Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Information Technology

Choice Based Credit System (CBCS) in the light of NEP-2020

Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)

SEMESTER-IV(2024-2028)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
ML307	**BS**	**Environmental Management and Sustainability**	60	20	20	0	0	4	0	0	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. To create awareness towards various environmental problems.
2. To create awareness among students towards issues of sustainable development.
3. To expose students towards environment friendly practices of organizations.
4. To sensitize students to act responsibly towards environment

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. The course will give students an overview of various environmental concerns and practical challenges in environmental management and sustainability.
2. Emphasis is given to make students practice environment friendly behavior in day-to-day activities.

SYLLABUS

UNIT I — 10 HOURS

Introduction to Environment Pollution and Control:

1. Pollution and its types (Air, Water, and Soil): Causes, Effects and Control measures
2. Municipal Solid Waste: Definition, Composition, Effects
3. Electronic Waste: Definition, Composition, Effects
4. Plastic Pollution: Causes, Effects and Control Measures

UNIT II — HOURS

Climate Change and Environmental Challenges:

1. Global Warming and Green House Effect
2. Depletion of the Ozone Layer
3. Acid Rain
4. Nuclear Hazards

UNIT III — 9 HOURS

Environmental Management and Sustainable Development:

1. Environmental Management and Sustainable Development: An overview
2. Sustainable Development Goals (17 SDGs)
3. Significance of Sustainable Development
4. Environment Friendly Practices At Workplace and Home (Three Rs' of Waste Management, Water Conservation, Energy Conservation)

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UNIT IV 8 HOURS

Environmental Acts:

1. The Water (Prevention and Control of Pollution) Act, 1974: Objectives, Definition of Pollution under this act, Powers and Functions of Boards
2. The Air (Prevention and Control of Pollution) Act, 1981:Objectives, Definition of Pollution under this act, Powers and Functions of Boards
3. The Environment (Protection) Act, 1986: Objectives, Definition of important terms used in this Act, Details about the act.
4. Environmental Impact Assessment: Concept and Benefits.

UNIT V 7 HOURS

Role of Individuals, Corporate and Society:

1. Environmental Values
2. Positive and Adverse Impact of Technological Developments on Society and Environment
3. Role of an individual/ Corporate/ Society in environmental conservation
4. Case Studies: The Bhopal Gas Tragedy, New Delhi's Air Pollution, Arsenic Pollution in Ground Water (West Bengal), Narmada Valley Project, Cauvery Water Dispute, Fukushima Daiichi Disaster (Japan), Ozone Hole over Antarctica, Ganga Pollution, Deterioration of TajMahal. Uttarakhand flash floods.

TEXTBOOKS:

1. Rogers, P.P., Jalal, K.F., Boyd, I.A. *An Introduction to Sustainable Development*, Earthscan.
2. Kalam, A.P.J., *Target 3 Billon: Innovative Solutions Towards Sustainable Development*, Penguin Books

REFERENCE:

1. Kaushik A. and Kaushik, *Perspectives in Environmental Studies*, New Delhi: New Age International Publishers.
2. Dhameja, S.K., *Environmental Studies*, S.K. Kataria and Sons, New Delhi
3. Bharucha E., *Environmental Studies for Undergraduate Courses*, New
4. Delhi: University Grants Commission.
5. Wright R.T., *Environmental Science: towards a sustainable future*, New Delhi: PHL Learning Private Ltd.
6. Rajagopalan R., *Environmental Studies*, New York: Oxford University Press.

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BTCS401N	**DCC**	**Data Base Management Systems**	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. To differentiate among the various database system according to their function.
2. To understand the process to develop database model and database design.
3. To understand managing a database using Structured Query Language.
4. To expand an understanding of necessary DBMS concepts such as: Database Transactions, Database Security, Integrity, Concurrency.
5. To understand and build a straightforward database system and show competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Construct conceptual data models by identifying the entities and relationships.
2. Evaluate the normality of a logical data model, and correct any anomalies.
3. Develop physical data models for relational database management systems.
4. Implement relational databases using a RDBMS.
5. Work as a valuable member of a database design and implementation team.

SYLLABUS

UNIT I — 10 HOURS

Introduction: Concept & Overview of DBMS, Three Schema Architecture of DBMS, Database Approach v/s Traditional File Accessing Approach, Advantages of Database Systems, Data Models, Schema and Instances, Data Independence, Data Base Language and Interfaces, Functions of DBA and Designer, Database Users.

Entity-Relationship Model: Basic concepts, Design Issues, Mapping Constraints, Keys, Entity- Relationship Diagram, Weak Entity Sets and Extended E-R features. ER Diagram to Relational Table conversion.

UNIT II — 9 HOURS

Relational Model: Structure of Relational Databases, Relational Algebra, Relational Calculus, Extended Relational Algebra Operations, Joins and its type. Integrity Constraints. Referential Integrity, Intension and Extension.

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BTCS401N	**DCC**	**Data Base Management Systems**	60	20	20	30	20	3	0	2	4

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UNIT III — 8 HOURS

SQL and PL/SQL: SQL commands, Set operations, Aggregate Functions, Null Values, Domain Constraints, Assertions, Views, Nested Sub Queries, Stored Procedures and Triggers, Database Security, Application development using PLSQL.

Relational Database Design: Functional Dependency, Database Anomalies, Normalization and its forms, Multi-Valued Dependencies, 4NF, Join Dependency, 5NF.

UNIT IV — 7 HOURS

Transaction and Concurrency Control: Physical Data Structures, Query Optimization, Transaction Model properties, State Serializability, Concurrency control protocols, Multiple Granularities, Granularity of Data Item. Multi version schemes, Database Recovery Methods, Recovery in Multi-Database System and Database Backup and Recovery from Catastrophic Failure.

UNIT V — 8 HOURS

File Organization and Index Structure: File & Record Concept, Placing file records on Disk, Types of Records, Types of Single-Level Index, Multilevel Indexes, Dynamic Multilevel Indexes using B tree and B+ tree. Mongo DB, NoSQL types, Features and tools.

TEXTBOOKS:

1. Henry F. Korth and Silberschatz Abraham, *Database System Concepts*, Mc.GrawHill, 6th Ed., 2015.
2. Raghu Ramakrishnan and Johannes Gehrke, *Database Management Systems*, McGraw- Hill Education, 2003.

REFERENCE:

1. Kahate, Atul, *Introduction to Database Management Systems*, Pearson Education India, 2006.
2. C J Date, *An Introduction to Database System*, Pearson Educations, 8th Edition, 2004.
3. Ivan Bayross, *SQL, PL/SQL - The Programming Language of Oracle*, BPB Publications 4th Revised Edition, 2010.
4. Elmasri, Navathe, *Fundamentals of Database Systems*, Pearson Educations 7th Edition, 2016.
5. Seema Kedar, *Database Management System*, Technical Publications, 2009.
6. Rajiv Chopra, *Database Management System (DBMS) A Practical Approach*, Kindle Edition, S Chand (December 1, 2010), 2017.

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LIST OF PRACTICALS

1. Design a Database and create required tables. For e.g. Bank, College Database.
2. Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables.
3. Write a SQL statement for table and record handling like implementing INSERT statement, using SELECT and INSERT together, DELETE, UPDATE, TRUNCATE statements and DROP, ALTER statements.
4. Write the queries for Retrieving Data from a Database Using the WHERE clause, using Logical Operators in the WHERE clause , Using IN, BETWEEN, LIKE, ORDER BY, GROUP BY and HAVING Clause, Using Aggregate Functions and Combining Tables Using JOINS.
5. Write the query for implementing the following functions: MAX (), MIN (), AVG (), COUNT ().
6. Write the query to implement the concept of Integrity constrains.
7. Write the query to create the views.
8. Perform the queries for triggers.
9. Perform the following operation for demonstrating the insertion, updating and deletion using the referential integrity constraints.
10. Write the query for creating the users and their role. Using GRANT and REVOKE operations.
11. Develop a small application for a patient admitted in a hospital which has capability of inserting, deleting, updating, and the patient record. The application should also be able to search the patient's record by its id.

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BTCS302N	**DCC**	**Analysis & Design of Algorithms**	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. To learn the algorithm analysis techniques.
2. To critically analyze the efficiency of alternative algorithmic solutions for the same problem
3. To understand the limitation of algorithm power.
4. To understand different algorithm design techniques.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Define the basic concepts of algorithms and analyze the performance of algorithms.
2. Explain different standard algorithm design techniques, namely, divide & conquer, greedy, dynamic programming, backtracking and branch & bound.
3. Demonstrate standard algorithms for fundamental problems in Computer Science.
4. Design algorithms for a given problem using standard algorithm design techniques.
5. Analyze and compare the efficiency of various algorithms of a given problem.
6. Identify the limitations of algorithms in problem solving.
7. To identify the types of problem, formulate, analyze and compare the efficiency of algorithms.

SYLLABUS

UNIT I — 10 HOURS

Algorithms Designing: Algorithms, Analyzing Algorithms, Asymptotic Notations, Heap Sort, Sorting and Searching Algorithms and their Analysis in terms of Space and Time Complexity.

Divide and Conquer: General Method, Binary Search, Merge Sort, Quick Sort, Selection Sort, Strassen's Matrix Multiplication Algorithms.

UNIT II — 9 HOURS

Greedy Method: General Method, fractional Knapsack Problem, Job Sequencing with Deadlines, Minimum-Cost Spanning Tree - Prim's and Kruskal's algorithm, Single Source Shortest Paths.

UNIT III — 8 HOURS

Dynamic Programming: General Method, Optimal Binary Search Trees, O/1 Knapsack, multistage graph, Traveling Salesperson Problem, All Pairs Shortest Paths.

UNIT IV — 7 HOURS

Backtracking: General Method, 8-Queens Problem, Graph Coloring, Hamiltonian Cycles, sum of Subsets.

Branch and Bound: General Method, O/1 Knapsack Problem, Traveling Salesperson Problem.

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BTCS302N	**DCC**	**Analysis & Design of Algorithms**	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

UNIT V 8 HOURS

NP Hard and NP Complete Problems: Basic Concepts, Cook's Theorem, NP Hard Graph and NP Scheduling Problems, Some Simplified NP Hard Problems.

TEXTBOOKS:

1. Ellis Horowitz and Sartaj Sahni, *Fundamental of Computer Algorithms*, 2nd Edition, Galgotia Publication, 2001.
2. Thomas H Cormen, Charles E Leiserson and Ronald L Rivest, *Introduction to Algorithms*, 3rd Ed., MIT Press. 2009.

REFERENCE:

1. Donal E Knuth, *Fundamentals of Algorithms: The Art of Computer Programming*, Vol l, 3rd Ed., Pearson Education, 1997.
2. Goodman, S.E. & Hedetnieni, *Introduction to Design and Analysis of Algorithm*, Tata McGraw Hill, 1977.
3. S. Dasgupta, C. H. Papadimitriou, and U. V. Vazirani, *Algorithms*, Tata McGraw Hill, 2006.
4. J.E Hopcroft, J.D Ullman, *Design and analysis of algorithms*, TMH Publication.

LIST OF PRACTICALS

1. Write a program for Iterative and Recursive Binary Search.
2. Write a program for Merge Sort.
3. Write a program for Quick Sort.
4. Write a program for Strassen's Matrix Multiplication.
5. Write a program for minimum spanning trees using Kruskal's algorithm.
6. Write a program for minimum spanning trees using Prim's algorithm.
7. Write a program for single sources shortest path algorithm.
8. Write a program for Floyd-Warshal algorithm.
9. Write a program for traveling salesman problem.
10. Write a program for Hamiltonian cycle problem.

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CL110M	**DCC**	**Red Hat Open stack Administration I**	0	0	0	0	100	0	0	4	2

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COURSE OBJECTIVES:

The student will have ability to:

1. P Launch instances to satisfy various use case examples.
2. Manage domains, projects, users, roles, and quota in a multitenant environment.
3. Manage networks, subnets, routers, and floating IP addresses.
4. Manage instance security with group rules and access keys.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Design and implement on-demand projects, software-defined networks, and virtual Machine instances.
2. Deploy a proof-of-concept Open stack installation for practice, development, demonstration, and testing, back in your own home or business computing environment.
3. Manage software-defined networks such as subnets, routers, floating IP addresses, images, flavors, security groups/rules, and block and object storage.
4. Create and customize advanced VM instances as applications, customize on deploy, and create scalable stacks of multiple VM applications.

SYLLABUS

UNIT I

Introduction to Red Hat Open Stack Platform: Describe Open Stack personas, launch an instance, and describe the Open Stack components and architecture.

Manage application projects in a multitenant cloud: Create and configure projects with secure user access and sufficient resources to support cloud user application deployment requirements.

UNIT II

Manage Open Stack networking: Describe how IP networks are implemented in Open Stack, including fundamental TCP/IP stack behavior, software-defined networking elements, and the common types of networks available to self-service cloud users.

Configure resources to launch a non-public instance: Configure the requisite resource types for launching a basic non-public instance, including v CPUs, memory, and a system disk image, and launch an instance of an application component that runs in a tenant network with no public access.

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CL110M	**DCC**	**Red Hat Open stack Administration I**	0	0	0	0	100	0	0	4	2

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UNIT III

Configure virtual machine system disks: Identify the available choices for configuring, storing and selecting block-based virtual machine (VM) system disks, including the choice of ephemeral or persistent disks for **s**pecific use cases

Provide additional storage strategies: Identify the available choices for additional cloud storage techniques, including object-based storage, network file sharing, and volumes sourced from a file sharing service.

UNIT IV

Configure resources to launch an instance with public access: Identify and configure the additional resource types required to launch instances with public access for specific use cases, including networking and access security elements.

Automate customized cloud application launches: Configure and deploy a typical multi-tier cloud application stack, defined as an architected template of scalable VM instances, including per- instance launch customizations.

UNIT V

Manage cloud application placement: Introduce over cloud layouts more complex than a single site, and explain the management resources to control the placement of launched instances, including segregation elements such as cells and availability zones, and placement attributes such as requisite compute node resources.

TEXTBOOKS:

1. Adolfo Vazquez, Chen Chang, Fiona Allen, Hervey Quarter main, Morgan Weetman, Snehangshu Karmakar. Red Hat Open Stack Administration I: Core Operations for Cloud Operators, Edition 1, Red Hat Inc.

REFERENCE:

1. Red Hat Open Stack Administration I: Core Operations for Cloud Operators, https://www.redhat.com/en/services/training/cl110-red-hat-openstackadministration-i
2. Red Hat Open Stack Administration I: Core Operations for Cloud Operators (CL110), https://www.redhat.com/en/blog/now-available-openstack-13-red-hatopenstack-administration-i-core-operations-cloud-operators-cl110

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CL110M	**DCC**	**Red Hat Open stack Administration I**	0	0	0	0	100	0	0	4	2

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LIST OF PRACTICALS

1. Introduction to the Lab.
2. Introduction to Red Hat Open stack.
3. Case Study: Manage application projects in a multitenant cloud.
4. Case Study: Manage Open Stack networking.
5. Configure virtual machine system disks.
6. Case Study: Configure resources to launch a non-public instance.
7. Configure resources to launch an instance with public access.
8. Case Study: Automate customized cloud application launches.
9. Case Study: Manage cloud application placement.
10. Case Study: Additional Storage Strategies.

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BTIT411	**SEC**	**Advanced JAVA**	0	0	0	30	20	0	0	2	1

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COURSE OBJECTIVES:

The student will have ability to:

1. Understand to develop java desktop applications.
2. Understand Database connectivity and SQL queries in java.
3. Design and develop Web applications using servlet and JSP.
4. Understand how to work with JavaBeans.
5. Designing applications using pre-built frameworks.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Learn to access database through Java programs, using Java Data Base Connectivity (JDBC).
2. Design new applications using object-oriented methodologies.
3. Create dynamic web pages, using Servlets and JSP.
4. Make a reusable software component, using Java Bean.
5. Design Data base connectivity program for simple problems.

SYLLABUS

UNIT I — 10 HOURS

Designing Graphical User Interfaces in Java, Components and Containers, Basics of Components, Using Containers, Layout Managers, AWT Components, Adding a Menu to Window, Extending GUI Features Using Swing Components, Java Utilities (java.util Package) Event-Driven Programming in Java, Event- Handling Process, Event Handling Mechanism, The Delegation Model of Event Handling, Event Classes, Event Sources, Event Listeners, Adapter Classes as Helper Classes in Event Handling.

UNIT II — 6 HOURS

Servlets: Basics of Web, MVC in Server-side Programming, Servlet API, Servlet Interface, Generic Servlet, HTTP Servlet, Servlet Life Cycle, Working with Apache Tomcat Server, Steps to create a servlet in Tomcat, Deployment descriptor. Servlet Request: Various Servlet Request methods for form data and HTTP header data.

UNIT III — 8 HOURS

Session Tracking: Purpose and need of Session Tracing. Approaches to session tracking: Cookies, Hidden Form Field, URL Rewriting, Session tracking with JAVA servlet API.

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BTIT411	**SEC**	**Advanced JAVA**	0	0	0	30	20	0	0	2	1

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UNIT IV 6 HOURS

Database Connectivity and Servlet Collaboration: Database drivers, JDBC, API for Querying with database, API for updating the database. Servlet collaboration: Methods of Request Dispatcher interface: forward, Include. Send redirect.

UNIT V 8 HOURS

Java Server Pages: Basic of JSP: Life Cycle of JSP, JSP API. Scripting Elements: - Scrip let Tag, expression tag, declaration tag. 9 Implicit Object: out, request, response, config, application, session, page context, page, and Exception. Directives: - page directive, include directive, taglib; Exception Handling, Action Elements, JSTL, Custom tags.

TEXTBOOKS:

1. Herbert Schildt, *J2EE The Complete Reference Java*, Ninth Ed., McGraw Hill, 2017
2. Bert Bates, Kathy Sierra, *Headfirst Java*, 2nd Ed., O' Reilly, 2005

REFERENCE:

1. Harvey. M. Dietel, *Advanced Java 2 Platform, How to program*, 2nd Ed., Prentice Hall.

LIST OF PRACTICALS

1. A program for creating text box, check box, radio button, list, submit button.
2. A program to execute select query using JDBC.
3. A program to update customer information.
4. A simple servlet that just generates plain text.
5. A program to display cookie id.
6. A program for session tracking.
7. Write a program showing Database connectivity.

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BTIT608N	**SEC**	**IT Workshop – SciLab/MATLAB**	0	0	0	30	20	0	0	2	1

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COURSE OBJECTIVES:

The student will have ability to:

1. Familiarization of the syntax, semantics, data-types and library functions of numerical computing languages such as MATLAB and/or SCILAB.
2. Learn application of MATLAB and/or SCILAB for implementation/simulation and visualization of basic mathematical functions relevant to electronics applications.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Understand the need for simulation/implementation for the verification of mathematical functions.
2. Understand the main features of the MATLAB/SciLab program development environment to enable their usage in the higher learning.
3. Implement simple mathematical functions/equations in numerical computing environment such as MATLAB/SciLab.
4. Interpret and visualize simple mathematical functions and operations thereon using plots/display.
5. Analyze the program for correctness and determine/estimate/predict the output and verify it under simulation environment using MATLAB/SCILAB tools.

SYLLABUS

UNIT I

Introduction To Simulation Software: About SciLab/MATLAB, SciLab/MATLAB System, Starting and Quitting SciLab/MATLAB.

Expressions: Variables Numbers, Operators Functions, Expressions.

UNIT II

Flow Control: If, else, and else if, switch and case, for, while, continue, break try - catch, return.

Command Window: The format Function, Suppressing Output, Entering Long Statements, Command Line Editing.

UNIT III

Matrices And Arrays: Entering Matrices sum and transpose, subscripts, colon Operator, magic Function.

Working With Matrices: Generating Matrices, The load Function, M-Files, Concatenation, Deleting Rows and Columns, Linear Algebra, Arrays Multivariate Data, Scalar Expansion, Logical Subscripting, find Function.

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTIT608N	**SEC**	**IT Workshop – SciLab/MATLAB**	0	0	0	30	20	0	0	2	1

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

UNIT IV

Scripts & Functions: Scripts, Functions, Global Variables, Passing String Arguments to Functions, eval Function, Function Handles, Vectorization , Pre allocation.
Other Data Structure: Multidimensional Arrays, Cell Arrays, Characters and Text, Structures.

UNIT V

Graphics: Plotting Process, Editing Process, Preparing Graphs, Basic Plotting Functions, Mesh & Surface Plot, and Image Reading & Writing, Printing graphics. SIMULINK

TEXTBOOKS:

1. MATLAB and its Applications in Engineering, Rajkumar Bansal, Pearson Publishers, ISBN-10: 8131716813, 2009.
2. A Guide to MATLAB: For Beginners & Experienced Users By: Kevin R. Coombes, John E. Osborn, Garrett J. Stuck

REFERENCE:

1. SCILAB(a Free Software to Matlab),Er. Hema Rama chandran and Dr. Achutsankar Nair, S. Chand Publishers, ISBN-10: 8121939704,2011
2. Introduction to SCILAB by Rachna Verma and Arvind Verma
SCILAB—A Beginner's Approach by Anil Kumar Verma
http://in.mathworks.com/
https://www.scilab.org/resources/documentation/tutorials

ShriVaishnavVidyapeethVishwavidyalaya, Indore

ShriVaishnav Institute of Information Technology

Choice Based Credit System (CBCS) in the light of NEP-2020

Bachelor of Technology (CSE with specialization in Enterprise System in association with Red Hat)

SEMESTER-IV(2024-2028)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTIT608N	**SEC**	**IT Workshop – SciLab/MATLAB**	0	0	0	30	20	0	0	2	1

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

LIST OF PRACTICALS

1. Addition, subtraction and multiplication of two matrices.
2. Verify whether the given matrix is singular or non-singular and compute its inverse if applicable.
3. Sorting of 1-D array and searching of an array/matrix. Also, list the set of numbers that obey a common condition in an array/matrix using find( ).
4. Solve simultaneous equations (maximum of three) using Cramer's rule. [Simultaneous equations may be obtained by applying KCL or KVL for a circuit and they can be solved for voltages or currents, respectively]
5. a) Show that log10(A*B)=log10 A+ log10 B and log10(A/B)=log10 A-log10 B
   b) Plot the voltage across capacitor during charging Vc=V0[1-e-(t/RC)]
6. a) Plot a straight line for the given slope and intercept using different plotattributes.
   b) Differentiate and integrate y=mx+c, separately, and display the resultson the same plot.
7. Plot y1=A*sin(2πf1t), y2=B*cos(2πf2t) and y3=A*sin(2πf1t)+B*cos(2πf2t),intime and frequency (after computing DFT or FFT) domains as subplots and infer the results.
8. Integrate and differentiate sin(x) and display the results on the same plot in different colors. Also display sin(x) on the same plot.
9. Compute mean, median, standard deviation and variance of a set of data using formulae and verify using built-in functions.
10. Find all the even and prime numbers between two numbers (range).
11. Demonstrate (a) reading and display image, (b) converting color image to gray and black-and- white and plotting their histograms, and (c) conversionof image file formats.
12. Compare the results of the built-in and user-defined function to compute cos(x)[the series cos(x)=1-(x2/2!)+ (x4/4!)- (x6/6!)+ … can be used]
13. Write a program to compute roots of a quadratic equation ax2+bx+c=0 given a, b and c.