mubarak Ali and M.AbdulHakkem, “*Management Accounting*”, Raja Publications, 2012.
3. R.Ramachandran, R.Srinivasan, “*Financial Management*”, 12th Edition, Sriram Publications, 2012.
4. R.S.N Pillai, Bagavathi and S.Kala, “*Marketing Management*”, S.Chand& Co Publications, 1st Edition, 2010.

Reference Books:

1. R.L. Gupta and V.K. Gupta, “*Principles and practice of Accountancy*”, Eleventh Edition, 2005, Sultan Chand Sons, New Delhi.
2. N. Vinayagam& B. Charumathi, “*Financial Accounting*”, Second Revised Edition, 2008, S.Chand& Company Ltd, New Delhi

UNIT I - Software Process Model**12 Hours**

The Nature of Software: The Nature of Software – The Changing Nature of Software – **Software Engineering:** The Software Process – Software Engineering Practice – Software Development Myths. **The Software Process: Software Process Structure:** A Generic Process Model – Process Assessment and Improvement – **Process Models:** Prescriptive Process Models – Specialized Process Models – The Unified Process.

UNIT II - Requirements Modeling**12 Hours**

Modeling: Principles that Guide Practice: Software Engineering Knowledge - Core Principles – Principles That Guide Each Framework Activity. **Understanding Requirements:** Requirements Engineering – Establishing the Groundwork – Eliciting Requirements – Developing UseCases – Building the Analysis Model – Negotiating Requirements – Validating Requirements. **Requirements Modeling: Scenarios based methods:** Requirements Analysis – Scenario-Based Modeling – UML Models That Supplement the Use Case- **Requirements Modeling: Class-based Methods:** Class-Based Modeling- Identifying Analysis Classes- Specifying Attributes- Defining Operations-Class Responsibility Collaborator Modeling

UNIT III - Software Design**12 Hours**

Design Concepts: Design within the Context of Software Engineering - The Design Process - Design Concepts - The Design Model. **Architectural Design:** Software Architecture – Architectural Genres – Architectural Styles – Architectural Design - **User Interface Design:** The Golden Rules– Interface Design Steps - **Quality Management: Quality Concepts:** Software Quality – The Software Quality Dilemma – Achieving Software Quality.

UNIT IV - Software Quality Assurance and Testing**12 Hours**

Software Quality Assurance: Background Issues – Elements of Software Quality Assurance – SQA Tasks, Goals and Metrics – Formal Approaches to SQA – Statistical Software Quality Assurance - **Software Testing Strategies:** A Strategic Approach to Software Testing –Strategic Issues – Test Strategies for Conventional Software – Validation Testing – System Testing – The Art of Debugging. **Testing Conventional Applications:** Software Testing Fundamentals –Internal and External Views of Testing – White Box Testing – Basis Path Testing – Control Structure Testing – Black Box Testing.

UNIT V - Software Project and Risk Management**12 Hours**

Managing Software Projects: Project Management Concepts: The Management Spectrum – People – The Product – The Process – The Project. **Estimation For Software Projects:** Software Project Estimation – Decomposition Techniques – Empirical Estimation Models. **Project Scheduling:** Basic Concepts – Project Scheduling – Scheduling - **Risk Management:** Software Risks – Risk Identification – Risk Projection – Risk Refinement – Risk Mitigation, Monitoring and Management.

Text Book:

1. Roger S. Pressman, “*Software Engineering - A Practitioner’s Approach*”, McGraw Hill, Eighth Edition, 2019.

Reference Books:

1. Ian Sommerville, “*Software Engineering*”, Pearson Education Asia, Tenth Edition, 2016.
2. James F Peters and Witold Pedrycz, “*Software Engineering – An Engineering Approach*”, John Wiley and Sons, New Delhi, 2010.

Elective I: MICROPROCESSOR AND MICROCONTROLLERS

SEMESTER: I
CREDITS: 3

CODE: P23CA1:B
HOURS/WEEK: 4

UNIT I - Introduction: 9 Hours

Evolution of Microprocessor – Intel 8085 Architecture – Instruction Set – Instruction and Data Formats – Addressing Modes – Status Flags – Intel 8085 Instructions – Simple 8085 Programs.

UNIT II - 8086 Microprocessor: 9 Hours

Architecture of Intel 8086 Microprocessor – Addressing Modes–Instruction Set - Assembly Language Programming.

UNIT III 9 Hours

Salient Features of 80286– Internal Architecture of 80286– Signal Description of 80286 – Salient Feature of 80386 DX Architecture and Signal Description of 80386 – Register Organization of 80386– Addressing Modes – Data Types of 80386 – Salient Feature of 80586 (Pentium)– Few Relevant Concepts of Computer Architecture – System Architecture.

UNIT IV - Interfacing Concepts: 9 Hours

Programmable Peripherals Interface (PPI) – Programmable Communication Interface (PCI) – DMA Controller– Interrupt Controller.

UNIT V 9 Hours

Architecture of 8051–Signal Descriptions of 8051–Register Set of 8051–Important Operational Features of 8051–Memory and I/O Addressing by 8051–Interrupts of 8051–Instruction Set of 8051–Design of a Micro Controller 8051 Based Length Measurement System for Continuously Rolling Cloth or Paper.

Text Books:

1. Badriram, “*Fundamentals of Microprocessor and Microcomputers*”, Dhanpat Rai and Sons, Fourth Edition 1993.
2. Liu and Gibson, “*Microcomputer System The 8086/8088 Family*”, Prentice Hall of India Pvt. Ltd, 1991.
3. A.K.Ray and K.M.Bhurchandi, “*Advanced Microprocessors and Peripherals*” TMH 2000.

Reference Books:

1. Douglas.V.Hall “*Microprocessor and Interfacing– Programming and Hardware*” McGraw Hill, 1986.
2. R.S.Goankar, “*Microprocessor Architecture, Programming and Applications 8080/8085 A*”, Wiley Eastern Ltd, New Delhi, 1991.

Elective I: COMPUTER GRAPHICS

SEMESTER : I
CREDITS : 3

CODE: P23CA1:C
HOURS/WEEK: 4

UNIT I 10 Hours

Overview of Graphics Systems: Video Display Devices – Input Devices – Hard Copy Devices – Graphics Software – Introduction to OpenGL. **Graphics Output Primitives:** Line–Drawing Algorithms – Line Equations – DDA Algorithm – Bresenham’s Algorithm – Circle – Generating Algorithms.

UNIT II 10 Hours

Attributes of Graphics Primitives: Color and Gray Scale – Line Attributes – Fill–Area Attributes – Character Attributes – Antialiasing. – OpenGL Color Functions. **Geometric Transformations:** Basic Two Dimensional Geometric Transformations – Matrix Representations and Homogeneous Coordinates.

UNIT III 10 Hours

Two–Dimensional Viewing: The Clipping Window – Clipping Algorithms – Two Dimensional Line Clipping – Polygon Fill – Area Clipping – Curve Clipping – Text Clipping. **Interactive Input Methods and Graphical User Interfaces:** Logical Classification of Input Devices – Interactive Picture Construction Techniques.

UNIT IV 10 Hours

Three Dimensional Viewing: Three–Dimensional Viewing Pipeline – Three–Dimensional Viewing – Coordinate Parameters Transformation from World to Viewing Coordinates – Projection Transformations – Perspective Projections– OpenGL Three Dimensional Viewing Functions.

UNIT V 10 Hours

Visible–Surface Detection Methods: Classification of Visible–Surface Detection Algorithms – Comparison of visibility – Detection Methods – Curved Surfaces – Wire–Frame Visibility Methods. **Computer Animation:** Design of Animation Sequences – Traditional Animation Techniques – General Computer–Animation Functions – Computer Animation Languages – Key-Frame Systems – Motion Specifications.

UNIT VI 10 Hours

Hierarchical Modeling: Basic modeling concepts- System Representation Symbol Hierarchies-Modeling Package- **Graphics File Formats:** Image file configuration-Color Reduction Methods- Uniform Color Reduction-Popularity Color Reduction- Median cut Color Reduction

Text Book:

1. Donald Hearn, M. Pauline Baker, “*Computer Graphics with Open GL*”, Pearson Education, Third Edition, 2009.

Reference Books:

1. Newman William M., Sproull Robert F., “*Principles of Interactive Computer Graphics*”, McGraw Hill, 2010.

Core Practical I: PROGRAMMING IN .NET TECHNOLOGY LAB

SEMESTER: I
CREDITS: 2

CODE: P23CA1P1
HOURS/WEEK: 4

	Ex.No.	Exercises
1		Simple Programs
	1.	Write a c# program to use all types of variables
	2.	Write a console application to perform arithmetic operations on numbers
	3.	Write a c# program to pass arguments to the console application
	4.	Write a console application to perform all logical and bitwise operations
	5.	Write a console application to manipulate strings
	6.	Write a C# program to parse from strings to numbers or dates and times
2.		Controlling flow
	7.	Write console application to perform if statement
	8.	Write a console application to demonstrate while, do, for, and for each statement
	9.	Demonstrate the pattern matching with the switch statement
3.		Handling Exceptions
	10.	Create a c# program to catch all exceptions, specific exception and catching with filters
	11.	Write a c# application to check overflow
4.		Writing , Debugging and Testing Functions
	12.	Write functions in c# to return a value
	13.	Write a recursive function to calculate factorial
	14.	Write a c# program to implement functions using lambdas
	15.	Write unit test for Calculator class
5.		Building your own types with Object-Oriented Programming
	16.	Build class library in c#
	17.	Create your own types with object-oriented programming
	18.	Write a c# program to demonstrate the different ways of passing parameters to a method
	19.	Write a c# program to explain the concept of controlling access with properties and indexes
	20.	Write a c# program to demonstrate the use of records
6.		Implementing interfaces and inheriting classes
	21.	Write a c# program to call methods using delegates
	22.	Write a c# program to implement interface

	23.	Demonstrate the exception handling concepts(inheriting)
	24.	Write a C# program to demonstrate the inheritance concept(extending, hiding, overriding. abstract class, polymorphism)
7.		Working with common .NET Types
	25.	Write a c# program to work with numbers, text, dates and times, pattern matching
	26.	Write a C# program to store multiple objects in collections (List, Dictionaries, Stacks, Queues)
	27.	Write a c# program to print the parts of the URL and to ping the given server
	28.	Write a c# program to display images
8.		Working with files
	29.	Write a C# program to read and write a text file
	30.	Create a CRUD application with EF Core (450)
9.		Web Applications
	31.	Design a web page to manipulate data using Razor Pages (596)
	32.	Asp .Net Core MVC Crud Using Entity Framework DB First approach
	33.	Design a MVC and Razor with database connection for CRUD application
	34.	Build a web service using ASP.NET Core Web API
	35.	Build an application with .NET Blazor

Core Practical II: OPERATING SYSTEM PROGRAMMING LAB

SEMESTER: I

CODE: P23CA1P2

CREDITS: 2

HOURS/WEEK: 4

Ex. No.	Exercise
1	Write a C program to simulate the following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time. a)FCFS b)SJF c) Round Robin d)Priority
2	Write a C program to simulate the following file allocation strategies. a)Sequential b)Indexed c)Linked
3	Write a C program to simulate the MVT and MFT memory management techniques.
4	Write a C program to simulate the following contiguous memory allocation techniques a)Worst-fit b)Best-fit c)First-fit
5	Write a C program to simulate paging technique of memory management.
6	Write a C program to simulate the following file organization techniques a) Single level directory b) Two level directory c)Hierarchical
7	Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance.
8	Write a C program to simulate disk scheduling algorithms a)FCFS b)SCAN c)C-SCAN
9	Write a C program to simulate page replacement algorithms a)FIFO b)LRU c)LFU
10	Write a C program to simulate page replacement algorithms a) Optimal

UNIT I - Language Skills**6 Hours**

Active Listening Skills- Effective Speaking skills- Reading Skills- Techniques for Improving Comprehension- Elements of Effective Writing Skills.

UNIT II - Employability Skills**6 Hours**

Writing Reports: Importance of Report- Meeting Minutes-Writing Cover Letter: -Academic and Business-Resume Writing.

UNIT III - Creative Skills**6 Hours**

Social Media writing: E mail and Blog-Preparing Presentation Graphics-PPT-Content writing (Paraphrasing, Summarizing and Story writing)-Describing products and services-describing processes-persuading people-giving opinions-presenting arguments-explaining-proposing-presenting a product.

UNIT IV - Presentational Skills**6 Hours**

Presentation Strategies - Process of Preparing and Delivering Presentation - Planning the Introduction and the Conclusion - Answering Questions after Presentation - Group Discussion.

UNIT V - Conversational Skills**6 Hours**

Face to face interaction in formal and informal situations - greetings-replying to greetings-introducing others-welcoming-bidding farewell-appearing in an interview-talking about oneself - Telephonic interactions: taking messages-making appointments-making enquiries regarding travel/hotel bookings-apologizing-complaining-giving information.

Text Books:

1. Raman, Meenakshi, and Sangeeta Sharma. "*Technical Communication*". 3rd ed., Oxford University Press, 2015.
2. Santhi Jeya. V, R. Selvam. "*Advanced Skills for Communication in English Book – I*". New Century Book House (P) Ltd, 2011.

Reference Books:

1. Raman, Meenakshi, and Sangeeta Sharma. "*Technical Communication for Gujarat Technological*" University. 2nd ed., Oxford University Press, 2017.
2. Raman, Meenakshi, and Sangeeta Sharma. "*Professional English*". 1st ed., Oxford University Press, 2019.
3. MacKenzie, Andrea et al. *NET Working Workplace Communication in the English Classroom*". Curriculum Development Institute Education Bureau Hong Kong (SAR), 2009.

BRIDGE COURSE I: OBJECT ORIENTED PROGRAMMING

SEMESTER: I

CODE: PB23CA11

CREDITS: 4

HOURS/WEEK: ...

UNIT I - Introduction to C++ and OOP:

Evolution of C++- The Object-Oriented Technology- Disadvantage of Conventional Programming- Programming Paradigms - Key Concepts of Object-Oriented Programming Advantage of OOP- Object-Oriented Languages – Usage of OOP – Usage of C++.

UNIT II - I/O in C++:

Streams in C++ – Formatted and Unformatted Console I/O Operations - Manipulators – Custom built I/O Objects - **C++ Declarations:** Keyword – Identifiers – Data Types in C++ - Type modifiers – Type Casting – Constants – Operators in C++. **C++ Functions:** Parts of Functions - Passing Arguments – Returning Values – Default Arguments – Inline Function – Function Overloading – Library Functions.

UNIT III - Classes and Objects:

Declaring Objects – Defining member functions - Data hiding and Encapsulation – Classes, Objects and Memory – Static Member Variable and Functions –Array of Objects - Object and Function Arguments – Friend functions – Recursive Member Function – Local Classes – Empty, Static and Const Classes – Member and Non-Member Functions –Overloading Member Functions –

UNIT IV - Constructors and Destructors:

Characteristics – Applications – Overloading Constructors – Copy Constructors - Destructors – Calling Constructors and Destructors – Private Constructors and Destructors. **Operator Overloading:** The Keyword Operator –Overloading Unary & Binary Operators – Type Conversion – Rules for Overloading Operators. **Inheritance:** Access Specifiers and Simple Inheritance –Types of Inheritance –Virtual Base Classes –Object as a Class member - Abstract Classes -Arrays of classes –

UNIT V - Binding, Polymorphism and Virtual Functions:

Binding in C++ -Pointer to derived class Objects –Virtual Functions - Array of Pointers – Abstract Classes – Virtual Functions in Derived Classes . **Exception Handling:** Principles –Exception Handling Mechanism –Catching Multiple Exceptions - Rethrowing and Specifying Exceptions - Exceptions in Constructors and Destructors - Controlling Uncaught Exception.

Text Book:

1. Ashok N. Kamathane, “*Object-Oriented Programming with ANSI and Turbo C++*”, Pearson Education Pvt. Ltd., New Delhi, 2005.

Reference Book:

2. Balagurusamy E., “*Object-Oriented Programming with C++*”, 3rd edition TMH Publishing company Ltd., New Delhi, 2006.

BRIDGE COURSE II: INFORMATION TECHNOLOGY

SEMESTER: I

CODE: PB23CA12

CREDITS: 4

HOURS/WEEK: ...

UNIT I - Basics of Information Technology:

Definition - Information Technology for Business - Technological Trends in IT - Applications of Information Technology - Information technology law - **Introduction to Computers:** Definition - Characteristics of a Computer - Classification of Computers - Basic Anatomy of the Computer - Applications / Uses of Computers in different fields

UNIT II - Input and Output Devices:

Input Devices - Output Devices - Data Representation - Programming Languages / Computer Languages - **Software:** System Software - Application Software - Difference between System Software and Application Software - Device Drivers - Computer Viruses, Bombs, Worms - Types of Viruses

UNIT III - Data Communication and Computer Networks:

Data Communication - Computer Network - The Uses of a Network - Types of Networks: LAN, MAN, WAN - -Intranet and Extranet - Network Topologies- Transmission Media: Guided Transmission Media - Wireless Transmission

UNIT IV - Internet and its Applications:

History of Internet - Uses of Internet / Application of Internet-Advantages of Internet - ISP - Internet Services - IP Address - Web Browser - URL - DNS - Internet Explorer - Types of internet connections - E-mail - Search Engine

UNIT V - Operating System:

Evolution of operating systems - Function of Operating System - Classification of Operating – System - Example of Operating System – DOS –Windows – UNIX - Linux - Difference between Windows and DOS- Difference between Linux and Windows

Text Books:

1. **“Introduction to Information Technology”** Pelin Aksoy, Laura DeNardis, Cengage Learning India Private Limited, 2008.
2. Alexis Leon and Mathews Leon, **“Fundamentals of Information Technology”**, Vikas Publishing House Pvt. Ltd. 2009
3. Dr.P.Rizwan Ahmed, **“Introduction to Information Technology”**, Second Edition, Margham Publications, Chennai,2016.

BRIDGE COURSE III: OBJECT ORIENTED PROGRAMMING LAB

SEMESTER: I

CODE: PB23CA1P

CREDITS: 2

HOURS/WEEK: ...

1. Default Arguments

(a) Write a C++ program to find out the Sum of the given Numbers using Default Argument.

2. Reference Arguments

(a) Write a C++ program to Swap Two Numbers using Reference Arguments.

3. Inline Functions

(a) Write a C++ program to Add and Multiply Two integer Numbers using Inline Functions.

4. Function overloading

(a) Write a C++ program using Function Overloading.

5. Class and objects

(a) Process student details using class and objects.

(b) Create a class to process employee payroll.

6. Friend Function

(a) Write a C++ program to demonstrate the Friend Function.

7. Constructor & Destructor

(a) Write a C++ program to initialize the Complex Number with zero, to initialize with the given values and to read the value.

8. Operator Overloading

(a) Write a C++ program to Overload Unary Operators.

(b) Write a C++ Program to Add Two Complex Numbers using Binary Operators.

9. Inheritance

(a) Prepare Pay Roll of an Employee using Single Inheritance.

(b) Prepare Student Mark List using Multilevel Inheritance.

10. Virtual Function

(a) Demonstrate the use of Virtual Function (run time polymorphism) to find the Area of the Given Object.

Base class : shape

Subclass : circle, square, rectangle, triangle.

Text Book:

1. Ashok N. Kamathane, "*Object-Oriented Programming with ANSI and Turbo C++*", Pearson Education Pvt. Ltd., New Delhi, 2005.

Reference Book:

1. Balagurusamy E., "*Object-Oriented Programming with C++*", 3rd edition TMH Publishing company Ltd., New Delhi, 2006.

UNIT I

The History and Evolution of Java : The Creation of Java - The Evolution of Java . **An Overview of Java** : Object-Oriented Programming - Two Paradigms - Sample Program – **Introducing Classes** : Declaring Objects – Methods – Method Overloading – Method Overriding – Constructors – A closer look at argument passing – Recursion – Inheritance – Packages and Interfaces – Exception Handling.

UNIT II

Multithreaded Programming : The Java Thread Model - The Main Thread - Creating a Thread - Creating Multiple Threads - Using `isAlive()` and `join()` - Thread Priorities -Synchronization. **Input/Output: Exploring java.io:** The I/O classes and interfaces – I/O Exceptions – The Stream Classes – The Byte Streams – The Character Streams- The Console class – Serialization – Lambda Expressions – Modules - String Handling – Generics

Unit III

Exploring java.lang: Primitive type wrappers – System – Math – Throwable. **Java.util:** The Collection Framework: Collections Overview – The collection interfaces – **The Collection classes:** ArrayList – LinkedList – HashSet – TreeSet - Accessing a Collection via an Iterator - Working with Maps – The Legacy classes and Interfaces - **More Utility Classes** : Date – StringTokenizer – Date – Calendar – Locale – Random – Time and TimerTask – Scanner - **Networking:** Networking basics – InetAddress – TCP/IP – URL – Datagrams

UNIT IV:

Event Handling : Two Event Handling Mechanisms - The Delegation Event Model - Event Classes - The KeyEvent Class - Sources of Events - Event Listener Interfaces - Using the Delegation Event Model - Adapter Classes - Inner Classes. **Introducing the AWT:** Working with Windows, Graphics, and Text : AWT Classes - Window Fundamentals - Working with Frame Windows - Introducing Graphics - Working with Color - Setting the Paint Mode - Working with Fonts - Managing Text Output Using FontMetrics. Using AWT Controls, Layout Managers, and Menus. **Introducing Swing:** Exploring Swing – Introducing Swing Menus – Database Connectivity - JDBC/ODBC connectivity steps – Simple Applications

Unit V : Web application basics- Definition-Distributed system-Available Frontends and Backends to develop web applications-Variou IDE configurations- Multitiered architecture- HTTP request and response- HTTP methods-**Java Servlets:** Java Servlets -A Simple Java Servlet-Anatomy of a Java Servlet. **Java ServerPages: JSP-JSP Tags-Tomcat-Adding jar dependencies-** Creating sample web application with database connectivity -CRUD-Hibernate.

Text Books:

1. Herbert Schildt, “*Java: The Complete Reference*”, 11th Edition, Tata McGraw Hill Publishing Company, New Delhi, 2018.

Reference Books:

1. Jim Keogh, “*J2EE: The Complete Reference*”, Tata McGraw Hill Publishing Company, New Delhi 2010.
2. Ken Arnold, James Gosling, David Holmes, “*Java™ Programming Language*”, Fourth Edition, Addison Wesley Profession, 2005.
3. Paul J. Deitel, Harvey M. Deitel, “*Java™ for Programmers*”, Second Edition, PHI Publications, 2011.

UNIT I - Introduction to Database**12 Hours**

Introduction: Database System Applications – Database Systems vs File Systems – View of data – Data Models – Database Languages – Database Users and Administrators – Transaction Management – Database System Structure – Application Architectures. Entity – Relationship model: Basic Concepts – Constraints – Keys – Entity – Relationship Diagram – Weak entity Sets – Extended E–R Features. Relational Model: Structure of Relational Database – Relational Algebra–Extended Relational Algebra Operations.

UNIT II - Relational Database Design and Integrity**12 Hours**

Integrity and security: Domain Constraints Referential Integrity – Assertions – Security and Authorization – Authorization in SQL – Encryption and Authentication. **Relational Database Design:** First Normal Form – Pitfalls in Relational Database Design – Functional Dependencies – Decomposition – Desirable Properties of Decomposition – Boyce Codd Normal Form – Third Normal Form – Fourth Normal Form – More normal Forms.

UNIT III - File Structure and Indexing**12 Hours**

Storage and File Structure: RAID – File Organization – Organization of Records in Files – Dictionary Storage. **Indexing and Hashing:** Basic Concepts – Ordered Indices – B+ – Tree Index Files – Static Hashing – Dynamic Hashing.

UNIT IV - Transaction Management and Concurrency control**12 Hours**

Transaction Management: Transactions Concept – Transaction state – Implementation of Atomicity and Durability – Concurrent Executions– Serializability –**Concurrency control:** Lock Based Protocols – Timestamp Based Protocols – Validation Based Protocols – **Recovery system:** Failure classification – Storage Structure – Recovery and Atomicity – Log Based Recovery–Shadow Paging.

UNIT V - Oracle and PL/SQL**12 Hours**

Introduction to Oracle: Classification of SQL Commands – Data Types – Operators – Built in functions – Sorting – Joins – Special Operators: Set Operators. **Indexing:** Removing Index – Creating Index on Multiple Columns. **Views:** Creating and Accessing – Classification of Views. **PL/SQL:** Introduction – Advantages of PL/SQL – Structure of PL/SQL Block – Conditional Statement – Stored Functions: Structure of Function – Compiling a Function – Calling a Function. **Stored Procedures:** Advantages of Procedures – Why Called “Stored Procedures”? – Differences between Procedures and Functions – Compiling a Procedure – Executing a Procedure. **Cursors:** What is Cursor? – Purpose of Cursors – Classification of Cursors.**Database Triggers:** Components of Trigger–Types of Triggers.

Text Books:

1. Abraham Silberchatz, Henry F. Korth and S. Sudharshan, “*Data Base System concepts*” Mc Graw Hill, Fifth Edition, 2006.
2. Satish Asnani, “*Oracle Database 11g –Hands–on SQL and PL/SQL*”, PHI Learning, 2010.

Reference Books:

1. C.J. Date, A. Kannan, S.Swamynathan, “*Introduction to Database Systems*”, Pearson Education, Eighth Edition 2006.
2. RamezElmasri, “*Fundamentals of Database Systems*”, Pearson Education, 2008.

Core VII: DATA STRUCTURES AND ALGORITHMS

SEMESTER: II
CREDITS: 4

CODE: P23CA207
HOURS/WEEK: 4

UNIT I - Introduction to Data structure **12 Hours**

Introduction and Overview: Definitions – Concept of Data Structures – Overview of Data Structures – Implementation of Data Structures. **Linked Lists:** Definition – Single Linked List – Circular Linked List – Double Linked List – Circular Double Linked List – Application of Linked Lists. **Stacks:** Introduction – Definition – Representation of Stack – Operations on Stacks – Application of Stacks. **Queues:** Introduction – Definition – Representation of Queues – Various Queue Structures – Application of Queues.

UNIT II - Tree and Binary Tree **12 Hours**

Trees : Basic Terminologies – Definition and Concepts – Representation of Binary Tree – Operations on Binary Tree – Types of Binary Trees – Trees and Forests – B Trees .

UNIT - III - Graphs and Algorithm Analysis **12 Hours**

Graphs: Introduction – Graph Terminologies – Representation of Graphs – Operations on Graphs – Applications of Graph Structures – BDD and its Applications. **Introduction:** What is an Algorithm? – Algorithm Specification – Performance Analysis.

UNIT IV - Divide-and-Conquer and Greedy Method **12 Hours**

Divide-and-Conquer: General Method – Binary Search – Finding the Maximum and Minimum – Merge Sort – Quick Sort – Selection. **The Greedy Method:** The General Method – Minimum Cost Spanning Trees – Single-Source Shortest Paths.

UNIT V - Dynamic Programming and Backtracking **12 Hours**

Dynamic Programming: The General Method – Multistage Graphs – All Pairs Shortest Paths – Single Source Shortest Paths. **Backtracking:** The General Method – The 8-Queens Problem – Sum of Subsets – Graph Coloring.

Text Books:

1. Samanta D, “*Classic Data Structures*”, Prentice Hall of India, 2006.
2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, “*Fundamentals of Computer Algorithms*”, Galgotia Publications, Second Edition, 1998.

Reference Books:

1. V. Aho, J. E. Hopcroft, and J. D. Ullman, “ *and Algorithms*”, Pearson Education, 2008.
2. Anany Levitin, “*Introduction to the Design and Analysis of Algorithms*”, Pearson Education 2003.

Elective II : SOFT COMPUTING

SEMESTER: II
CREDITS: 3

CODE: P23CA2:A
HOURS/WEEK: 4

UNIT I - Introduction to Soft Computing

12 Hours

Introduction: Artificial Neural Network– Advantages of Neural Networks– Fuzzy Logic– Genetic Algorithms–Hybrid Systems– Neuro Fuzzy Hybrid Systems – Neuro Genetic Hybrid Systems– Fuzzy Genetic Hybrid Systems.

UNIT II - Artificial Neural Networks

12 Hours

Artificial Neural Networks– Fundamental Concept– Evolution of Neural Networks– Basic Models of Artificial Neural Network– Terminologies of ANNs– McCulloch-Pitts Neuron– Linear Separability – Hebb Network.

UNIT III - Supervised Learning Network

12 Hours

Supervised Learning Network– Perceptron Networks–Adaptive Linear Neuron (Adaline) – Multiple Adaptive Linear Neurons–Back Propagation Network–Radial Basis Function Network.

UNIT IV - Introduction to Fuzzy Logic

12 Hours

Introduction to Fuzzy Logic – Classical Sets–Operations on Classical Sets – Fuzzy Sets, –Fuzzy Relations–Membership Functions–Defuzzification–Fuzzy Arithmetic and Fuzzy Measures– Fuzzy Rule base and Approximate Reasoning– Fuzzy Decision Making– Fuzzy Logic Control System.

UNIT V - Genetic Algorithms

12 Hours

Genetic Algorithms – Introduction– Traditional Optimization and Search Techniques –Genetic Algorithm and Search Space– Genetic Algorithms vs. Traditional Algorithms– Basic Terminologies in Genetic Algorithm– Simple GA– General Genetic Algorithm– The Schema Theorem–Classification of Genetic Algorithm–Holland Classifier System–Genetic Programming– Applications of GA.

Text Book:

1.Dr.S.N. Sivananda, Dr.S.N. Deepa, “*Principles of Soft Computing*”, Wiley India Edition, 2011.

Reference Books:

1. F.O. Karray& C.D. Silva “*Soft Computing and Intelligent Systems Design*” – theory, tools and applications, Pearson Education, 2009
2. J.S.R. Jang, C.T. Sun & E. MizutaniNeuro-Fuzzy and “*Soft Computing – A computational approach to learning and machine intelligence*”, Pearson Education, 2004.

ELECTIVE II: DATA WAREHOUSING AND DATA MINING

SEMESTER: II

CODE: P23CA2:B

CREDITS: 3

HOURS/WEEK: 4

UNIT I - Data Mining Introduction and Preprocessing 12 Hours

Introduction: Why Data Mining? – What is Data Mining? – What Kinds of Patterns can be Mined? – Which Technologies Are Used? – Which Kinds of Applications Are Targeted? – Major issues in Data Mining. **Data Preprocessing: Data Preprocessing:** An Overview – Data Clearing – Data Integration – Data Reduction – Data Transformation and Data Discretization.

UNIT II - Data Warehousing Concepts 12 Hours

Data Warehousing and Online Analytical Processing: Data Warehouse: Basic Concepts – Data Warehouse Modeling: Data Cube and OLAP – Data Warehouse Design and Usage – Data Warehouse Implementation – Data Generalization by Attribute – Oriented Induction.

UNIT III - Patterns and Classification Techniques 12 Hours

Mining Frequent Patterns, Associations, and Correlations: Basics Concepts and Methods: Basic Concepts – Frequent Itemset Mining Methods. **Classification: Basic Concepts:** Basic Concepts – Decision Tree Induction – Rule Based Classification – Lazy Learners.

UNIT IV - Cluster Analysis Concepts and Techniques 12 Hours

Cluster Analysis: Basic Concepts and Methods: Cluster Analysis – Partitioning Methods – Hierarchical Methods – Density Based Methods – Grid Based Methods.

UNIT V - Outlier Detection Techniques 12 Hours

Outlier Detection: Outliers and Outlier Analysis–Outlier Detection Methods – Statistical Approaches – Proximity based Approaches – Clustering based Approaches – Classification based Approaches. **Data Mining Trends and Research Frontiers:** Data Mining Applications.

Text Book:

1. Jiawei Han and Micheline Kamber, “*Data Mining Concepts and Techniques*”, Third Edition, Morgan Kaufmann, 2012.

Reference Books:

1. Margaret H. Dunham, “*Data Mining: Introductory and Advanced Topics*”, Pearson Education, 2003.
2. Arun K. Pujari, “*Data Mining Techniques*”, University Press, 2001.

ELECTIVE II: ARTIFICIAL INTELLIGENCE

SEMESTER: II
CREDITS: 3

CODE: P23CA2: C
HOURS/WEEK: 4

UNIT I - Introduction to Artificial Intelligence **12 Hours**

What is Artificial Intelligence? The AI problems – What is an AI technique? - Criteria for success. Problems, Problem Spaces and Search: Defining the Problem as a State Space Search – Production Systems – Problem Characteristics.

UNIT II - Searching Techniques **12 Hours**

Heuristic Search Techniques: Generate and Test – Hill Climbing: Simple Hill Climbing, Steepest Ascent Hill Climbing – Best First Search: OR Graphs, The A* Algorithm – Problem Reduction: AND-OR Graphs, The AO* Algorithm – Constraint Satisfaction – Means Ends Analysis.

UNIT III - Knowledge Representation **12 Hours**

Knowledge Representation Issues: Representation and Mappings – Approaches to Knowledge Representation – Issues in Knowledge Representation: Important Attributes, Relationship among Attributes. Using Predicate Logic: Representing Simple Facts in Logic – Representing Instance and Isa Relationships – Computable Functions and Predicates – Resolution.

UNIT IV - Representing Knowledge using Rules **12 Hours**

Representing Knowledge Using Rules: Procedural versus Declarative Knowledge – Logic Programming – Forward versus Backward Reasoning – Matching – Control Knowledge.

UNIT V - Expert Systems **12 Hours**

Expert Systems: Representing and Using Domain Knowledge – Expert System Shells Explanation – Knowledge Acquisition. Perception and Action: Real-Time Search – Perception: Speech Recognition – Action – Robot Architectures.

Text Book:

1. Elaine Rich, Kevin Knight, “*Artificial Intelligence*”, Second Edition, Tata McGraw Hill publications, 2008.

Reference Books:

1. Dan W. Patterson, “*Introduction to Artificial Intelligence and Expert Systems*”, Second Edition, Prentice Hall of India Publications, 2006.
2. Nils J. Nilsson, “*Artificial Intelligence: A New Synthesis*”, Second Edition, Harcourt Asia Publications, 2000.
3. V.S. Janakiraman, K. Sarukesi, P. Gopalakrishnan, “*Foundations of Artificial Intelligence and Expert Systems*”, McMillan India Publications, 2005.

Elective III - CUSTOMER RELATIONSHIP MANAGEMENT

SEMESTER: II
CREDITS: 3

CODE: P23CA2: D
HOURS/WEEK: 4

UNIT I - Introduction to CRM: 12 Hours

Introduction -Strategic CRM - Operational CRM - Analytical CRM - Where does social CRM fit? - Misunderstandings about CRM - Defining CRM - CRM constituencies - Commercial contexts of CRM - The not-for-profit context – the ‘third sector’ - Models of CRM -**Understanding relationships:** What is a relationship? Relationship quality - Why companies want relationships with customers - Customer lifetime value - When might companies not want relationships with customers? - Why customers want relationships with suppliers - Customer satisfaction, loyalty and business performance -Relationship management theories.

UNIT II - Managing the customer lifecycle – customer acquisition: 13 Hours

Introduction - What is a new customer? - Portfolio purchasing - Prospecting - Key performance indicators of customer acquisition programmes - Making the right offer - Operational CRM tools that help customer acquisition Managing the customer lifecycle. **Customer retention and development:** Introduction What is customer retention? - Economics of customer retention - Which customers to retain? -Strategies for customer retention - Positive customer retention strategies - Context makes a difference - Key performance indicators of customer retention programmes - Strategies for customer development -Strategies for terminating customer relationships

UNIT III - Strategic CRM: Customer Portfolio Management: 11 Hours

What is a portfolio? - Who is the customer? - Customer portfolio models - Strategically significant customers - The seven core customer management strategies - How to deliver customer-experienced value :introduction Understanding value - When do customers experience value?-Modelling customer-perceived value -Sources of customer value - Customization - Value through the marketing mix

UNIT IV - Operational CRM : Sales Force Automation: 12 Hours

What is SFA? - The SFA eco-system SFA software functionality - SFA adoption - How SFA changes sales performance. Marketing Automation : What is marketing automation? - Benefits of marketing automation - Software applications for marketing.

UNIT V - Analytical CRM : Developing and managing customer-related databases: 12 Hours

Corporate customer-related data - Structured and unstructured data - Developing a customer-related database - Data integration - Data warehousing - Data marts - Knowledge management. **Using Customer-Related Data:** Introduction - Analytics for CRM strategy and tactics - Analytics throughout the customer lifecycle - Analytics for structured and unstructured data - Big data analytics Analytics for structured data - Three ways to generate analytical insight

Text Book:

1. Francis Buttle and Stan Maklan, “*Customer Relationship Management*”: Concepts and Technologies, Routledge, 2015.

Reference Books:

1. Ed Peelan and Rob Beltman., “*Customer Relationship Management*”, Pearson, 2013.
2. V. Kumar, Werner Reinartz, “*Customer Relationship Management*”, John Willey & Sons, 2006.

Elective III: ENTERPRISE RESOURCE PLANNING

SEMESTER: II

CODE: P23CA2: E

CREDITS: 3

HOURS/WEEK: 4

UNIT I - Introduction to ERP

12 Hours

Introduction to ERP: Enterprise - ERP concepts - Justification for ERP investment – Risk involved in ERP implementation - Benefits of ERP - Important ERP Products (Software)

UNIT II - ERP and related Technologies

12 Hours

ERP and related Technologies: Business Intelligence - E-Commerce & E-Business – Business Process Re-engineering - Data Warehousing and Data Mining - Online Analytical Process (OLAP) - Supply Chain Management - Customer Relationship Management

UNIT III - Business Modules in ERP

12 Hours

Business Modules in ERP: Marketing – Finance - Material Management – Production - Quality Management - Sales Distribution – Plant Maintenance - Human Resource Management

UNIT IV - ERP Implementation

14 Hours

ERP Implementation: ERP Implementation Life Cycle - Requirement definition - Implementation methodologies - Process definition Vendors and Consultants - ERP Project Teams - Dealing with Employee Resistance - Training and Education Data Migration

UNIT V - ERP Operation, Maintenance and Future Trends

10 Hours

ERP Operation, Maintenance and Future Trends: Post implementation Activities - Operation and maintenance of ERP Systems - Performance Measurement of ERP Systems - Internet enabled ERP - Future trends in ERP

Text Book:

1. Alexis Leon, “*ERP Demystified*”, Tata McGraw-Hill Publications, 2008.

Reference Book:

1. Dr. Ashim Raj Singla, “*Enterprise Resource Planning*”, 2nd Edition, Cengage Learning India Pvt., Ltd., 2016

Elective III: MANAGEMENT INFORMATION SYSTEMS

SEMESTER: II

CREDITS : 3

CODE: P23CA2: F

HOURS/WEEK: 4

Unit I: Foundation Concepts

15 Hours

Information Systems in Business: The Real World of Information Systems - The Fundamental Roles of IS in Business - Trends in Information Systems - The Role of e-Business in Business - Types of Information Systems - Managerial Challenges of Information Technology. **The Components of Information Systems:** Components of Information Systems - Information System Resources - Information System Activities - Recognizing Information Systems.

Unit II: Information Technologies

15 Hours

Hardware: Digital Devices - Processing Data: The CPU - Motherboard - Random-Access Memory - Hard Disk - Solid State Drives - Removable Media - Input and Output Devices - Other Computing Devices - Smartphones - Integrated Computing and Internet of Things (IoT) - The Commoditization of the Personal Computer. **Software:** Operating Systems - Application Software - Utility Software and Programming Software - Applications for the Enterprise - Enterprise Resource Planning - Supply Chain Management - Mobile Applications - Cloud Computing - Open-Source Software. **Data and Databases:** Big Data - Databases - Data Models and Relational Databases - Database Management Systems - Structured Query Language - Other Types of Databases - **Finding Value in Data:** Business Intelligence - Data Warehouse - Data Mining and Machine Learning - Knowledge Management. **Networking and Communication:** The Internet and the World Wide Web - The Dot-Com Bubble - Web 2.0 - Wireless Networking - Mobile Network - Bluetooth - VoIP - Organizational Networking - Cloud Computing.

Unit III: Business Applications

15 Hours

e-Business Systems: Cross-Functional Enterprise Applications - Enterprise Application Integration - Transaction Processing Systems - Enterprise Collaboration Systems. **Functional Business Systems:** Marketing Systems - Manufacturing Systems - Human Resource Systems - Accounting Systems - Financial Management Systems. **Customer Relationship Management:** The Three Phases of CRM - Trends in CRM - **Enterprise Resource Planning:** Trends in ERP - **Supply Chain Management:** The Role of SCM - Trends in SCM - **e-Commerce** - The Scope of e-Commerce - Electronic Payment Processes. **Decision Support in Business** - Decision Support Trends - Decision Support Systems - Management Information Systems - Online Analytical Processing - Using Design Support Systems - Executive Information Systems - Enterprise Portals and Decision Support - Knowledge Management Systems - **Artificial Intelligence Technologies in Business** - Business and AI - Expert Systems - Developing Expert Systems - Neural Networks - Genetic Algorithms - Virtual Reality - Intelligent Agents.

Unit IV: Development Processes

15 Hours

Developing Business/IT Strategies: Planning Fundamentals - Organizational Planning - The Scenario Approach - Planning for Competitive Advantage - Business Models and Planning - Business/IT Architecture Planning - Identifying Business/IT Strategies - Business Application Planning. **Implementation Challenges:** Implementing Information Technology - End-User Resistance and Involvement - Change Management. **Developing Business Systems:** IS Development - The Systems Approach - Systems Analysis and Design - The Systems Development Life Cycle - Starting the Systems Development Process - Systems Analysis - Systems Design - End-User Development - Technical Notes: Overview of Object-Oriented Analysis and Design. **Implementing Business Systems:** Implementing New Systems - Project Management - Evaluating Hardware, Software, and Services - Other Implementation Activities.

Unit V: Management Challenges**15 Hours**

Security, Ethical, and Societal Challenges of IT: Ethical Responsibility of Business Professionals - Computer Crime - Privacy Issues - The Current State of Cyber Law - Other Challenges - Health Issues - Societal Solutions. **Security Management of Information Technology:** Tools of Security Management - Inter-Networked Security Defenses - System Controls and Audits. **Managing Information Technology:** Business and IT - Managing Information Technology - Business/IT Planning - Managing the IT Function - Organizing IT - Outsourcing and Offshoring IT and IS - Failures in IT Management - Management Involvement. **Managing Global IT:** The International Dimension - Global IT Management - Cultural, Political, and Geoeconomic Challenges - Global Business/IT Strategies - Global Business/IT Applications - Global IT Platforms - Global Data Access Issues - Global Systems Development.

Text Books:

1. James A. O'Brien, George M Marakas, Ramesh Bebl, "*Management Information Systems*", Thirteenth Edition, Tata McGraw Hill Education Private Limited, 2017.
2. David Bourgeois, Joseph Mortati, Shouhong Wang, James Smith, "*Information Systems for Business and Beyond*", Lulu.com, Illustrated edition, 2019.

Reference Books:

1. Gordon B. Davis, Margrethe H. Olson, "*Management Information Systems: Conceptual Foundations, Structure and Development*", Tata McGraw Hill Education, 2000.
2. Raymond Jr McLeod Jr., George Schell, "*Management Information System*", Pearson Publication, 10th Edition, 2000.
3. Kenneth C. Laudon, Jane P. Laudon, "*Management Information Systems: Managing the Digital Firm Hardcover*", Pearson Publication, 13th Edition, 2013.
4. James A. O'Brien, George M Marakas, Ramesh Bebl, "*Management Information Systems*", Ninth Edition, Tata McGraw Hill Education Private Limited, 2010.

Core Practical III: PROGRAMMING IN JAVA LAB

SEMESTER: II

CODE: P23CA2P3

CREDITS: 2

HOURS/WEEK: 4

Ex.No.	Exercise
1	Classes and Objects. Create Student Class with the following data and methods. Member Data: regno, name, course, java_mark, dbms_mark, os_mark, total, average and result. Member Methods: readData(), processData(), display() Create 5 objects for students and display the mark sheet.
2	Inheritance. Create a class Employee with employee details such as Emp_Name, E_ID, Age, Sex, Date_of_Join etc., define a sub class Salary of Employee with details like LIC, HRA, DA and TA. Calculate salary of the employee by inheriting Employee details.
3	Interfaces. Define an interface Bank with a method rateofInterest() and implement the same with classes SBI, PNB and Axis.
4	Packages. Create packages like Pack and MyPack and import the same into some user defined classes.
5	Exceptions handling. Create a try block that is likely to generate three types of exception (handle ArithmeticException, ArrayIndexOutOfBoundsException, FileNotFoundException) using try and then incorporate necessary catch blocks to catch and handle them appropriately. Create an user defined Exception.
6	Multithreading. Create a class Parent by extending a Thread class and also create a class as Child and illustrate the concept of multithreading by applying thread class methods.
7	Lambda Expressions Write a Java program to illustrate lambda expressions with parameters.
8	Collection Interfaces. Write a program to create a List(Books) using ArrayList and add items to the list and traverse the items through Iterator.
9	I/O Streams. Create a class named InputStreamReaderExample and read the contents of the file using the methods FileInputStream() and InputStreamReader().
10	Applying AWT concepts. Design a Registration form with AWT Controls.
11	Applying swing concepts. Develop a java swing Frame to retrieve the records form the Job Portal database table Design a scientific Calculator using swing components.
12	JDBC Design a web application for Student details with database operations insert, delete and update.
13	(i) Simple Java Code for Welcome Servlet. (ii) Servlet Program to read data from a client.

14	Create an Address Book application using Servlet With CRUD Operation.
15	(i) Simple Jsp program for Welcome User. (ii) Using JSP: declarations, expressions and scriptlets (iii) JSP code to read data from a client.
16	Create a Job Portal application using Jsp With CRUD Operation
17	Test the CRUD API using Postman.
18	Create an API for CRUD.

Text Books:

1. Herbert Schildt, “*JAVA™ : Complete Reference*”, Eleventh Edition, McGraw Hill, 2019.
2. Ivan Bayross, “*Web Enabled Commercial Application Development using Java 2*”, BPB Publications, 2013. (Unit Covered-V : Java Database Connectivity)

Reference Books:

1. Ken Arnold, James Gosling, David Holmes, “*Java™ Programming Language*”, Fourth Edition, Addison Wesley Profession, 2005.
2. Paul J. Deitel, Harvey M. Deitel, “*Java™ for Programmers*”, Second Edition, PHI Publications, 2011.

Core Practical IV : DATABASE MANAGEMENT SYSTEMS LAB

SEMESTER : II
CREDITS: 2

CODE: P23CA2P4
HOURS/WEEK: 4

Ex.No.	Exercise
1	Create an Employee table using the details employee name, Designation, Department date of joining, salary etc..
2	Insert values into Employee table using the details employee name, Designation, Department, date of joining, salary etc.
3	Find out name of students those who are getting result as "Pass" using Where clause. Find out List of students, whose name start with "B" using LIKE operator Find out list of Employee those who getting salary between 20000 and 40000
4	Find out list of Employee those who are working in Finance and HR department using Logical operator. Sort the records in employee table in ascending order using name Find out the number are staff working in each department using grouping Apply Set operations like Union, Intersection, Difference in employee table.
5	Find out name of student who score maximum marks using sub query Apply Inner and Outer Join in employee table.
6	Use Aggregate function in student table to find MIN, MAX in total marks Use String function, Date function in student table.
7	Create view by selecting employee those who are getting salary as more than Rs 40,000 Display records from newly created view
8	Develop a PL/SQL program using function to find out factorial of given number
9	Develop a PL/SQL program using Procedure to calculate result of student.
10	Develop a PL/SQL program using Cursors to process records in employee table
11	Develop a PL/SQL program using Triggers to process records in student table
12	Develop a PL/SQL program using Exception.
13	Develop a PL/SQL program using function to Prepare pay bill for employee

BRIDGE COURSE – IV: INTERNET PROGRAMMING

SEMESTER: II
CREDITS: 4

CODE: PB23CA24
HOURS/WEEK: ...

UNIT I - Overview of Basic Html Tags

10 Hours

Getting Started with HTML – Formatting Text by using Tags – using Lists and Backgrounds – Creating Hyperlinks and Anchors – Introduction to Style Sheets – Formatting Text by using Style Sheets – Formatting Paragraphs by using Style Sheets.

UNIT II - Multimedia Tags and Overview of Java script

10 Hours

Displaying Graphics – Creating Division Based Layouts – Creating Tables – Formatting Tables – Creating User Forms – Incorporating Sound and Video – Canvas. **The Basics of Java Script:** Overview of Java Script – Object Oriented and Java Script – General Syntactic Characteristics – Primitives, Operations, and Expressions – Screen Output and Keyboard Input – Control Statements – Object Creation and Modification.

UNIT III - Arrays, Functions and Event Handling

10 Hours

Arrays – Functions – An Example – Constructors – Pattern Matching Using Regular Expressions – Another Example – Errors in Scripts. **Java Script and XHTML Documents:** The Java Script Execution Environment – The Document Object Model – Element Access in Java Script. **Events and Event Handling:** Handling Events from Body Elements – Handling Events from Button Elements – Handling Events from Text Box and Password Elements – The DOM 2 Event Model – The Navigator Object – DOM Tree Traversal and Modification.

UNIT IV - Dynamic Html

10 Hours

Dynamic Documents with Java Script: Introduction – Positioning Elements – Moving Elements – Element Visibility – Changing Colors and Fonts – Dynamic Content – Stacking Elements – Locating the Mouse Cursor – Reacting to a Mouse Click – Slow Movement of Elements – Dragging and Dropping Elements.

UNIT V - Angular JS an Overview

10 Hours

Introduction to AngularJS: Introduction – Understanding Directives – Creating Controllers – Working with AngularJS Expression – Making Use of AngularJS Filters – Understanding AngularJS Modules – Exploring AngularJS Services – Learning AngularJS Views

Text Books:

1. Faithe Wempen, “*HTML5 Step by Step*”, First edition, Microsoft Press, 2011.
2. Robert W. Sebesta, “*Programming the World Wide Web*”, Pearson Education, Seventh Edition, 2014.
3. Felix Alvaro, “*ANGULARJS: Easy AngularJS for Beginners*”, Kindle Edition, 2016.

Reference Book:

1. Joel Sklyar, “*Principles of Web Design: The Web Technologies Series*,” Fifth Edition, 2011.

BRIDGE COURSE – V: LINUX PROGRAMMING

SEMESTER: II
CREDITS: 4

CODE: PB23CA25
HOURS/WEEK: ...

UNIT I - Shell Programming and Files

12 Hours

Getting Started: An Introduction to UNIX, Linux and GNU -Programming Linux:. **Shell Programming:** why program with a shell? a bit of philosophy-what is a shell?-pipes and redirection-the shell as a programming language-shell syntax-going graphical the dialog utility-putting it all together. **Working with Files:** linux file structure-system calls and device drivers-library functions-low-level file access-the standard I/O library-Formatted input and output-file and directory maintenance-scanning directories-errors-the/proc file system-advanced topics.

UNIT II - The Linux Environment and Terminals

12 Hours

The Linux Environment: program arguments-environment variables-time and date-temporary files-user information-host information-logging-resources and limits. **Terminals:** Reading from and Writing to the terminal-talking to the terminal-the terminal driver and the general terminal interface-the termios structure-terminal output-detecting keystrokes. **Managing Text-Based Screens with curses:** compiling with curses-curses terminology and concepts-the screen-the keyboard-windows-sub windows-the keypad-using color-pads-the CD collection application,

UNIT III - Data Management and Tools with Debugging

12 Hours

Data Management: managing memory-file locking-databases-the CD application. **Development Tools:** problems of multiple source files-the make command and make files-source code control-writing a manual page-distributing software-RPM packages-other package formats-development environments. **Debugging:** types of errors-general debugging techniques-debugging with gdb-more debugging tools-assertions-memory debugging.

UNIT IV - Process Signals, POSIX .Pipes and Semaphores

12 Hours

Processes and Signals: what is a process:-process structure-starting new processes-signals, **POSIX Threads:** what is a thread?-advantages and drawbacks of threads-a first threads program-simultaneous execution-synchronization-thread attributes-cancelling a thread-threads in abundance. **Inter-Process Communication: Pipes:** what is a pipe?-process pipes-sending output to popen-the pipe call-parent and child processes-named pipes: FIFOs-the CD database application. **Semaphores, Shared memory and Message Queues:** semaphores-shared memory-message queues-the CD database application-IPC status commands.

UNIT V - Sockets, Programming with GNOME and KDE using GTK+ and Qt

12 Hours

Sockets: what is a socket?-socket connections-network information-multiple clients-datagrams. **Programming GNOME using GTK+:** introducing X-introducing GTK+ -Events, signals and widgets-GTK+ widgets-GNOME widgets- GNOME menus-dialogs-CD database application **.Programming KDE Using Qt :**introducing KDE and Qt-installing Qt-signals and slots-Qt widgets-dialogs-menus and toolbars with KDE-CD database application using KDE/Qt.

Text Books:

1. Neil Matthew,Richard Stones, “*Beginning Linux Programming*”, Fourth Edition, Wiley Publishing Inc,2008.

Reference Books:

1. Paul Cobbaut,“*Linux Fundamentals*” version 1.3,published by Free Software Foundation on 24 may 2015.

2. Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, “*Linux in a Nutshell*”, 6th Edition, O'Reilly Media, 2009.
3. Neil Matthew, Richard Stones, Alan Cox, “*Beginning Linux Programming*”, 3rd Edition, 2004.
4. Robert Love, “*Linux System Programming*”, O'Reilly Media, 2ndEd., 2007.
5. William Shotts, “*The Linux Command Line*” version 16.07, 3rd internet edition, published by No Starch press on July 28, 2016.

BRIDGE COURSE – VI: INTERNET PROGRAMMING LAB

SEMESTER: II

CODE: PB23CA2P

CREDITS: 2

HOURS/WEEK: ...

1. Create a sample web site for the college and courses offered using various formatting text tags and hyperlink
2. Create a web page contain world map which link various parts of the map using
 - i. To embed an image map concept in web page
 - ii. To locate hotspot in an image map
3. Write a program to design a website of your home town with the following
 - i. Cascading Style Sheet
 - ii. External style Sheet
 - iii. Inline Style Sheet
4. Create a web site for a restaurant that links pages using list and hyperlinks
5. Design a web page to display the class time table using tables
6. Create a web page to display various geometric transformations.
7. Write a program to play a video and audio clip of your department activities using multimedia content in a web page
8. Create a web page for a bio-data to enter the personal information using various input elements
9. Design a web page for a news article using semantic elements
10. Write a java script program to validate the screen input
11. Write a program in java script to design calculator using event handler
12. Design a web page to change the background color of a web page using button element.
13. Create a web page for college admission forms
14. Write a program to create a web page using AngularJS expressions
15. Create a validation form in web page using Angular JS framework

Text Books:

1. Faithe Wempen, “*HTML5 Step by Step*”, First edition, Microsoft Press, 2011.
2. Robert W. Sebesta, “*Programming the World Wide Web*”, Pearson Education, Seventh Edition, 2014.
3. Felix Alvaro, “*ANGULARJS: Easy AngularJS for Beginners*”, Kindle Edition, 2016.

Reference Book:

1. Joel Sklyar, “*Principles of Web Design: The Web Technologies Series,*” Fifth Edition, 2011.

UNIT I - Getting Started with Android Programming: 12 Hours

What Is Android? -Android Versions -Features of Android - Architecture of Android - Android Devices in the Market - The Android Market - **Obtaining the Required Tools:** Eclipse - Android SDK - Android Development Tools (ADT) - Creating Android Virtual Devices (AVDs) - Creating Android Applications. **Activities and Intents:** Understanding Activities: Applying Styles and Themes to Activity - Hiding the Activity Title - Displaying a Dialog Window - Displaying a Progress Dialog. **Linking Activities Using Intents:** Resolving Intent Filter Collision - Returning Results from an Intent - Passing Data Using an Intent Object

UNIT II - Getting to Know the Android User Interface: 12 Hours

Understanding the Components of a Screen - Views and ViewGroups - LinearLayout - AbsoluteLayout - TableLayout - RelativeLayout - FrameLayout - ScrollView - **Adapting to Display Orientation:** Anchoring Views - Resizing and Repositioning. **Managing Changes to Screen Orientation:** Persisting State Information during Changes in Configuration - Detecting Orientation Changes - Controlling the Orientation of the Activity - **Creating the User Interface Programmatically** - **Listening for UI Notifications:** Overriding Methods Defined in an Activity - Registering Events for Views.

UNIT III - Designing Your User Interface Using Views : Basic Views: 12 Hours

TextView View - Button, ImageButton, EditText, CheckBox, ToggleButton, RadioButton and RadioGroup Views - ProgressBar View - AutoCompleteTextView View - **Picker Views:** TimePicker View - Displaying the TimePicker in a Dialog Window - DatePicker View - Displaying the DatePicker View in a Dialog Window - **List Views:**ListView View - Customizing the ListView - Using the Spinner View. Displaying Pictures and Menus with Views. **Using Image Views to Display Pictures:** Gallery and ImageView Views - ImageSwitcher - GridView. **Using Menus with Views:** Creating the Helper Methods - Options Menu - Context Menu

UNIT IV - Data Persistence: 12 Hours

Saving and Loading User Preferences - Using get Shared Preferences() -Using getPreferences() - Persisting Data to Files - **Saving to Internal Storage:** Saving to External Storage (SD Card) - Choosing the Best Storage Option - Using Static Resources - **Creating and Using Databases:**Creating the DBAdapter Helper Class - Using the Database Programmatically - Adding Contacts - Retrieving All the Contacts - Retrieving a Single Contact - Updating a Contact - Deleting a Contact -Upgrading the Database - Pre-Creating the Database - Bundling the Database with an Application - **Content Providers** : Sharing Data in Android - Using a Content Provider - Predefined Query String Constants - Projections - Filtering - Sorting.

UNIT V - Messaging and Location based services: 12 Hours

SMS Messaging: Sending SMS Messages Programmatically - Getting Feedback After Sending the Message - Sending SMS Messages Using Intent - Receiving SMS Messages - Updating an Activity from a Broadcast Receiver - Invoking an Activity from a BroadcastReceiver - Caveats and Warnings. **Sending E- Mail. Displaying Maps** : Creating the Project - Obtaining the Maps API Key - Displaying the Map - Displaying the Zoom Control - Changing Views - Navigating to a Specific Location - Adding Markers - Getting the Location That Was Touched - Geocoding and Reverse Geocoding - **Getting Location Data** : Monitoring a Location. Developing Android Services – Publishing Android Applications.

Text Books:

1. Wei-Meng Lee, “*Beginning Android Application Development*”, Wrox, First Edition,2012.

Reference Book:

1. Tim Warren, “*Android Programming for Beginners: The simple Guide to learning*
2. *Android Programming Fast*”, Ingram Publications, 2020.
3. John Horton, “*Android Programming for Beginners*”, Second Edition, Packt Publications, 2018.
4. PratiyushGuleria , “*Android for Beginners*” , BPB Publications.

Core IX: PROGRAMMING IN PYTHON

SEMESTER: III

CREDITS: 4

CODE: P23CA309

HOURS/WEEK: 4

UNIT I - Introduction to Python, Data types and Statements **15 Hours**

Introduction: Getting Started with Python Programming - **Data Types, and Expressions:** Strings, Assignment, and Comments - Numeric Data Types and Character Sets, Expressions - **Loops and Selection Statements:** Definite iteration: the for Loop - Selection: if and if-else statements - Conditional iteration: the while Loop.

UNIT II - Strings, Files, Lists and Functions **15 Hours**

Strings and Text Files: Accessing Characters and substrings in strings - Data Encryption - Strings and Number systems - String methods - Text Files - Text Files and Their Format - Writing Text to a File - Reading Text from a File. **Lists and Dictionaries:** Lists – Tuples - Dictionaries - **Design with Functions:** Defining Simple Functions - Design with recursive Functions.

UNIT III - OOPs and Databases **15 Hours**

Design with Classes: Getting inside Objects and Classes - Structuring Classes with Inheritance and Polymorphism. **Python and Databases:** Working with Databases in MySQL - Working with Tables in MySQL - Managing users in MySQL - Accessing (CRUD) MySQL data from Python - Working with SQLite Database.

UNIT IV - Numpy, Panda and Matplotlib **15 Hours**

Introduction to NumPy: NumPy Standard Data Types - The Basics of NumPy Arrays - NumPy Array Attributes - Computation on NumPy Arrays: Universal Functions - Aggregations: Min, Max, and Everything in Between. **Data Manipulation with Pandas:** Installing and Using Pandas - Introducing Pandas Objects - Data Indexing and Selection. **Visualization with Matplotlib:** Importing matplotlib - Setting Styles - Saving Figures to File - Simple Line Plots - Simple Scatter Plots.

UNIT V - Introduction to Django **15 Hours**

Introduction to Django: Virtual Environments - Install Django - Text Editors. **Hello World app:** Initial Set Up - Create an app - Views and URLConf. **Pages app:** Initial Set Up - Templates - Class-Based Views - URLs - Add an About Page - Extending Templates - Tests.

Text Books:

1. K.A. Lambert, “*Fundamentals of Python: first programs*”, Second Edition, Cengage Learning, 2020 (Unit - I, II and III)
2. Jake VanderPlas, “*Python Data Science Handbook: Essential Tools for Working with Data*”, O’Reilly Media Inc., First Edition, 2020 (Unit - IV)
3. William S Vincent, “*Django for Beginners: Build Websites with Python and Django*”, 2022 (Unit - V)

Reference Books:

1. John V Guttag, “*Introduction to Computation and Programming Using Python*”, 2nd Edition, Prentice Hall of India, 2015
2. R Nageswara Rao, “*Core Python Programming*”, 2nd Edition, Dreamtech Press, 2016
3. Mark Lutz, “*Learning Python*”, O’ Reilly, 2018
4. John Zelly, Mark Lutz, “*Python Programming: An Introduction to Computer Science*”, O’ Reilly, 2018.
5. Antonio Mele, “*Django 3 By Example*”, Third Edition, 2020.

Core X: COMPUTER NETWORKS AND NETWORK SECURITY

SEMESTER:III
CREDITS : 4

CODE: P23CA310
HOURS/WEEK: 5

UNIT I - Introduction - Uses of Computer Networks: 15 hours

Business Applications - Home Applications - Mobiles users - Social Issues - Network Hardware - Network Software. **Reference Models:** The OSI Reference model - The TCP/IP Reference model. **The physical Layer:** The Theoretical Basis for Data Communication - Guided Transmission Media - Wireless Transmission.

UNIT II - The Data Link Layer: 15 hours

Design Issues - Error Detection and Correction - Elementary Data Link Protocols - Sliding Window Protocols. **Ethernet:** Classic Ethernet Physical Layer - Classic Ethernet MAC Sub layer - Switched Ethernet- Fast Ethernet. **Bluetooth:** Bluetooth Architecture - Bluetooth Applications - The Bluetooth Protocol Stack - Bluetooth Frame Structure.

UNIT III - The Network Layer: 15 hours

Design Issues - Routing Algorithms. **Congestion Control Algorithms:** Approaches to Congestion Control - Traffic Aware Routing - Admission Control - Traffic Throttling - Load Shedding. **Quality of Service:** Application Requirements - Traffic Shaping - Packet Scheduling - Admission Control - Integrated Services - Differentiated Services - **The Network Layer in the Internet:** The IP Protocol - IP Address.

UNIT IV - The Transport Layer: 15 hours

The Transport Service - **The Internet Transport Protocol (UDP):** Introduction to UDP - Remote Procedure Call - Real Time Transport Protocol. **The Internet Transport Protocol (TCP):** Introduction to TCP - TCP Service Model - The TCP Protocol - The TCP Segment Header - TCP Connection Establishment - TCP Connection Release. **The Application Layer:** Domain Name System - Electronic Mail.

UNIT V - Computer and Network Security Concepts: 15 hours

Computer Security Concepts - The OSI security Architecture - Security Attacks - Security Services - Security Mechanisms - **Classical Encryption Techniques:** Symmetric Cipher Model - Substitution Techniques - Transposition Techniques - Rotor Machines – Steganography - **Block Ciphers and the Data Encryption Standard :** Traditional Block Cipher structure - The Data Encryption Standard - The Strength of DES - Cryptanalysis – Block Cipher Design Principles – **Public key Cryptography and RSA:** Principles of Public Key Cryptosystems – The RSA Algorithm.

Text Books:

1. Andrew S. Tanenbaum and David J Wetherall, “*Computer Networks*”, Pearson Education, Fifth Edition, Eighteenth Impression, 2020. (Unit Covered I to IV).
2. William Stallings, “*Cryptography and Network Security-Principles and Practice*”, Pearson Education, Seventh Edition, Eight Impressions, 2019. (Unit Covered V).

Reference Books:

1. Behrouz A Forouzan, “*Data Communications and Networking*”, McGraw Hill, Fifth Edition, 2012.
2. William Stallings, “*Data and Computer Communications*”, Pearson Education, Tenth Edition, 2014.

Elective IV: ORGANIZATIONAL BEHAVIOUR

SEMESTER: III
CREDITS: 3

CODE: P23CA3: A
HOURS/WEEK: 4

UNIT I - Introduction to Organizational Behaviour 12 Hours

Introduction: Elements of OB – Nature and Scope of OB – Contributing Disciplines to OB. Organizational Behaviour in Historical Perspective – **Foundations of Individual Behaviour:** Introduction – The Individual and Individual Differences – Human Behaviour and its Causation.

UNIT II - Personality and Perception 12 Hours

Personality – Perception – Attitudes: Concept of Attitudes – Formation of Attitudes – Types of Attitudes – Measurement of Attitude – Change of Attitude. **Values:** Concept of Value – Types of Values – Formation of Values – Values and Behaviour. **Job Satisfaction.**

UNIT III - Learning and Motivation 12 Hours

Learning: Meaning and Definition – Determinants of Learning – Learning Theories – Learning Principles – Reinforcement – Punishment – Learning and Behaviour. **Motivation:** Concepts – Meaning of Motivation – Nature of Motivation – Motivation Cycle or Process – Need for Motivation – Theories of Motivation – Motivation and morale.

UNIT IV - Organizational Conflicts 12 Hours

Organizational Conflicts: Definition of Conflict – Sources of Conflict – Types of Conflicts – Aspects of Conflicts – Functional Conflict – Dysfunctional Conflict – Conflict Process – Conflict Management. **Job Frustration – Stress Management.**

UNIT V - Communication and Leadership 12 Hours

Communication: Nature and Need for Communication – Communication Process – Communication Channel – Communication Networks – Communication Barriers – Effective Communication. **Leadership – Organisational Structure – Organisational Culture.**

Text Book:

1. S.S Khanka, “*Organizational Behaviour*”, S. Chand and Company Ltd, Revised Edition 2009.

Reference Books:

1. John W Newstrom and Keith Davis, “*Organizational Behaviour*”, TMH, 13th Edition, 2010.
2. Hugh J Arnold and Daniel C Fieldman, “*Organizational Behaviour*”, Mc Graw Hill, 10th Edition, 2005.

Elective IV: DECISION SUPPORT AND BUSINESS INTELLIGENCE.

SEMESTER: III

CODE: P23CA3:B

CREDITS: 3

WEEK/HOURS: 4

UNIT I - Management Support Systems: An Overview: 12 hours

Managers and Decision-Making – Managerial Decision-Making and Information Systems – Managers and Computer Support – Computerized Decision Support and the Supporting Technologies- A Framework for Decision Support – The Concept of Decision Support Systems – Group Support Systems–Enterprise Information Systems-Knowledge Management Systems-Expert Systems-Artificial Neural Networks-Advanced Intelligent Decision Support Systems-Hybrid Support Systems.

UNIT II - Decision-Making Systems, Modeling, and Support: 12 hours

Decision-Making: Introduction and Definitions-Systems-Models- Phases of the Decision-Making Process-Decision-Making: The Intelligence Phase - The Design Phase- The Choice Phase-The Implementation Phase-How Decisions Are Supported-ersonality Types, Gender, Human Cognition, and Decision Styles-The Decision-Makers.

UNIT III - Decision Support Systems: An Overview: 12 hours

DSS Configurations-What Is a DSS?-Characteristics and Capabilities of DSS - Components of DSS-The Data Management Subsystem-The Model Management Subsystem-The User Interface (Dialog) Subsystem -The Knowledge-Based Management Subsystem-The User-DSS Hardware-DSS Classifications.

UNIT IV - Modeling and Analysis: 12 hours

MSS Modeling-Static and Dynamic Models-Certainty, Uncertainty, and Risk-Influence Diagrams-MSS Modeling with Spreadsheets-Decision Analysis of a Few Alternatives (Decision Tables and Decision Trees)-The Structure of MSS Mathematical Models-Mathematical Programming Optimization-Multiple Goals, Sensitivity Analysis, What-If, and Goal Seeking-Problem-Solving Search Methods-Heuristic Programming-Simulation.

UNIT V - Business Intelligence: Data Warehousing, Data Acquisition, Data Mining, Business Analytics, and Visualization: 12 hours

The Nature and Sources of Data-Data Collection, -Database Management Systems in Decision Support Systems/Business Intelligence-Database Organization and Structures-Data Warehousing-Data Marts-Business Intelligence/Business Analytics-Online Analytical Processing (OLAP)-Data Mining -Data Visualization, Multidimensionality, and Real-Time Analytics.

Text Book:

1. Efraim Turban, Jay E. Aronson,Ting-Peng Liang, “*Decision Support Systems and Intelligent Systems*”, 9th Edition, Pearson 2013.

Reference Books:

1. Larissa T. Moss, S. Atre, “*Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making*”, Addison Wesley, 2003.
2. Carlo Vercellis, “*Business Intelligence: Data Mining and Optimization for Decision Making*”, Wiley Publications, 2009.
3. David Loshin Morgan, Kaufman, “*Business Intelligence: The Savvy Manager’s Guide*”, Second Edition, 2012.
4. Cindi Howson, “*Successful Business Intelligence: Secrets to Making BI a Killer App*”, McGraw-Hill, 2007.
5. Ralph Kimball , Margy Ross , Warren Thornthwaite, Joy Mundy, Bob Becker, “*The Data Warehouse Lifecycle Toolkit*”, Wiley Publication Inc.,2007.

Elective IV: HUMAN RESOURCE MANAGEMENT

SEMESTER : III
CREDITS : 3

CODE: P23CA3: C
HOURS/WEEK: 4

UNIT I - Human Resource Planning Overview 12 Hours

Human Resource Planning: How HRP Relates to Organizational Planning or Strategic Planning, the need for Human Resource Planning, The Steps in Human Resource Planning Process, Situation Analysis, Environmental Scanning and Strategic Planning, Forecasting Human Resource Demands.

UNIT II - Job Analysis 12 Hours

Job Analysis and Job Design: Purpose and uses of Job Analysis, Job Analysis Technique, Job Analysis – Methods of Data Collection, Job Design Approaches, Job Characteristic Approach to Job Design.

The Recruitment Process: Environmental Factors Affecting Recruitment Process, Recruitment Methods, Evaluating the Recruitment Process.

UNIT III - Selection Process 12 Hours

The Selection Process: Step in Selection Process (Techniques of Selection Process), Ethical Standards of Testing, Types of Interviews, Evaluation of the Selection Program.

Training and Development: The Functions of Training, Assessing Training Needs, Types of Training, Evaluation of Training and Development.

UNIT IV - Career Planning and Developing 12 Hours

Career Planning and Development: Career Development, Career Management. Industrial Relations: Characteristics of Industrial Relations, Significance of Harmonious Industrial Relations, Approaches to Industrial Relations, Factors Affecting Industrial Relations Strategy, Causes of Poor Industrial Relations, Effects of Poor Industrial Relations.

UNIT V - Strategic HRM 12 Hours

Strategic Human Resource Management: Strategic Human Resource Management, Strategic Planning, Need for Strategic Management, Benefits of Strategic Management, Dysfunctions of Strategic Management.

Text Book:

1. B. Pattanayak, "*Human Resource Management*", 3rd Edition, Prentice-Hall of India, 2006.

Reference Books:

1. David A. Dedecenezo, Stephen P. Robbins, "*Personnel/ Human Resource Management*", 3rd Edition, Prentice-Hall of India, 1990.
2. Adwin B. Flippo, "*Personnel Management*", (Mcgraw Hill Series in Management).
3. F. R. David, "Concept of Strategic Management". New York:Macmillan., 1993.
4. Narender. K. Chadha, "*Human Resource Management: Issues, Challenges and Case Studies*" (2nd revised ed.), Shri Sai Printographers, New Delhi, 2002.
5. Nirmal Singh. "*Human Resource Management*", Galgotia Publications Pvt. Ltd., New Delhi, 2004.

Elective V: BIG DATA ANALYTICS AND CLOUD COMPUTING

SEMESTER: III

CODE: P23CA3: D

CREDITS: 3

HOURS/WEEK: 4

UNIT – I

Types of Digital Data: Classification of Digital Data-**Introduction to Big Data:** Characteristics of Data-Evolution of Big Data-Definition of Big Data-Challenges with Big Data-What Is Big Data-Other Characteristics of Data Which are Not Definitional Traits of Big Data-Why Big Data. **Big Data Analytics:** What Is Big Data Analytics-Classification of Analytics-Top Challenges Facing Big Data-Data Science.

UNIT – II

The BigData Technology Landscape: Nosql-Hadoop-**Introduction To Hadoop:**Why Hadoop?-RDBMS Versus Hadoop-Distributed Computing Challenges-History of Hadoop-Hadoop Overview-Use Case of Hadoop-Hadoop Distributors-HDFS -Processing Data With Hadoop-Managing Resources and Applications With Hadoop YARN-Interacting With Hadoop Ecosystem. **Introduction To MongoDB:** What Is MongoDB?-Why MongoDB?-Terms Used In RDBMS and MongoDB-Data Types in MongoDB-MongoDBQuery Language.

UNIT – III

Introduction To MAPREDUCE Programming: Introduction – Mapper – Reducer – Combiner – Partitioner – Searching –Sorting-Compression.**Introduction To Hive:** What Is Hive?-Hive Architecture- Hive Data Types-Hive File Format-Hive Query Language -RcfileImplementation. **Introduction To Pig:** What Is Pig?-The Anatomy of Pig- Pig on Hadoop-Data Types in Pig-Running Pig-Execution Modes of Pig-HDFS Commands-Relational Operators.

UNIT – IV

Getting Started: Cloud Computing Basics - Cloud Computing Overview - Applications - Intranets and the Cloud – First Movers in the Cloud – **Your Organization and Cloud Computing:** When You Can Use Cloud Computing: - Benefits – Limitations -Security Concerns – Regulatory Issues – **Cloud Computing Titans:** Google, EMC, NetApp, Microsoft, Amazon, Salesforce.com, IBM.

UNIT – V

Cloud Storage: Overview-Cloud Storage providers-**Standards:**Application-Client-Infrastructure-Service.**Developing Applications :** Google – Microsoft – **Local Clouds and Thin Clients:** Virtualization in your Organization-Server Solutions-Thin Clients-**Migrating to the Cloud :** Cloud Services for individuals – Cloud Services aimed at the Mid-Market- Enterprise-Class Cloud Offerings – Migration.

Text Books:

1. Seema Acharya and SubhashiniChellappan, “*Big Data and Analytics*”, Wiley India Pvt. Ltd., 2019, 2nd Edition.
2. Anthony T. Velte Toby J. Velte, Robert Elsenpeter, “*Cloud Computing: A Practical Approach*”, The McGraw Hill, 2017.

Reference Books:

1. Judith Hurwitz, Alan Nugent, Dr. Fern Halper and Marcia Kaufman,“*Big Data*” Wiley Publications, 2014.
2. Tom White, “*Hadoop: The definitive Guide*”, O'Reilly Media, 2010.
3. Barrie Sosinsky, “*Cloud Computing Bible*”,Wiley Publishing, 2011.
4. RajkumarBuyya, James Broberg, and AndrzejGoscinski, “*Cloud Computing Principles and Paradigms*” Published by Wiley India Pvt Ltd, 2014.

Elective V: BLOCK CHAIN AND CRYPTO-CURRENCIES

SEMESTER: III
CREDITS: 3

CODE: P23CA3: E
HOURS/WEEK: 4

UNIT I - Fundamentals of Blockchain and Blockchain Types **12 Hours**

Fundamentals of Blockchain: The Evolution of Blockchain - Traditional vs. Blockchain Transactions - Blockchain Concepts - How Blockchain Technology Works - Components of Blockchain - Block in a Blockchain - Blockchain Layers - Pros and Cons of Blockchain - Blockchain Types and Consensus Mechanism: Introduction - Decentralization and Distribution -Types of Blockchain - Consensus Protocol

UNIT II - Cryptocurrency, Public Blockchain and Consortium Blockchain **12 Hours**

Cryptocurrency: Bitcoin, Altcoin and Token: Bitcoin and the Cryptocurrency - Cryptocurrency Basics - Types of Cryptocurrency - Cryptocurrency Usage - **Public Blockchain System:**The Bitcoin Blockchain - Ethereum Blockchain - **Consortium Blockchain:** Hyperledger Platform - Overview of Ripple - Overview of Corda

UNIT III - Smart Contracts and Private Blockchain **12 Hours**

Smart Contracts: Smart Contract - Characteristics of a Smart Contract - Types of Smart Contracts - Types of Oracles - Smart Contracts in Ethereum - Smart Contracts in Industry - **Private Blockchain System:** Key Characteristics of Private Blockchain - Why We Need Private Blockchain - E-commerce Site Example - Smart Contract in Private Environment - State Machine - Different Algorithms of Permissioned Blockchain - ByzantineFault - Multichain

UNIT IV - Initial Coin Offering and Security in Blockchain **12 Hours**

Initial Coin Offering: Launching an ICO - Investing in an ICO - Pros and Cons of Initial Coin Offering - Successful Initial Coin Offerings - Evolution of ICO - **Security in Blockchain:** Security Aspects in Bitcoin - Security and Privacy Challenges of Blockchain in General - Performance and Scalability - Identity Management and authentication - Regulatory Compliance and Assurance - Safeguarding Blockchain Smart Contract (DApp)

UNIT V - Applications, Limitations and Challenges of Blockchain **12 Hours**

Application of Blockchain: Blockchain in Banking and Finance - Blockchain in Education - Blockchain in Energy - Blockchain in Healthcare - Blockchain in Real-estate - Blockchain in Supply Chain - The Blockchain and IoT - **Limitations and Challenges of Blockchain:** Blockchain Implementation - Limitations - Challenges.

Text Book:

1. Chandramouli Subramanian, Asha A George, "*Blockchain Technology*", First Edition, Universities Press, 2021

Reference Books:

- 1.Imran Bashir, "*Mastering Blockchain*" PACKT Publishing-Kindle Edition,2017
- 2.Antony Lewis, "*The Basics of Bitcoins and Blockchains*"- Kindle Edition, 2018

Elective V: PARALLEL COMPUTING

SEMESTER : III
CREDITS : 3

CODE: P23CA3: F
HOURS/WEEK: 4

UNIT I - Introduction to Parallel Computing 12 Hours

Introduction to Parallel Computing – Motivating Parallelism – Scope of Parallel Computing – Parallel Programming Platforms – Implicit Parallelism – Limitations of Memory System Performance – Dichotomy of Parallel Computing Platforms – Physical Organization of Parallel Platforms – Communication Costs in Parallel Machines – Routing Mechanisms for Inter Connection Networks – Impact of Process Mapping and Mapping Techniques.

UNIT II - Parallel Algorithm Design 12 Hours

Principles of Parallel Algorithm Design – Preliminaries – Decomposition Techniques – Characteristics of Tasks and Interactions – Mapping Techniques for Load Balancing – Methods for Containing Interaction Over Heads – Parallel Algorithm Models.

UNIT III - Matrix Algorithms 12 Hours

Dense Matrix Algorithms – Matrix Vector Multiplication – Matrix _ Matrix Multiplication – Solving a system of Linear Equations.

UNIT IV - Sorting Algorithms 12 Hours

Sorting: Issues in Sorting on Parallel Computers – Sorting Networks – Bubble Sort and its Variants – Quick Sort – Bucket and Sample Sort – Other sorting Algorithms.

UNIT V - Graph Algorithms 12 Hours

Graph Algorithms – Definitions and Representation Prim’s Algorithm – Dijkstra’s Algorithm – All Pairs Shortest Paths – Transitive Closure – Connected Components – Algorithm for Space Graphs.

Text Book:

1. Ananth Grama, AnshulGuptha, George Karypis and Vipin Kumar, “*Introduction to Parallel Computing*”, Pearson Education, 1994.

Reference Book:

1. Harry F. Jordan, Gita Alaghband, “*Fundamentals of Parallel Processing*”, Prentice Hall, 2003.

Core Practical V: SMART DEVICES PROGRAMMING LAB

SEMESTER: III

CODE: P23CA3P5

CREDITS: 2

HOURS/WEEK: 4

Ex.No.	Exercises
1	Create Hello World Application.
2	Demonstrate Life Cycle of an activity.
3	Layouts: Linear, Relative and Table
4	Create multiple activities with an application.
5	Demonstrate the use of Scroll view and List view.
6	Illustrate Menu in an application.
7	Create activity with Portrait and Landscape mode.
8	Make SMS and Phone call services.
9	Perform read, write and delete operations on SQLite Database.
10	Create an application with login and homepage.
11	Apply Geo-Location based Service in an application.
12	Real time applications: College Portal, Online Quiz.

Core Practical VI: PROGRAMMING IN PYTHON LAB

SEMESTER: III

CODE: P23CA3P6

CREDITS: 2

HOURS/WEEK: 4

Ex. No.	Exercise
1	Write a Python program with Control Statements.
2	Demonstrate the following functions/methods which operates on strings in Python with suitable examples: i) len() ii) strip() iii) rstrip() iv) lstrip() v) find() vi) rfind() vii) index() viii) rindex() ix) count() x) replace() xi) split() xii) join() xiii) upper() xiv) lower() xv) swapcase() xvi) title() xvii) capitalize() xviii) startswith() xix) endswith()
3	Write a Python program to perform read and write operations on a file.
4	Write a Python program to compute the number of characters, words and lines in a file.
5	Demonstrate the following functions/methods which operates on lists in Python with suitable examples: i) list() ii) len() iii) count() iv) index() v) append() vi) insert() vii) extend() viii) remove() ix) pop() x) reverse() xi) sort() xii) copy() xiii) clear()
6	Demonstrate the following functions/methods which operates on tuples in Python with suitable examples: i) len() ii) count() iii) index() iv) sorted() v) min() vi) max() vii) cmp() viii) reversed()
7	Demonstrate the following functions/methods which operates on dictionary in Python with suitable examples: i) dict() ii) len() iii) clear() iv) get() v) pop() vi) popitem() vii) keys() viii) values() ix) items() x) copy() xi) update()
8	Demonstrate the following kinds of Functions used in Python i) User-defined Functions ii) Built-in Functions Iii) Lambda Functions iv) Recursion Functions
9	Write Python program using Classes and Objects.
10	Create an Employee Database and perform database connectivity with mysql
11	Create an Student Database and perform database connectivity with sqlite
12	Demonstrate a Python program to implement the basics of NumPy Arrays
13	Demonstrate a Python program to apply the Data Manipulation with Pandas
14	Demonstrate a Python program to Visualize with Matplotlib - lineplot, scatterplot
15	Demonstrate a Python program for rendering forms in Django Framework

SEMESTER: III
CREDITS: 1

CODE: P23CA3G1
HOURS/WEEK: 1

UNIT I: Project Development and Documentation

Identifying the Real Time Applications: Types of Applications – Stand-alone Applications – Web Applications – Mobile Applications- IoT Applications– Aim and Objectives of the Project - Pros and Cons of Existing and Proposed work – Software Requirements – Hardware Requirements - Acknowledgement – Abstract Writing – Tables and Figures – Bibliography – Appendix

UNIT II – Elements of Research

Basic Elements of Research – Objectives – Types of Research – Steps involved in Research – Identifying the problem statement – Evolving strategies for solving – Designing Feasible experiments – Planning and Scheduling – Developing hypothesis.

UNIT III – Research Design

Preparing the research design – Determining Simple Design – Collecting the data – Execution of the Project – Analysis of data – Hypothesis Testing – Generalizations and interpretation – Preparation of the report

UNIT IV– REVIEW OF LITERATURE

Literature review-Primary and Secondary sources - Reviews – Monograph - Patents - Research databases - web as a source - Searching the web - Critical literature review - Identifying gap areas from literature and research database - Development of working hypothesis.

UNIT V –RESEARCH ETHICS

Ethical issues - Ethical committees - Commercialization - Copy right – royalty - Intellectual property rights and patent law- Trade Related aspects of Intellectual Property Rights – Reproduction of published material – Plagiarism - Citation and acknowledgement - Reproducibility and accountability - Software for detection of Plagiarism.

Text Books:

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. “*An introduction to Research Methodology*”, RBSA Publishers.
2. Kothari, C.R., 1990. “*Research Methodology*”: Methods and Techniques. New Age International. 418p.
3. Wadehra, B.L. 2000. “*Law relating to patents*”, Trademarks, copyright designs and geographical indications. Universal Law Publishing.

Reference Books:

1. Sinha, S.C. and Dhiman, A.K., 2002. “*Research Methodology*”, Ess Publications. 2 volumes.
2. Trochim, W.M.K., 2005. “*Research Methods: The Concise Knowledge Base*”, Atomic Dog Publishing. 270p.

BRIDGE COURSE VII: DIGITAL COMPUTER FUNDAMENTALS AND ARCHITECTURE

SEMESTER: III

CREDITS: 4

CODE: PB23CA37

HOURS/WEEK: ...

UNIT I

Number Systems – Binary Arithmetic – Binary codes.

UNIT II

Logic Gates and Logic Circuits – Boolean Algebra – Karnaugh Map.

UNIT III - Arithmetic Building Blocks:

Half Adder – Full Adder – Controlled Inverter – The Adder–Subtractor. **Data Processing Circuits:** Multiplexer – Demultiplexer – Decoder – Encoder.

UNIT IV - Flip–Flops:

RS Flip Flop – Edge Triggered RS Flip Flop – Edge Triggered D Flip Flop – JK Flip Flop – JK Master Slave Flip Flop. **Registers:** Types of Registers – **Counters:** Asynchronous Counters – Synchronous Counters – MOD Counters – Decade Counters – Pre–Settable Counters.

UNIT V - Central Processing Unit

Central Processing Unit: General Register Organization – Stack Organization – Instruction Formats – Addressing Modes – Data Transfer And Manipulation – Program Control – Reduced Instruction Set Computer – CISC characteristics – RISC Characteristics.

Text Books:

1. V.Vijayendran, “*Digital Fundamentals*”, S.ViswanathanPvt.,Ltd., 2008.
2. Donald P Leach., Albert Paul Malvino, “*Digital Principles and Applications*”, TMH, Fifth Edition 2005.
3. Morris Mano M, “*Computer System Architecture*”, Prentice Hall of India, Third Edition, 2008.

Reference Book:

1. ThomasL.Floyd, “*Digital Fundamentals*”, Eleventh Edition, Pearson publication, 2015,

BRIDGE COURSE VIII: PHP AND MYSQL

SEMESTER: III

CODE: PB23CA38

CREDITS: 4

HOURS/WEEK: ...

UNIT I - Introduction to PHP

12 Hours

PHP BASICS: Introduction - PHP Getting Started - Syntax - PHP Variables, Predefined Variables: super globals, server variables - Constants - Echo and Print - Data Types - String Functions - Operators - Control Structures: - Arrays - Sorting Arrays - Loops

UNIT II - PHP Functions and File System

12 Hours

PHP Functions - Math Operations - Date and Time -Classes and Objects - Forms: GET and POST -Include Files - File system- Parsing Directories- File Upload- File Download

UNIT III - Cookies and Session

12 Hours

State Management: Cookies - Sessions - Form Handling - Form Validation - Filters - Error Handling - Send Email - PHP Magic Constants - JSON Parsing - Regular Expressions - Exception Handling

UNIT IV - MYSQL Database

12 Hours

PHP & MySQL DATABASE : MySQL Introduction:MySQLi (object-oriented, MySQLiprocedural,PDO) - MySQL Connect - MySQL Create Database - MySQL Create Table - MySQL Insert - MySQL Prepared - MySQL Last Inserted ID - MySQL Select - MySQL Where - MySQL Limit - MySQL Order By - MySQL Update - MySQL Delete.

UNIT V - Ajax and MVC

12 Hours

MySQL CRUD Application - MySQL Ajax Search - MySQL Login System – MVC - Simple PHP MVC Example

Text Books:

1. Antonio Lopez, “*Learning PHP 7*”, PACKT Open Source Publication, 2016
2. Dennis Popel, “*Learning PHP Data Objects: A Beginner's Guide to PHP Data Objects, Database Connection Abstraction Library for PHP 5*”, Packt Publishing, 2009. (UNIT V)

Reference Books:

1. Adrian W. West, “*Practical PHP and MySQL Website Databases*”, Apress, 2016
2. Leon Atkinson, “*Core PHP Programming*”, Pearson Education, 2004.
3. www.jkmaterials.yolasite.com/resources/labmanuals/BTech/WT-PHP-Record.pdf
4. MySQL® Notes for Professionals, GoalKicker.com
5. PHP Notes for Professionals, GoalKicker.com

BRIDGE COURSE IX: PHP AND MYSQL LAB**SEMESTER: IV**
CREDITS: 2**CODE: PB23CA3P**
HOURS/WEEK: ...

Ex. No.	Exercise
1	Write a PHP program using Control structures
2	Write a PHP program to read an integer Array and sorting the array in Ascending order
3	Write a PHP program using functions
4	(a) Write a PHP program using date and time objects (b) Write a PHP program using string objects
5	Write a PHP program using class and objects
6	Write a PHP program to design form to get student information using POST and GET
7	Write a PHP program to upload and down load a files
8	Write a PHP program to create cookies and sessions
9	Write a PHP program to create cookies and sessions
10	Write a PHP program to Handle runtime Exception
11.	Write a PHP program to send Email
12.	Write a PHP program to Create Database and tables using MySQLi
13.	Write a PHP program to Create simple CRUD Application

Core XI: MACHINE LEARNING FOR DATA SCIENCE

SEMESTER: IV
CREDITS: 4

CODE: P23CA411
HOURS/WEEK: 5

UNIT I - Journey from Statistics to Machine Learning 9 Hours

Statistical terminology for model building and validation- machine learning-major differences between statistical modeling and machine learning-steps in machine learning model development and deployment-statistical fundamentals and terminology for model building and validation.

UNIT II - Using R for Machine Learning Managing and Understanding Data 9 Hours

R Data Structures – Vectors-Factors-Managing data with R. **Exploring and understanding data:** Exploring the structure of data-exploring numerical variables-exploring categorical variables-Exploring relationships between variables.

UNIT III - Lazy learning – Classification using Nearest Neighbors 9 Hours

Understanding classification using nearest neighbors. **Probabilistic Learning- Classification using Naives Bayes:** Understanding Naïve Bayes. **Divide and Conquer- Classification using Decision trees and rules:** Understanding Decision Trees-Understanding Classification Rules.

UNIT IV - Forecasting Numeric Data- Regression Methods 9 Hours

Understanding Regression -Understanding Regression Trees and Model Trees. **Black Box Methods- Neural Networks And Support Vector Machines:** Understanding Neural Networks-Understanding Support Vector Machines. **Finding Patterns-Market Basket Analysis Using Association Rules. Finding Groups of Data:** Clustering With K-Means.

UNIT V - Evaluating Model Performance 9 Hours

Measuring performance for classification – Estimating future performance. **Improving Model Performance:** Tuning stock models for better performance-improving model performance with meta-learning.

Text Books:

1. Brett Lanz, “*Machine Learning with R*”, PACKT publishing Ltd., Third Edition
2. Pratap Dangeti, “*Statistics for Machine Learning*”, Packt Publishing Ltd., July 2017.

Reference Book:

1. SaikutDutt, Subramanian Chandramouli, Amit Kumar Das, “*Machine Learning*”, Pearson Education, 2019

Core XII: INTERNET OF THINGS

SEMESTER: IV

CODE: P23CA412

CREDITS: 4

HOURS/WEEK: 5

UNIT- I **9 Hours**

Introduction& Concepts: Introduction to Internet of Things- Physical Design of IoT- Logical Design of IoT- IoT Enabling Technologies- IoT Levels & Deployment Templates

UNIT- II **9 Hours**

Domain Specific IoTs: Home Automation- Cities- Environment- Energy- Retail- Logistics- Agriculture- Industry- Health & Life style. **IoT and M2M:** M2M-Difference between IoT and M2M- SDN and NFV for IoT- Software Defined Networking- Network Function Virtualization.

UNIT- III **9 Hours**

IoT System Management with NETCONF-YANG: Need for IoT Systems Management- Simple Network Management Protocol- Limitations of SNMP- Network Operator Requirements- NETCONF- YANG- IoT Systems Management with NETCONF-YANG-NETOPEER

UNIT- IV **9 Hours**

IOT Platform Design Methodology: Purpose & Requirements- Purpose specification - Domain model specification- Information model specification-Service level specification- Functional view specification- Operational view specification- Device & Component Integration-Application Development. **Data Analytics for IoT:** Introduction-Apache Hadoop-Apache Oozie - Apache Spark-Apache Storm-Using Apache Storm for Real-time Data Analysis.

UNIT- V **9 Hours**

IoT Physical Devices & Endpoints: What is an IoT Device - Exemplary Device: Raspberry Pi- About the Board-Linux on Raspberry Pi-Raspberry Pi Interfaces-Programming Raspberry Pi with Python - Other IoT Devices.**Getting to Know the Arduino Uno :** Discovering Other Arduino Boards - Arduino Technical Details - Kitted Out: Starting with a Beginner's Kit - Preparing a Workspace - Installing Arduino - Surveying the Arduino Environment - Using Arduino Web Editor

Text Books:

1. ArshdeepBahga and Vijay Madiseti, "*Internet of Things: A HANDS-ON APPROACH*", First Edition, Universities Press, 2020
2. Arduino for dummies a wiley brand by John Nussey , Copyright © 2018 by John Wiley & Sons, Inc., (UNIT 5)

Reference Books:

1. Francis DaCosta, "*Rethinking the Internet of Things-A scalable approach to connecting everything*", First edition, Apress open publication, 2013.
1. Peter Waher, "*Learning Internet of Things*", PACKT Publishing-First Edition, 2015.
2. Cuno Pfister, "*Getting started with the internet of things*", O'Reilly Publication, First Edition, 2014, Kindle Edition Publication.

Core Practical VII: MACHINE LEARNING FOR DATA SCIENCE LAB

SEMESTER: IV

CODE: P23CA4P7

CREDITS: 3

HOURS/WEEK: 4

Ex. No.	Exercise
1	Vectors and List operations in R
2	Matrices and Array operations in R
3	Saving, loading and removing R datastructures
4	Visualizing numeric data – scatterplot, boxplot, piechart, histograms
5	Measuring the central tendency
6	Pre-processing methods
7	Build model using K-Nearest Neighbour
8	Construct model using Decision Trees
9	Develop a model using logistic regression
10	Identify patterns using Association Rules
11	Evaluation of models

VLO: THE BIG PICTURE / SOCIAL ETHICS

SEMESTER: IV

CODE: P23VLO21 / P23VLO22

CREDITS: 2

HOURS/WEEK: 2

Core Project II: PROJECT - II

SEMESTER: IV

CREDITS: 8

CODE: P23CA4PJ

HOURS/WEEK: 14

Self-Study: INFORMATION RETRIEVAL TECHNIQUES

SEMESTER:
CREDITS: 3

CODE: PX2CAISA
HOURS/WEEK: ...

Course Objective:

The main objective of this course is to make the students to understand the basics of information retrieval to modelling query operations and indexing and also to understand various applications of information retrieval.

UNIT I: MOTIVATION

Basic Concepts – Practical Issues - Retrieval Process – Architecture - Boolean Retrieval – Retrieval Evaluation – Open Source IR Systems–History of Web Search – Web Characteristics– The impact of the web on IR —IR Versus Web Search–Components of a Search engine

UNIT II: MODELING

Taxonomy and Characterization of IR Models – Boolean Model – Vector Model - Term Weighting – Scoring and Ranking –Language Models – Set Theoretic Models - Probabilistic Models – Algebraic Models – Structured Text Retrieval Models – Models for Browsing

UNIT III: INDEXING

Static and Dynamic Inverted Indices – Index Construction and Index Compression. Searching- Sequential Searching and Pattern Matching. Query Operations -Query Languages– Query Processing - Relevance Feedback and Query Expansion - Automatic Local and Global Analysis – Measuring Effectiveness and Efficiency

UNIT IV: CLASSIFICATION AND CLUSTERING

Text Classification and Naïve Bayes – Vector Space Classification – Support vector machines and Machine learning on documents. Flat Clustering – Hierarchical Clustering – Matrix decompositions and latent semantic indexing – Fusion and Meta learning

UNIT V: SEARCHING THE WEB AND RETRIEVAL

Searching the Web –Structure of the Web –IR and web search – Static and Dynamic Ranking – Web Crawling and Indexing – Link Analysis - XML Retrieval Multimedia IR: Models and Languages – Indexing and Searching Parallel and Distributed IR – Digital Librerie.

Text Books:

1. ***“Implementing and Evaluating Search Engines”***, The MIT Press, Cambridge, Massachusetts London, England, First Edition 2010.
2. Ricardo Baeza – Yates, Berthier Ribeiro – Neto, —”***Modern Information Retrieval: The concepts and Technology***” behind Searchll (ACM Press Books), Second Edition, 2011.
3. David A. Grossman, Ophir Frieder, ***“Information Retrieval: Algorithms and Heuristics”***, Springer, 2nd Edition, 2004.

References Books:

1. Bruce Croft, Donald Metzler, Trevor Strohman, ***“Search Engines: Information Retrieval in Practice”***, Pearson, 2009.
2. Manning D. Christopher, Raghavan Prabhakar & Schutz Hinrich, ***“Introduction to Information Retrieval”***, Cambridge University Press, Online Edition, 2009.
3. Stefan Butcher, Charles L. A. Clarke, Gordon V. Cormack, —”***Information Retrieval: Implementing and Evaluating Search Engines”*** (The MIT Press), Illustrated Edition, 2016.

Self-Study: SOCIAL NETWORK ANALYTICS

SEMESTER:
CREDITS: 3

CODE: PX2CAISB
HOURS/WEEK: ...

Course Objective:

The main objective of this course is to make the students to gain knowledge about social network and its data sources and to analyse the data left behind in social networks with data visualization.

UNIT I: INTRODUCTION TO SEMANTIC WEB

The development of Semantic Web – Emergence of the Social Web – The Development of Social Network Analysis – Basic Graph Theoretical Concepts of Social Network Analysis – Electronic Sources for Network Analysis – Electronic Discussion Networks, Blogs and Online Communities

UNIT II : KNOWLEDGE REPRESENTATION ON THE SEMANTIC WEB

Semantic Web: RDF and OWL

UNIT III : SOCIAL NETWORK MINING

Detecting Communities in Social Network – Evaluating Communities –Methods for Community Detection – Applications of Community Mining Algorithms – Tools for detecting communities – Application: Mining Facebook

UNIT IV: COMMUNITY MAINTAINED SOCIAL MEDIA RESOURCES

Community Maintained Resources – Supporting technologies for community maintained resources– User motivations-Location based social interaction – location technology– mobile location sharing – Automated recommender system

UNIT V: VISUALIZATION OF SOCIAL NETWORKS

Visualization of Social Networks - Node-Edge Diagrams – Random Layout – Force-Directed Layout – Tree Layout – Matrix Representations –Matrix and Node-Link Diagrams– Visualizing Online Social Networks.

Text Books:

1. Matthew A. Russell, "*Mining the Social Web: Data Mining Facebook, Twitter, LinkedIn, Google+, Github and more*", O'REILLY, Third Edition, 2018.
2. Charu Aggarwal, "*Social Network Data Analytics*," Springer, First Edition, 2014
3. Jennifer Golbeck, "*Analyzing the social web*", Waltham, MA: Morgan Kaufmann (Elsevier), First Edition, 2013.

Reference Books:

1. Borko Furht, "*Handbook of Social Network Technologies and Applications*", Springer, First Edition, 2010
2. Peter Mika, "*Social Networks and the Semantic Web*", Springer, First Edition, 2007

Self-Study: PRINCIPLES OF MULTI MEDIA

SEMESTER:
CREDITS: 3

CODE: PX2CAISC
HOURS/WEEK: ...

Course Objective:

The main objective of this course is to make the students to develop multimedia skills in respect to many application including business, schools, home, education and virtual reality and also to learn the cost involved in multimedia planning, designing and producing.

UNIT-I: MULTIMEDIA-AN OVERVIEW

Introduction- Multimedia Presentation and Production- Characteristics of a Multimedia Presentation- Uses of Multimedia- Analog and Digital Representations- Digitization- Text-Introduction-Types of texts-Unicode standards-Font-Insertion of Text-Text compression-Text file format. Images-Image Data Representation-Image Acquisition-Image Processing-Binary Image Processing-Grayscale Image Processing-Image Processing Software

UNIT-II: GRAPHICS, AUDIO AND VIDEO

Introduction- Advantages of Graphics- Uses of Graphics- Components of a Graphics System- 2D Coordinate Systems- 2D Modeling- 3D Transformations- Projection- 3D Modeling- 3D Surface Characteristics and Lights- Audio- Introduction- Acoustics- Sound Waves-Types and Properties of Sounds- Musical Instrument Digital Interface- Digital Audio Processing- Audio-Processing Software- Video- Introduction- Motion Video- Analog Video Camera- Digital Video- Video Recording and Storage Formats- Video-Processing Software

UNIT-III: ANIMATION

Historical Background-Uses of Animation-Traditional Animation-Principles of Animation-Computer based Animation-Animation on the Web-3D Animation-Rendering Algorithm-Animation file formats-Animation software.

UNIT-IV: MULTIMEDIA ARCHITECTURE

Introduction-User Interface-OS multimedia support-Multimedia support- Multimedia Extensions- Hardware support-Distributed multimedia Applications-Real time protocols-What is multimedia database-Content-based storage and retrieval- Designing a basic Multimedia Database-Audio and Video Features-classification of Data .Multimedia Document-Introduction-Document and Document Architecture-Hypermedia concepts and design-Digital rights and Library.

UNIT-V: VIRTUAL REALITY

Introduction-Forms of Virtual reality-AR Applications-Software requirements-Peripheral Devices-Virtual reality modelling Language

Text Books;

1. Ranjan Parekh, "*Principles of Multimedia*" Tata McGraw Hill Education Private Limited, 2nd Edition 2013
2. Tay Vaughan - 1999– "*Multimedia: Making it work*" – Fourth Edition – Tata McGraw – Hill Edition.

References Books:

1. Walterworth john A– 1991- "*Multimedia Technologies and Application*" - Ellis Horwood Ltd. – London.
2. John F koegel Buford – "*Multimedia Systems*" – Addison Wesley – First Indian Reprint.

Self-Study: SOFTWARE QUALITY MANAGEMENT

SEMESTER:
CREDITS: 3

CODE: PX2CAISD
HOURS/WEEK: ...

Course Objective:

The main objective of this course is to make the students to understand quality management processes, distinguish between the various activities of quality assurance, quality planning and quality control.

UNIT I: INTRODUCTION TO SOFTWARE QUALITY

Software Quality – Hierarchical models of Boehm and McCall – Quality measurement – Metrics measurement and analysis – Gilb’s approach – GQM

UNIT II: SOFTWARE QUALITY ASSURANCE

Quality tasks – SQA plan – Teams – Characteristics – Implementation – Documentation – Reviews and Audits

UNIT III: QUALITY CONTROL AND RELIABILITY

Tools for Quality – Ishikawa’s basic tools – CASE tools – Defect prevention and removal – Reliability models – Rayleigh model – Reliability growth models for quality assessment

UNIT IV: QUALITY MANAGEMENT SYSTEM

Elements of QMS – Rayleigh model framework – Reliability Growth models for QMS – Complexity metrics and models – Customer satisfaction analysis.

UNIT V: QUALITY STANDARDS

Need for standards – ISO 9000 Series – ISO 9000-3 for software development – CMM and CMMI – Six Sigma concepts.

Text Book:

1. Allan C. Gillies, “*Software Quality: Theory and Management*”, Thomson Learning, 2003. (2. Stephen H. Kan, “*Metrics and Models in Software Quality Engineering*”, Pearson Education (Singapore) Pte Ltd., 2002.

References Books:

1. Norman E. Fenton and Shari Lawrence Pfleeger, “*Software Metrics*” Thomson, 2003
2. Mordechai Ben – Menachem and Garry S.Marliss, “*Software Quality*”, Thomson Asia Pte Ltd, 2003.

SEMESTER:
CREDITS: 3

CODE: PX2CAISE
HOURS/WEEK: ...

Course Objective:

The main objective of this course is to make the students to learn the fundamentals of deep learning, and the main research activities in this field. Moreover, students will learn to implement, train, and validate their own neural network, and they will improve their understanding of the on-going progress in computer vision and multimedia field.

UNIT I: BASICS OF NEURAL NETWORKS

Basic concept of Neurons – Perceptron Algorithm – Feed Forward and Back Propagation Networks

UNIT II: INTRODUCTION TO DEEP LEARNING

Feed Forward Neural Networks – Gradient Descent – Back Propagation Algorithm – Vanishing Gradient problem – Mitigation – ReLU Heuristics for Avoiding Bad Local Minima – Heuristics for Faster Training – Nestors Accelerated Gradient Descent – Regularization – Dropout

UNIT III: CONVOLUTIONAL NEURAL NETWORKS

CNN Architectures – Convolution – Pooling Layers – Transfer Learning – Image Classification using Transfer Learning

UNIT IV: MORE DEEP LEARNING ARCHITECTURES

LSTM, GRU, Encoder/Decoder Architectures – Autoencoders – Standard- Sparse – Denoising – Contractive- Variational Autoencoders – Adversarial Generative Networks – Autoencoder and DBM

UNIT V: APPLICATIONS OF DEEP LEARNING

Image Segmentation – Object Detection – Automatic Image Captioning – Image generation with Generative Adversarial Networks – Video to Text with LSTM Models – Attention Models for Computer Vision – Case Study: Named Entity Recognition – Opinion Mining using Recurrent Neural Networks – Parsing and Sentiment Analysis using Recursive Neural Networks – Sentence Classification using Convolutional Neural Networks – Dialogue Generation with LSTMs.

Text Books:

1. Ian Good Fellow, Yoshua Bengio, Aaron Courville, “*Deep Learning*”, MIT Press, 2017.
2. Amlan Chakrabarti Amit Kumar Das, Saptarsi Goswami, Pabitra Mitra, “*Deep Learning*”, Pearson, June 2021
3. Phil Kim, “*Matlab Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence*”, Apress , 2017.

References Books:

1. Francois Chollet, “*Deep Learning with Python*”, Manning Publications, 2018.
2. Ragav Venkatesan, Baoxin Li, “*Convolutional Neural Networks in Visual Computing*”, CRC Press, 2018.
3. Navin Kumar Manaswi, “*Deep Learning with Applications Using Python*”, Apress, 2018.