Rayat Shikshan Sanstha's

SADGURU GADGE MAHARAJ COLLEGE, KARAD.

(An Empowered Autonomous College)

Accredited By NAAC with 'A^{+} (3.63 CGPA)' GradeISO- 9001-2015 Certified

Affiliated to Shivaji University, Kolhapur

Bachelor of Computer Application

DEPARTMENT OF B.C.A

Under the Faculty of Commerce and Management

Choice Based Credit System (CBCS)

Regulations in accordance with **National Education Policy** to be implemented from Academic Year 2023-24

Syllabus For

B.C.A. Part – III

SEMESTER V & VI

(Syllabus to be implemented from June 2025)

B.C.A. Part–III

Semester– V

NMJT23-571 ASP.NET with C#

Credits – 2 **Theory: 30 Teaching Hours**

Course Outcomes- After the successful completion of the course the students are able to-

CO1. Understand Web server, HTTP request response architecture.
CO2. Learn Web forms and their controls.
CO3. Learn state management in web forms.
CO4. Understand ADO.NET Architecture with connection oriented and Disconnected layer.

Unit	Contents	Hours Allotted
I	**Introduction to .Net:** An Overview of C#, History and Features of C#, .NET Framework Architecture, IDE – (Integrated Development Environment), Components of .NET: CLR, CLS, Microsoft Intermediate Language ("MSIL" or "IL"), The Common Type System (CTS), Data Types, Value and Reference Types, C# - Flow Control: Branching and Looping, Type casting, Boxing and Unboxing, JIT compiler and it's types, .DLL and .EXE	07
II	**Object Oriented Concepts** Object Oriented Concepts: Classes and Objects, Command Line Arguments, Polymorphism, Inheritance and it's types- Single, Multiple, Multilevel, Hierarchical, Parameter Passing Mechanism – 'val' and 'ref', Abstract Classes, Sealed Classes, Partial Classes, Exception Handling	07
III	**Introduction to ASP.NET** Introduction to Scripting Languages, ASP.NET Introduction, Features of ASP.NET, Web browser and web server, HTTP request response structure, HTML form elements, GET/POST method, Client side and Server side programming, Web form life cycle, Page events, Server Controls: Textbox, List controls, File Upload, Link button, Image map, Image, Image button, Calendar, Literal control, Radio button, Checkbox, Validation Controls, Navigation controls, Master Page.	08
IV	**State Management and Database Connectivity** State Management: Cross page post back property of button, Response. Redirect, Server. Transfer, Response. Write, State Management - Session, Application, Global. Sax, Caching. Database Connectivity: SqlServer Database, Data controls- Grid view, List view , Form View, Details View, Repeater, Introduction to ADO.Net, ADO.NET Architecture- Connection, command, data reader, data adapter, data set, Understanding connected layer of ADO.NET and disconnected layer of ADO.NET.	08

Reference Books:-

1. Beginning ASP.NET 4.5 in C# and VB, Wrox, 2012, ISBN-10: 1118311809
2. Beginning ASP.NET 4.5 in C#, Apress, 2012, ISBN-10: 1430242515
3. Pro C# with .NET 3.0, Andrew Troelsen, Apress, 2007, ISBN 978-1-59059-823-8

NMJT23-572 Cloud Computing

Credits – 2 **Theory: 30 Teaching Hours**

Course Outcomes:

CO1. Understand the fundamental principles of Cloud Computing.

CO2. Understand the importance of virtualization in distributed computing and how this has enabled.

CO3. Describe the principles of Parallel and Distributed Computing and evolution of cloud computing from existing technologies.

CO4. Implement different types of Virtualization technologies and Service Oriented Architecture systems.

Units	Content	Hours allocated
I	**Introduction to Cloud Computing** 1.1 Introduction 1.2 Roots of Cloud Computing 1.3 Layers and Types of Cloud 1.4 Desired Features of a Cloud 1.5 Platform as a Service Providers 1.6Architecture of cloud computing 1.7Challenges in the cloud 1.8 Types of Cloud : Private, Public, Hybrid	07
II	**Virtualization** 2.1 Introducing virtualization and its benefits 2.2 Implementation Levels of Virtualization 2.3 Virtualization at the OS Model 2.4 Virtualization Structure: Hosted Structure, Bare-Metal 2.5 Structure Virtualization of CPU,Memory, and I/O Devices 2.6 Virtualization in Multicore Processors 2.7 Virtual Clusters and Resource management	07
III	**Cloud Computing Services** 3.1 Infrastructure as a Service 3.2 Platform as a servive 3.3 Leveraging PaaS for productivity 3.4 Guidelines for selecting PaasPovider 3.5 Concern with PaaS 3.6 Language and PaaS 3.7 Software as a Servive 3.8 Database as a Service 3.9 Specialized Cloud Services	08
IV	**Cloud Computing Applications** 4 4.1 Business Applications: MailChimp, Salesforce, Chatter,Paypal 4.2 Education Applications:Google Apps for 4.3 Education,Chromebooks for Education,Tablets with Google Play for Education 4.4 Entertainment Applications:Online games, Video Conferencing Apps, 4.5 Social Applications:Facebook, Twitter, LinkedIn	08

References:

1. Cloud Computing : Principles and Paradigm- Rajkumar Buyya, James Broberg, Andrzej Goscinski, Willey Publication
2. Cloud Comuting : Black Book- Kailash Jayaswal, Jagannath Kallakurchi, Donald J. Houde, Dr.Deven Shah
3. Cloud Computing : Bible- Barrie Sosinsky, Willey Publication

Cloud Computing : A Hands-On Approach- Arshdeep Bahga, Vijay Madisetti

NMJT23-573Linux

Credit:02 **Marks:50**

Course Outcomes:

CO1. Understand the working and use of NANO editor.
CO2. Learn Regular expressions using meta characters.
CO3. Learn filters with the help of regular expression.
CO4. Learn advanced BASH shell Programming.

UNIT No.	Description	No. of Periods
I	**Introduction to Linux, File System and System Calls** Introduction to Linux: Operating System Basics, History of Linux, Architecture of Linux, Operating System Services, Shell, Types of Shell, Kernel, Login and Logout, General Purpose Utilities (banner, cal, date, calendar, who, tty, uname, password, lock, echo, tput, bc, clear, script, wc, echo, test, expr), Finding Information of commands. **File System:** File system terminology, A Hierarchical file system, Boot block, Super block, I node table, Storage and Accessibility of files, File and Directory Manipulation commands (pwd, cd, ls, mv, cp, rm, mkdir, rmdir, cat) File ownership and permission, File system commands, File locating command (find), File permissions. System Calls: Open, Read, Write, Close	07
II	**Process and BASH Shell Scripting** BASH Shell Scripting: Introduction of Shell Scripts, Variable and Invoking the Shell Variables, Operators (Arithmetic, Relational, Logical, Assignment, Reassignment), Special Variables ($*, $@, $1-$9, $?, $!, $$, $-), Control Statement- Conditional, Selection statements, Looping statements.	07
III	**Memory Management, NANO Editor and Regular Expressions** Memory Management: Swapping, Demand Paging, Paging, and Segmentation. **NANO Editor:** Installing the Nano Text Editor in Linux, Nano Command Keys, Create a New File using Nano, Open an Existing File Using Nano, Edit Files Using Nano Text Editor in Linux, Cut and Paste Lines of Text Using Nano, Valid Shortcuts in Nano Text Editor, Search Text Using Nano, Spell Check Using Nano, Save Your Work Using Nano, Save with Backups. Regular Expressions: Met characters, Controlling Repeated Characters through *, +, and ?, Using and Modifying the '.' Met character, Controlling Where a Pattern Matches, Matching from a List of Options, Matching Characters That Must Not Appear, Matching Met characters Literally, Controlling Repetition, Selecting between Sequences	08
IV	**Filters and Advanced BASH Shell Programming** **Filters:** cat, tac, head, tail filters and options, sed and sed options, grep and grep options, Line Addressing, Multiple Instruction(-E and -F), Context Addressing, Writing Selected Lines to a File. **Advanced BASH Shell Programming:** Seq Command for sequence, Shell and subshell, Exporting Shell Variables, Arrays, String Manipulation, Shell Functions.	08

References Books:

1. LINUX with Operating System Concepts by Richard Fox, CRC Press
2. Linux Commands- Instant Reference by Bryan PF affenberge
3. The Design of the Unix Operating System- Bach
4. Unix Shell Programming- Yashwant Kanetkar
5. Unix Concepts and Application – Sumitabhadas
6. Linux : The Complete Reference- Richard Peterson

NMJT23-574 Software Project Management

Credits -2 **Theory: 30 Teaching Hours**

Course Outcomes- At the end of this course student will be able to:

CO1.To understands the fundamental principles of software project management. CO2.To be a good knowledge of responsibilities of project manager.

CO3.To be familiar with the different methods and techniques used for project management.

CO4.To gain knowledge of the key responsibilities of a project manager, such as leadership, communication, and resource allocation.

Unit	Content	Hours Alloted
I	**Software Development Process and Models** **Introduction to Software Development Process**: Defining software development, tailoring processes, and improving process discipline. **Software Production Process**: Understanding the need for process discipline in software development. **Software Models**: Waterfall Model, Prototyping Model, RAD Model, Incremental Model, Spiral Model, Component Assembly Model. **Software Life Cycle**: Overview of the stages and phases in the software development life cycle.	7
II	**Software Development and Project Management Software Development Team:** Roles and structure of the team, leadership and communication. Project Management: Top-Down and Bottom-Up Planning, Activity types, Project duration, and Schedule Monitoring **Tools (Gantt Chart, PERT Chart, Critical Path Method).**	7
III	**Project Review, Engineering, and Problem Solving** **Project Review and Tracking**: Importance of recovery plans, tracking meetings, and escalation meetings. **Project Engineering**: Product requirements, understanding customer needs, and investigation strategies. **Problem Solving Techniques**: Data Flow Diagrams, Data Dictionary, Structured English, Decision Trees, Decision Tables, Feasibility Study.	8
IV	**Software Testing and Quality Assurance Software Testing**: Test Plan, Verification & Validation, General Testing Methods (White Box, Black Box), Unit Testing, System Integration, and Validation Testing. **Software Quality**: Quality measures (FURPS), Software Quality Assurance (SQA), Reviews (FTR), and formal approaches like Clean	8

References:

1. "Software Engineering: A Practitioner's Approach" by Roger S. Pressman"
2. Software Engineering: Theory and Practice" by Shari Lawrence Pfleeger and Joanne M. Atlee
3. Clean Code: A Handbook of Agile Software Craftsmanship" by Robert C. Martin

"The Art of Software Testing" by Glenford J. Myers

NMJTE23-575 Elective-I Python

Credits – 2 **Theory: 30 Teaching Hours**

Course Outcomes- At the end of this course students will be able to:

CO1.Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.

CO2.Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.

CO3.Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python.

CO4.Identify the commonly used operations involving file systems and regular expressions.

Units	Contents	Hours Allotted
I	**INTRODUCTION TO PYTHON** Installation, Spyder IDE, Python Interpreter, History Of Python, Python Features, Applications Of Python, Data Types, Types Of Operators, Operators Precedence, Expressions, Statements, Functions, Comment, Strings - Accessing Values In Strings, Updating Strings, Escape Characters, Built-In String Methods, User Input	**07**
II	**CONTROL FLOW AND LOOPS** Conditionals: Boolean Values And Operators, Conditional (If), Alternative (If-Else) ,Chained Conditional (If-Elif-Else) Looping-While Loop, The Infinite Loop, For Loop, Iterating By Sequence Index, Using Else Statement With Loops, Nested Loops, Break, Continue & Pass Statement. Functions: Function With Arguments, Lambda Functions	07
III	**LISTS, TUPLES, DICTIONARIES AND SET** Lists-Create a List, Get and Set Items ,Add and Remove Items, List Slices, Different List Methods TUPLES - Creation and Accessing Values, Updating Tuples, Deleting Tuple Elements, Basic Tuples Operations, Indexing, Slicing DICTIONARY- Accessing Values in Dictionary, Updating Dictionary, Delete Dictionary Elements, Properties of Dictionary Keys, Built In Dictionary Functions and Methods. SETS -Concept of Sets, Creating, Initializing and Accessing the Elements, Sets Operation.	**08**
IV	**MODULES, FILES I/O,GUI** The Import Statement, Modules (Date time, Calendar, Math Module) Files I/O: Text Files, Reading And Writing Files Introduction To GUI In Python	08

Reference Books:-

1. R. NageswaraRao, ―Core Python Programming‖, Dreamtech 15 2.

2.Practical Programming: An introduction to Computer Science Using Python, second edition, Paul Gries, Jennifer Campbell, Jason Montojo, The Pragmatic Bookshelf.

3. Programming with python, A users Book, Michael Dawson, Cengage Learning

4.Python Programming: An Introduction to Computer Science Paperback – a. by John M Zelle.
Python Crash Course, 2nd Edition Paperback –by Eric Matthes.

NMJTE23-575 Elective-II Android Programming

Credits -2 **Theory: 30 Teaching Hours**

Course Outcomes- Upon successful completion of this course, the students will be able to:

CO1.Understand the building blocks of Mobile Operating Systems

CO2.Analyze different elements of Android Development Environment

CO3.Illustrate the structure of Mobile Applications using Android

CO4. Identify different components used in Mobile Applications using Android

Unit	Content	Hours Allotted
I	**Introduction to Mobile Operating System:** Mobile operating system, Operating system structure, Constraints and Restrictions, Features: Multitasking Scheduling, Memory Allocation, File System Interface, Keypad Interface, I/O Interface, Protection and Security, Multimedia features. Brief history of Android, Different types of mobile applications	9
II	**Android Development Environment :** Introduction to Mobile development IDE's, Setting up development environment, Android Software Development, Working with the AndroidManifest.xml, Dalvik Virtual Machine & .apk file extension, Android Architecture, Building a sample Android application using Android Studio. Android Project Structure, Working with emulator	8
III	**Android Application Framework :** Layouts & Drawable Resources, Basic Building blocks - Activities and Activity lifecycle, UI Components - Views & Notifications, Components for communication -Intents & type of Intents, Android API levels (versions & version names), Developing sample Application	4
IV	**Basic UI design:** Form widgets, Text Fields, Layouts, Option menu, Context menu, Sub menu, Time and Date, Images and media, Composite, Alert Dialogs & Toast, Popup, Introduction to SQLite Programming, SQLite Database.	9

References:

1. AnubhavPradhan, Anil V Deshpande, ― Mobile Apps Development‖ Edition:I
2. Teach Yourself Android Application Development In 24 Hours, Edition:I, Publication: SAMS
3. Jeff McWherter, Scott Gowell ―Professional Mobile Application Development‖, John Wiley & Sons, 2012.
4. Barry Burd, ―Android Application Development All in one for Dummies‖, Edition:I

NMNT23-576 E-Commerce

Credits: - 2 **Theory: 30 Teaching Hours**

Course Outcomes-

1. Analyze the impact of E-commerce on business models and strategy.
2. Describe the major types of E-commerce.
3. Explain the process that should be followed in building an E commerce presence.
4. Identify the key security threats in the E-commerce environment.
5. Describe how procurement and supply chains relate to B2B E commerce.

Unit	Content	Hours Allotted
I	**Introduction** E-Commerce- Concept, Definition, Goals, Components and functions, Advantages and Limitations, Challenges and opportunities, E-Commerce models- C2C, C2B, C2G, B2C, B2B,B2G, EDIConcept, components, Working mechanism of EDI, Advantages and disadvantages of EDI	07
II	**Electronic payment System** Concept of e-payment, Difference between traditional and electronics payment system, Digital cash, Credit and Debit card system, Smart Card, Prepaid, postpaid and instant payment system, Electronic funds transfer, Concept of e-banking	07
III	**E-Security** Concept of E-security, Security threats- concept and types, Malicious code, Phishing and identity theft, Hacking and cyber vandalism, Credit card fraud/Theft, Spoofing, Denial of service (DoS), Firewall and proxy server	08
IV	**Security Solutions** Concept of encryption and encryption, Symmetric and asymmetric key encryption, Cipher text, Digital Envelopes, Digital certificates, Security socket layer(SSL), Limitations of encryption solutions.	08

Reference Books-

1. E-Commerce- Kenneth C. Laudon and Carol Guercio Traver
2. Internet marketing and E-commerce-Ward Hanson and Kirthi Kalyanam
3. E-Commerce Concepts , Models , Strategies by -- G.S.V. Murthy
4. E-Commerce by --Kamlesh K Bajaj and Debjani Nag
5. Electronic Commerce by --Gary P. Schneider
6. E-Commerce A Managers Guide, Ravi Kalkota

NMJP23-577

Lab Course Based On ASP .NET with C#

Credits - 2

Course Outcomes- At the end of this course student will be able to:

CO1. An ability to design implements and evaluate a computer-based system, process, component or program to meet desired needs.

CO2. An ability to use current techniques, skills and tools necessary for computing practice

CO3. To read and write simple ASP.Net programs.

CO4. Ability to explore ASP.Net especially the object oriented concepts and the built-in objects of python.

Sr.No.	Title Of Experiments
1.	Accept your Name in TextBox1 and check it not greater than 10 character, print appropriate message using if.. else.. Accept Fee in TextBox2 and check Fee should be in number and >=16000
2.	Write a console program to accept a single alphabet and convert it into lower if it is upper and vice versa
3.	Write a Console Program to accept number from lower to limit to higher limit 10 numbers in integer array and print all the divisors of 12
4.	Write a console program to convert entered days into years, weeks and days
5.	Write a console program to calculate area of sphere by using function
6.	Write a program to accept a lower or upper alphabet check it is vowel or consonant using switch Statement
7.	Write a console program to declare and initialize as string =”Fox jump over the lazy dog” And count total words in the string.
8.	Write a Console program to accept 5 integer numbers in an array and find sum and average of elements And then count total elements below average and above average
9.	Write a console program to accept year and check it is leap or not.
10.	Write a console program to accept 5 elements in an integer array and find minimum and maximum element in it.
11.	Write a console program to write a function Add with 2 integer numbers as parameter having return type int and call it in Main() method to display sum of 2 numbers.
12.	Create Employee form to accept EmpNO, Name, Designation, Salary. Using ADO create connectively to add records in database table Emp. Take 2 buttons Submit and Clear button
13.	Write a console program to accept base and index as integer and find power(p= 23=8) without using built-in math functions

NMJP23-578

Lab Course Based on Linux and Python

Credits – 2

Course Outcomes: At the end of this course students will be able to:
CO1. understand the kernel-shell and general purpose utilities.
CO2. understand file system of Linux operating system.
CO3. learn Process management and Simple BASH Programming.

Practicals on Linux

Sr. No.	Title of the Experiment
1	Write a shell script to print "Hello, World!"
2	Create a script that takes a filename as input and displays whether the file exists or not.
3	Wire a Linux command to display calendar with various options.
4	Wire a Linux command to display list of user currently work on linux.
5	Wire a Linux command to display content of file
6	Demonstrate Directory handling commands.
7	Demonstration of General Purpose Utilities
8	Write a shell script using if statements to check file exists or not.
9	Write a shell script to check the given number is odd or even.
10	Write a shell script to greet message according to time.
11	Write a shell script to print the Fibonacci series
12	Write a shell script to print the numbers between 1 to10.
13	Write a shell script to greet message according to time

Practical's on Python

Sr No.	Title of the Experiment
1	Write Python program to do arithmetical operations such as Addition, Subtraction, Multiplication and Division
2	Write Python program to display greatest number among three numbers.
3	Write Python program to display multiplication table of any number.
4	Write Python program to Find the Factorial of a given number.
5	Write Python program to reverse the given number using while loop.
6	Write Python program to generate Fibonacci series up to the given range using Function.
7	Write Python program to check the given string is palindrome or not.
8	Write Python program to do following operations on string: create, indexing, slicing, upper, lower, compare
9	Write Python program to create a python List and do following operations on List: append (), extend (), insert (), remove (), reverse (), len (), min () & max (), sort ()
10	Write Python program to create a python Tuple and do following operations on tuple: Concatenation, Repetition, Membership.

NFP23-579

Mini Project under Field Project Evaluation on (SEE)

Credits:02

Credit Assigned - 02 Workload – 2 Hrs Per Week		**Total Marks 50**
Unit-I	The group of students may undertake a software project in consultation with the internal guide. The group size should not exceed three students. The student is expected do project in any language studied in V^{th} or earlier Semesters. The mini Project will be evaluated by the external examiners. Project documentation format is as per standard format.	**Practical Method**

B.C.A. Part–III Sem-VI
NMJT23-671 Java Programming

Credits – 2 **Theory: 30 Teaching Hours**

Course Outcomes:-

CO1. Use the syntax and semantics of java programming language and basic concepts of OOP.

CO2.Apply the concepts of Multithreading and Exception handling to develop efficient and error free code.

CO3Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.

CO4.Design and program stand-alone Java applications and GUI

Unit	Content	Hours Allotted
Unit-I	**Introduction to Java:** History of Java and features of Java, Primitive Data Types- Integer (byte, short, int, long), floating point (float, double), char, boolean, Non-Primitive Data Type – String, Java Keywords, variables, constants, Operators- arithmetic, relational, logical, unary, ternary, bitwise, Branching and looping statements, Typecasting- Implicit and Explicit, wrapper classes, Command line arguments, Writing simple java program, compiling and executing Java program (javac, java commands).	**07**
Unit-II	**Object Oriented Programming using Java:** Introduction- Class, Object and methods, Access modifiers and accessibility, Static members, constructors, destructor and this keyword, Encapsulation and Abstraction, Inheritance- Definition and its types single, multilevel, hierarchical, Interface – definition and implementation, Abstract Class – definition and use, Polymorphism- Definition and concepts of method overloading and overriding, Final method and Final Class, Java Packages – introduction, defining packages, CLASSPATH, importing packages, System Packages – java, lang, awt, javax, swing, net, io, util.	**08**
Unit-III	**Multithreading and Exception Handling:** Introduction to Multithreading, Understanding Threads, Thread Life-Cycle, Creating threads using Thread class & Runnable Interface, Thread Priorities, Exception handling - Fundamentals of exception handling, Exception types, Using try and catch, multiple catch clauses, throw, throws and finally, Built- in exceptions, Creating own exception sub classes.	**07**
Unit-IV	**GUI Programming and Event Handling:** Introduction to GUI, Abstract Window Toolkit (AWT), Component and Container, Using Containers - Frame and Panel, Layout Managers - Flow Layout, Grid Layout, Card Layout, Border Layout, AWT Components – Label, Button, Text Field, Checkbox, Checkbox Group, Event Handling- The Delegation event model, Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes.	**08**

Reference Books:

1. Programming with Java A Primer, E. Balaguruswamy, Tata McGraw Hill Companies.
2. Java : The Complete Reference, Herbert Schildt, Tata McGraw-Hill
3. Java Programming- Rajendra Salokhe (Aruta Publication)
4. THE Java™ Programming Language, Fourth Edition By Ken Arnold, James Gosling, David Holmes
5. Introduction to Java programming, By Y. Daniel Liang, Pearson Publication.

NMJT23-672 Data Warehousing and Data Mining

Credits – 2 **Theory: 30 Teaching Hours**

Course Outcomes- At the end of this course students will be able to:

CO1. Define the Data warehouse architecture and its Implementation.

CO2. Describe the Architecture of a Data Mining system.

CO3. Understand the various Data preprocessing Methods. CO4. Perform classification and prediction of data.

Units	Contents	Hours Allotted
Unit-I	**Data Warehousing:** Introduction to data warehousing, Data warehousing components, Building a data warehouse, Difference between database system and data warehouse, Data warehouse architecture	**08**
Unit-II	**Data Mining:** Introduction of data mining - Definition and functionalities Issues in DM, Applications of data mining, KDD process. Data Pre-processing: Data Pre-processing, Data cleaning, Data integration and transformation, Data reduction, Discretization and concept hierarchy generation, Data mining Tasks	**08**
Unit-III	**Data Mining techniques:** Frequent item - set and association rule mining: apriori algorithm, use of sampling for frequent item- set tree algorithm, Graph sampling : frequent sub graph mining , tree mining ,sequence mining Classification and Prediction - Issues Regarding Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification –Prediction – Accuracy and Error Measures .	**07**
Unit-IV	**Cluster Analysis:** Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods – K-Means and K-Medoids	**07**

Reference Books:-

1. Kimball, Ralph & et al, The Data Warehouse Lifecycle Toolkit, John Wiley & Sons, 2006.
2. Jiawei Han and MichelineKamber : ―Data Mining Concepts and Techniques‖, 3rd Edition,Elsevier,2012.
3. Arun K. Pujari, "Data Mining",University Press.
4. PaulrajPonnian, ―Data Warehousing Fundamentals‖, John Willey

NMJT23-673 Computer Network

Credits – 2 **Theory: 30 Teaching Hours**

Course Outcomes- At the end of this course students will be able to:

CO1. Define, use and implement Computer Networks and the basic components of a Network system.

CO2. Know and Apply pieces of hardware and software to make networks more efficient, faster, more secure, easier to use.

CO3. Able to transmit several simultaneous messages, and able to interconnect with other networks.

CO4. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

UnitNo	Name & Contents of Units	No .of Lectures.
Unit-I	**Basics of Data communication** 1.1. Data Communication concept 1.1.1 Components-sender, receiver, message, transmission media 1.1.2 Data Flow- simplex, half-duplex, or full-duplex 1.2 Networks 1.2.1 Definition, Advantages and disadvantages 1.2.2 Categories of Networks- LAN, WAN. MAN 1.2.3 Network Architecture-Client-Server and Peer to peer 1.3 Multiplexing and switching 1.3.1 Frequency-Division Multiplexing, Wavelength Division Multiplexing, Time-Division Multiplexing 1.3.2 Circuit switching, Packet Switching, Message Switching	07
Unit-II	**Transmission media and Reference Models** 2.1 Transmission Media 2.1.1 Guided Media - Twisted-Pair Cable, Coaxial Cable, Fiber-Optic Cable 2.1.2 Unguided Media: Radio Waves, Microwaves, Infrared, satellite communication 2.2 Transmission Modes- Parallel and Serial - (Asynchronous, Synchronous) 2.3 Reference Models 15 2.3.1 OSI reference model 2.3.2 TCP/IP reference model 2.3.3 Comparison of OSI and TCP/IP reference model 2.4 Protocol Standards 2.5 IP address scheme and characteristics of IP address	08
Unit-III	**Data link, Network and Transport layer** 3.1 Data link Layer- 3.1.1Design issues 3.1.2 Framing, error detection and correction 3.2 Network layer 3.2. 1 design issues of network layer 3.2.2 Routing algorithm (shortest path, Flooding, distance vector,) 3.2.3 Congestion control 3.3 Transport layer 3.3.1 Transport Layer Primitives: listen, connect,	07

	send, receive, disconnect 3.3.2 Protocols: TCP, UDP	
Unit-IV	**Session, Presentation and Application layer** 4.1 Session layer: 4.1.1 Services: dialog management, synchronization, activity management, exception handling 4.1.2 Remote procedure calls 4.2 Presentation layer: 4.2.1 Services: Translation, compression, encryption 4.2.2 Cryptography: concept, symmetric key & asymmetric key cryptography 4.3 Application layer: 4.3.1 Function4.3.2 Domain name system (DNS),Hypertext Transfer Protocol (HTTP),Simple Mail Transfer Protocol (SMTP) ,Telnet, File Transfer Protocol (FTP)	08

Reference Books:-

1. Computer Networking :A top down approach , James Kurose Pearson
2. Computer Networks Tanenbaum,Pearson Education India
3. Network Warrior Gary A. Donahue ,O'Reilly
4. S. Keshav, An Engineering Approach to Computer Networking
5. Douglas E. Comer, Computer Networks and Internets

NMJT23-674 Emerging Trends in Database and Web Technology

Credits -2 **Theory: 30 Teaching Hours**

Course Outcomes- Upon successful completion of this course, the students will be able to:

CO1. Use XML and AJAX for asynchronous data transfer.
CO2. Describe the role of JQuery in Web application.
CO3. Differentiate between SQL and NoSQL database system.
CO4. Analyze given data using MongoDB.

Unit	Content	Hours Alloted
Unit-I	Introduction to XML and AJAX Introduction to XML, Working with Basics of XML: XML Tree, XML Syntax, XML Elements, XML Attributes, XML Namespaces, XML Display, XML Application, Overview of AJAX, AJAX components, Asynchronous Data Transfer with XML Http Request.	**07**
Unit-II	Introduction to jQuery JQuery Introduction, jQuery Syntax, jQuery Selectors, jQuery Events, jQuery Effects, jQuery and HTML contents, jQuery and CSS Classes, Working with jQuery and AJAX.	**08**
Unit-III	Introduction to NoSQL Introduction to NoSQL database, Types of NoSQL database, NoSQL data modeling, Benefits of NoSQL database, Comparison between SQL and NoSQL database system, NoSQL using MaongoDB.	**07**
Unit-IV	Working with MongoDB Introduction to MongoDB shell, Basic data types, Running the MongoDB shell, MongoDB Client, ,Basic operations with MongoDB shell, Arrays, querying with MongoDB, find function, OR queries, Types specific querying, Aggregation in MongoDB.	**08**

References Books:

1 Teach yourself XML in 21 days, Steven Holzner, Sams.

2. Foundations of AJAX, Ryan Asleson and Natahniel T. Schutta, Apress

3. Learning from jQuery: Building on Core Skills, 2013, CallumMacrae, O'Reilly

4. Professional NoSQL, Shashank Tiwari, 2011, Wiley

5. Teach yourself NoSQL with MongoDB in 24 Hours, Brad Dayley, Sams

NMJTE23-675 Elective-I R-Programming

Credits -2 **Theory: 30 Teaching Hours**

Course Outcomes:

CO1: Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.

CO2.Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.

CO3.Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python.

CO4.Identify the commonly used operations involving file systems and regular expressions.

Unit	Content	Hours Allotted
Unit-I	**Introduction to R:** Installation of R &RStudio, Features of R, Variables, Constants, Operators in R, Datatypes and R Objects, Accepting Input, Important Built-in functions, Creating Vectors, Accessing elements of a Vector, Operations on Vectors, Vector Arithmetic	**07**
Unit-II	**Control statements and functions:** Control statements: if...else, if else() function, switch() function, repeat loop, while loop, for loop, break statement, next statement, Formal and Actual arguments, Named arguments, Global and local variables, Argument and lazy evaluation of functions, Recursive functions. Creating strings, paste(), Formatting numbers and string using format(), String manipulation	**07**
Unit-III	**Matrices, Arrays and Data frames:** Creating matrices, Accessing elements of a Matrix, Operations on Matrices, Matrix transpose, 3 Creating arrays, Accessing array elements, Calculations across array elements, Introduction to data frames and basic operations on data frames.	**08**
Unit-IV	**Introduction to Data Visualization:** Data visualization basics, Installing and loading packages, importing data, Working with missing data, Extracting a subset of a data frame, Scatter Plot, Box Plot, Bar plot, Plotting categorical data, Stacked bar plot, Histogram, plot() function and line plot, pie chart / 3D pie chart.	**08**

References Books:-

1. R. NageswaraRao, ―Core Python Programming‖, Dreamtech 15
2. Practical Programming: An introduction to Computer Science Using Python, second edition, Paul Gries, Jennifer Campbell, Jason Montojo, The Pragmatic Bookshelf.
3. Programming with python, A users Book, Michael Dawson, Cengage Learning
4. Python Programming: An Introduction to Computer Science Paperback – a. by John M Zelle.
5. Python Crash Course, 2nd Edition Paperback –by Eric Matthes.

NMJTE23-675 Elective-II Internet of Things (IoT)

Credits -2 **Theory: 30 Teaching Hours**

Course Outcomes:

CO1: To design some IOT based prototype.
CO2. Analyze the different digital marketing avenues.
CO3. Examine digital marketing tools.
CO4. Examine digital marketing tools.

Unit	Content	Hours Allotted
Unit-I	**Fundamentals of IoT** : Overview of basic electronics and basic components used in electronics lab: Resistors, Capacitors, Diodes, Transistors, Overview of digital electronics: Logic Gates and Families, Arithmetic circuits, Decoders, Multiplexers, flip flops, Shift Register, Integrated Circuits, Overview of Microprocessor and Microcontroller, Common features of Microcontroller.	**07**
Unit-II	**IoT Environment:** Introduction to embedded system: History, Classifications and applications of embedded systems, Design principals of IoT architecture, Outline of IoT architecture, Various platforms of IoT, Key features of IoT, IoT Hardware, IoT Software, IoT protocols,Real time examples of IoT, Advantages of IoT,	**07**
Unit-III	**Introduction to Arduino :** Arduino Uno architecture, Pin configuration and architecture, Device and platform features, Concept of digital and analog ports, Familiarizing with Arduino Interfacing Board, Arduino IDE Interfacing basic hardware components with Arduino, Software and Libraries	**08**
Unit-IV	**IoT Application Development "** Arduino data types, Variables and constants, Operators, Control Statements, Arrays, Functions, Arduino i/o Functions: Pins Configured as INPUT, Pullup Resistors, Pins Configured as OUTPUT, pinMode() Function, digitalRead() Function, digitalWrite() Function, analogRead() function, analogWrite() function, Arduino time Functions: delay() function, delayMicroseconds() function, millis() function, micros() function,	**08**

References Books:-

1. Olivier Hersent, David Boswarthick, Omar Elloumi , ―The Internet of Things Key applicationsand Protocols‖, Wiley, 2012.
2. Vijay Madisetti and ArshdeepBahga, ―Internet of Things (A Hands-onApproach)‖,1st Edition, VPT, 2014
3. CunoPfister, Getting Started with the Internet of Things, O"Reilly Media, 2011
4. Arduino, The complete guide to Arduino for beginners, including projects, tips, tricks, and programming!, James Arthur, 2020

NMNT23-676 IT Security

Credits -2 **Theory: 30 Teaching Hours**

Course Outcomes:

CO1: Understand the concept and need of IT security,

CO2. Identify different security threats to information systems.

CO3. Describe security controls used for IS security.

CO4. Understand provisions in IT Act 2000 and Design Security policy for IT Enabled Organization.

Unit	Content	Hours Allotted
Unit-I	**Introduction to IT Security** Definition of Information System Security, Basics–Introduction, Need, Significance and Challenges of IT Security, IT Assets - Physical Assets (Servers, Workstations, Peripherals, Smartphones, Networking Devices, Information Technology Equipment, Storage Devices, Supplies, IT Personnel) and Logical Assets(Software, Data and Information)Information security dimensions- confidentiality, integrity and Availability	**08**
Unit-II	**Security Threats** Introduction and types of security threats, sources of threats, Cyber Crimes. Security Attacks- Passive attacks (Network Analysis; eavesdropping; Traffic control), Active attacks (Phishing, Sniffing, spoofing, Denial of service attack), Malicious Code (Virus, Malware, Worm, Trojan horse), Keyboard loggers, Web tracking, Perpetrators (Hackers; Crackers) Other Security Threats- Acts of God (Natural disaster), environmental hazards, Theft, User error, Hardware failure, Software failure.	**08**
Unit-III	**IT Security Control Measures** Identification, Access Controls/Authentication: Password Protection, Biometric verification, Intrusion detection and prevention system, Multilevel authentication. Antivirus, Recovery software and services, Data backups, Malware detectors, Logs. Cryptography-Types of Cryptography, Digital signature and certificate. Firewall System, Deception Technology Control Measures for Internet Security	**07**
Unit-IV	**IT Act and Security Standards** IT Act 2000 and features of IT Act, Amendments in IT Act, Cyber-crimes under Information Technology Act 2000, Legal issues and challenges	**07**

References Books:-

1. Mark Stamp's Information Security: Principles and Practice (WIND) Paperback – by Deven N. Shah, Wiley.
2. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley, 2nd edition
3. Michael T. Simpson, Kent Backman, James Corley ―Hands- On Ethical Hacking and Network Defense‖,2016
4. Steven DeFino, Barry Kaufman, Nick Valenteen ―Official Certified Ethical Hacker Review Guide‖,2015
5. William Stallings, ―Principle of Computer Security‖, McGraw Hill Education, Fourth Edition, 2016.

NMJP23-677 Lab Course based on JAVA Programming

Credits – 4

Course Outcomes:- At the end of this practical paper students will be able to:

CO1: Implement the Concept of OOP in Java through simple programs.

CO2. Implementation and Evaluation of concept related to class and inheritance, concept of Multiprogramming and Exception Handling.

List of Experiments:	
1	Java programs based on branching and looping statements.
2	Java programs based Type Casting
3	Java programs based on command line arguments
4	Java programs based on constructors
5	Java programs based on inheritance
6	Java programs based on method overloading
7	Java programs based on method overriding
8	Java programs based on interfaces
9	Java programs based on packages
10	Java programs based on multithreading
11	Java programs based on exception handling

NMJP23-678 Lab Course based on Trends in Database and WT and R-Programming

Credits-4

Course Outcomes- At the end of this course student will be able to:

CO1. Demonstrate and use different types of XML files.

CO2. Apply various built in statements and queries to demonstrate AJAX and Jquery

CO3. Apply syntax of R through practice exercises.

CO4: Implement the control statements, functions, data visualization. in R.

Practical on Recent Trends on Databases and WT

Sr. No.	Title Of The Experiment
1.	Create a simple XMLHttpRequest and retrieve data from txt file.
2.	Create a simple XMLHttpRequest with callback function and retrieve text file data.
3.	Create an XML document to store details of students (name, roll number, course, marks)
4.	Write an XML document representing a bookstore with multiple books, each having title, author, price, and category as attributes.
5.	Design an XML file to represent a company's employee database using elements and attributes.
6.	Write an XML file that describes a menu of a restaurant with multiple food items and prices.
7.	Create a simple AJAX application that fetches text data from a server file without refreshing the webpage.
8.	Design a webpage where a button click event triggers an AJAX call that loads a text file.
9.	Write a simple jQuery program to change the text color of a paragraph on a button click.
10.	Create a web page using jQuery that hides and shows elements with hide() and show() methods.
11.	Demonstrate event handling in jQuery using click(), hover(), and dblclick() functions.

Practical on R Programming

Sr. No.	**Title Of The Experiment**
1.	Find the factorial of a number
2.	Check whether a number is prime or not
3.	Find Sum, Mean and Product of Vector
4.	Generate Random Number from Standard Distributions
5.	Find Minimum and Maximum
6.	Check Armstrong Number
7.	Sum of Natural Numbers Using Recursion
8.	Print the Fibonacci Sequence
9.	Check for Leap Year
10.	Check whether number is Odd or Even
11.	Check if a Number is Positive, Negative or Zero
12.	Find the Sum of Natural Numbers.

NOJT23-679 On the Job Training

Credits-2

Guidelines for Major Project Work :	**Number of Copies:** The student should submit two Hard-bound copies of the Project Report. **Acceptance/Rejection of Project Report**: The student must submit an outline of the project report to the college for approval. The college holds the right to accept the project or suggest modifications for resubmission. Only on acceptance of draft project report, the student should make the final copies. **Format of the Project Report:** The student must adhere strictly to the following format for the submission of the Project Report. **a. Paper**: The Report shall be typed on white paper, A4 size, for the final submission. The Report to be submitted to the must be original and subsequent copies may be photocopied on any paper. **b. Typing**: The typing shall be of standard letter size, 1.5 spaced and on both side of the paper. (Normal text should have Arial Font size 11 or 12. Headings can have bigger size). **c. Margins**: The typing must be done in the following margins: Left ----- 1.5 inch, Right ----- 1 inch Top ----- 1 inch, Bottom ----- 1 inch **d. Front Cover**: The front cover should contain the following details: **TOP :** The title in block capitals of 6mm to 15mm letters. **CENTRE**: Full name in block capitals of 6mm to 10mm letters. **BOTTOM**: Name of the University, Course, Year of submission - all in block capitals of 6mm to 10mm letters on separate lines with proper spacing and centering. **f. Blank Sheets**: At the beginning and end of the report, two white black bound papers should be provided, one for the purpose of binding and other to be left blank. **Appendix** – • Input Design • Report Design • Implementation

	• Testing Standard Project **Standard Project Report Documentation Format** a) Cover Page b) Institute/College certificate c) Guide Certificate d) Student declaration e) Acknowledgement f) Index (Chapter Scheme with page numbers) 1) Introduction to Project – Introduction –Working of System – Need and scope of System – Organization Profile 2) Proposed System – Objectives – Software Requirement Specifications. 3) System Diagrams • DFD • ERD • UML (if applicable) System Requirements • Hardware • Software 4) System Design • Database Design • Input Design • Output Design 5) User Manual 6) Input and Outputs screens and Reports (Fill at least 20 different valid records)

	8) Conclusion and Suggestions • Conclusion and suggestions • Future enhancement Bibliography/References: **Note : Minimum 5 reports are essential as outputs of the project work done by the student.**