Shri Vaishnav Vidyapeeth Vishwavidyalaya
Shri Vaishnav Institute Of Information Technology
Choice Based Credit System (CBCS) in the light of NEP-2020
B.Tech. (CSE- Artificial Intelligence and Machine Learning-Microsoft)
SEMESTER-IV (2023- 2027)

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 on the following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

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 to environmentally friendly practices of organizations.
4. To sensitize students to act responsibly towards the environment.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate the following knowledge, skills, and attitudes.

The 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 making students practice environmentally friendly behavior in day-to-day activities.

Syllabus

Unit I: Introduction to Environment Pollution and Control **10HRS**

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: Climate Change and Environmental Challenges **9HRS**

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

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Unit III: Environmental Management and Sustainable Development **8HRS**

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)

Unit 1V: Environmental Acts **8HRS**

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: Role of Individuals, Corporate and Society **7HRS**

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 Taj Mahal. Uttarakhand flash floods.

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***Teacher Assessment** shall be based on the following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Textbook:

1. Rogers, P.P., Jalal, K.F., Boyd, I.A.(Latest Edition) . An Introduction to Sustainable Development. Earthscan
2. Kalam, A.P.J. (Latest Edition). Target *3 Billon: Innovative Solutions Towards Sustainable Development.* Penguin Books
3. Kaushik, A. and Kaushik (Latest Edition). Perspectives *in Environmental Studies.* New Delhi: New Age International Publishers.
4. Dhameja, S.K. (Latest Edition). *Environmental Studies.* S.K. Kataria and Sons. New Delhi
5. Bharucha,E. (Latest Edition). *Environmental Studies for Undergraduate Courses.* New Delhi: University Grants Commission.
6. Wright, R. T. (Latest Edition). *Environmental Science: towards a sustainable future. New* Delhi: PHL Learning Private Ltd.
7. Rajagopalan, R. (Latest Edition). *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 Educational Objectives (CEOs):

The student will have ability:

1. To differentiate among the various database systems 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 (COs):

After completion of this course the students are expected to be able to demonstrate the following knowledge, skills, and attitudes.

The 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 RDBMS.
5. Work as a valuable member of a database design and implementation team.

Syllabus:

UNIT I **10HRS**

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.

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UNIT II **9HRS**

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.

UNIT III **8HRS**

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 **7HRS**

Transaction and Concurrency Control: Physical Data Structures, Query Optimization, Transaction Model properties, State Serialize ability, 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 **8HRS**

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.

UNIT-V **8HRS**

File Organization and Index Structure: File & Record Concept, placing file records on Disk, Fixed and Variable sized Records, Types of Single-Level Index (primary, secondary, clustering), Multilevel Indexes, Dynamic Multilevel Indexes using B tree and B+ tree. Mongo DB, No SQL types, Features, and tools.

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***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Textbook:

1. Henry F. Korth and Silberschatz Abraham, "Database System Concepts", McGraw Hill, 6th Edition,2015.
2. Elmasri, Navathe, "Fundamentals of Database Systems", Pearson Educations 7th Edition, 2016.
3. Seema Kedar, Database Management System, Technical Publications, 2009.
4. Rajiv Chopra, Database Management System (DBMS) A Practical Approach. Kindle Edition, S Chand (December 1, 2010), 2017.

References:

1. Raghu Ramakrishnan and Johannes Gehrke "Database Management Systems" McGraw- Hill Education, 2003.
2. Kahate, Atul "Introduction to Database Management Systems" Pearson Education India, 2006.
3. C J Date, "An Introduction to Database System", Pearson Educations, 8th Edition, 2004
4. Ivan Bayross, "SQL, PL/SQL - The Programming Language of Oracle", BPB Publications 4th Revised Edition, 2010.

Suggested 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 constraints.
7. Write the query to create the views.

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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, the patient record. The application should also be able to search the patients' 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 Educational Objectives (CEOs):

The student will have ability to:
1. To learn 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 (COs):

After completion of this course the students are expected to be able to demonstrate the following knowledge, skills, and attitudes.

The students will be able to
1. Define the basic concepts of algorithms and analyse 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. Analyse 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, analyse, and compare the efficiency of algorithms.

Syllabus:

UNIT I **10HRS**

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.

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

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UNIT II **9HRS**

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 **8HRS**

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

UNIT IV **7HRS**

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.

UNIT V **8HRS**

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

Textbook:

1. Ellis Horowitz and SartajSahni, "Fundamental of Computer Algorithms", 2nd Edition, Galgotia Publication, 2001.

References:

1. Thomas H Cormen, Charles E Leiserson and Ronald L Rivest "Introduction to Algorithms",3rd Edition, MIT Press. 2009.
2. Donal E Knuth, "Fundamentals of Algorithms: The Art of Computer Programming" Vol l,3rd Edition, Pearson Educatio, 1997.
3. Goodman, S.E. & Hedetnieni, "Introduction to Design and Analysis of Algorithm", Tata McGraw Hill, 1977.
4. S. Dasgupta, C. H. Papadimitriou, and U. V. Vazirani,"Algorithms",Tata McGraw Hill, 2006.
5. J.E Hopcroft, J.D Ullman, "Design and analysis of algorithms" TMH Publication.

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Suggested 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 the Hamiltonian cycle problem.

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BTCS203N	DCC	Principles of Operating System	60	20	20	30	20	3	0	2	4

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***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):
The student will have ability to:
1. To learn the fundamentals of Operating Systems.
2. To study the mechanisms of Operating System to handle processes and threads and their communication.
3. To gain knowledge of process management concepts that includes architecture, Mutual exclusion algorithms, deadlock detection and recovery algorithms.
4. To learn the mechanisms involved in memory management in Operating System.
5. To know the components and management aspects of disc scheduling.

Course Outcomes (COs):
After completion of this course the students are expected to be able to demonstrate the following knowledge, skills, and attitudes.

The students will be able to:
1. To describe the detailed structure of Operating System.
2. To design and Implement Process management Techniques in Operating System.
3. To calculate CPU Scheduling criteria.
4. To understand The Memory Management of Operating System.
5. To elaborate Disc Scheduling.

Syllabus:

UNIT I **10HRS**

Introduction to Operating System: Introduction and Need of operating system, Layered Architecture/Logical Structure of Operating system, Type of OS (Multiprogramming, Time Sharing, Real Time, Networked, Distributed, Clustered, Hand Held), Operating system as Resource Manager and Virtual Machine, System Calls/Monitor Calls, Firmware- BIOS, Boot Strap Loader. Threads- processes versus threads, threading, concepts, models, kernel & user level threads, thread usage, benefits.

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UNIT II **9HRS**

Process Management: Process Model, Creation, Termination, States & Transitions, Context Switching, Process Control Block, CPU and I/O bound, CPU scheduler- short, medium, long-term, dispatcher, scheduling: - preemptive and non-preemptive, Static and Dynamic Priority Criteria/Goals/Performance Metrics, scheduling algorithms- FCFS, SJFS, shortest remaining time, round robin, Priority scheduling, multilevel queue scheduling, multilevel feedback queue scheduling.

UNIT III **8HRS**

Inter process Communication: Introduction to Message Passing, Race Condition, Critical Section Problem, Peterson's Solution, Semaphore, Classical Problems of Synchronization Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem. Deadlock- System model, Resource types, Deadlock Problem, Deadlock Characterization, Methods for Deadlock Handling, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock Detection, Recovery from Deadlock.

UNIT IV **7HRS**

Memory Management: Concepts, functions, logical and physical address space, address binding, degree of multiprogramming, swapping, static & dynamic loading- creating a load module, loading, static & dynamic linking, memory allocation schemes- first fit, next fit, best fit, worst fit and quick fit.

Virtual Memory: Concept, virtual address space, paging scheme, pure segmentation and segmentation with paging scheme hardware support and implementation details, memory fragmentation, demand paging, working set model, page fault frequency, thrashing, page replacement algorithms- optimal, FIFO, LRU; Bleady's anomaly; TLB (translation look aside buffer).

UNIT V **8HRS**

File Management: Concepts, Naming, Attributes, Operations, Types, Structure, File Organization & Access (Sequential, Direct, Index Sequential) Methods, Memory Mapped Files, Directory Structures One Level, Two Level, Hierarchical/Tree, Acyclic Graph, General Graph, File System Mounting, File Sharing, Path Name, Directory Operations, Overview Of File System in Linux & Windows.

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BTCS203 N	DCC	Principles of Operating System	60	20	20	30	20	3	0	2	4

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Input/output Subsystems: Concepts, Functions/Goals, Input/Output devices- Block and Character, Spooling, Disk Structure & Operation, Disk Attachment, Disk Storage Capacity, Disk Scheduling Algorithm- FCFS, SSTF, Scan Scheduling, C-Scan Schedule.

Textbook:

1. Abraham Silberschatz,"Operating system concepts",10th Edition,John Willey & Sons. INC, 2018
2. Andrew S.Tannanbaum, "Modern operating system", 4th Edition,Pearson Education, 2014.

References:

1. Achyut S Godbole," Operating System",3rd TMH,2017.
2. William Stalling, "operating system" 8th, Pearson Education, ,2014.
3. Vijay Shukla, "Operating System", 3rd, Kataria &Sons ,2013.
4. Singhal & Shivratri," Advanced Concept in Operating Systems", 1st, TataMc-Graw Hill Education, edition 2017.

Suggested list of Practicals: -

1. Implement and update the BIOS settings of your PC.
2. If there are 5 printers connected in a system each process to print will take different time to complete, and CPU will give a fixed time to each process after that deadline next process will enter in CPU. If a problem is not completed in each slot, then that process will be reentered as per the FCFS, on rotation basis? Apply the scheduling on this?
3. Implement Non-Preemptive Priority CPU Scheduling.
4. Implement Non-Preemptive Shortest Job first CPU Scheduling.
5. If there are 5 different resources like 3 printers,2 scanners are connected to a system each taking different time to complete the task. Which scheduling is best and gives best performance of CPU?
6. Implement the scheduling for that where CPU give chance to complete those process first which comes first?
7. Implement Round-Robin CPU scheduling.
8. Write a program to implement Semaphore.

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BTCS203 N	DCC	Principles of Operating System	60	20	20	30	20	3	0	2	4

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9. Find the solution for the situation where 5 faculties are sitting in a round table. There are 4 ball pens placed on this table. At a time only one pen can be picked by one faculty to writing work. What would happen if all picked the pen for writing simultaneously?
10. Find the solution for a dentist checkup clinic where only one chair and one dentist are available for treatment. And having n chairs to wait for patient.
▪ If there is no patient, then the doctor sleeps in his own chair.
▪ When a patient arrives, he must wake up the doctor.
▪ If there are many patients and the doctor is doing treatment of him, then the remaining patients either wait if there are empty chairs in the waiting room or they leave if no chairs are empty.
11. Write a program for Memory Management Algorithms e.g. First Fit, Best Fit, Worst Fit.
12. Demonstrate Virtual memory Techniques like LRU, FIFO etc.
13. Implement Shortest Seek Time First Disk Scheduling Algorithm.
14. Implement Scan Scheduling Disk Scheduling Algorithm.
15. Implement Circular Scan Disk Scheduling Algorithm.
16. Implement Look Disk Scheduling Algorithm.

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SEMESTER-IV (2023- 2027)

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*				
BTAIML402M	DSC	AI fundamentals	60	20	20	30	20	2	0	2	3

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Course Educational Objectives (CEOs):

1. To enable students to understand and explain the fundamental concepts of artificial intelligence, including machine learning, anomaly detection, computer vision, natural language processing, knowledge mining, and responsible AI.
2. To equip students with the knowledge and skills to use Microsoft Azure AI tools, such as Azure Machine Learning Studio, Azure Automated Machine Learning, and Azure Machine Learning Designer, to solve real-world problems through machine learning.
3. To provide hands-on experience to students in applying computer vision techniques, including image analysis, classification, object detection, face analysis, and receipt analysis, using Azure AI services.
4. To familiarize students with decision support systems and their practical applications through the exploration of Anomaly Detectors and their implementation in detecting anomalies in various contexts.

Course Outcome (COs):

After completion of this course, the students are expected to be able to demonstrate the following knowledge, skills, and attitudes.
The students will be able to

1. Describe Artificial Intelligence workloads and considerations.
2. Describe the fundamental principles of machine learning on Azure.
3. Describe features of computer vision workloads on Azure.
4. Describe features of Natural Language Processing (NLP) workloads on Azure.
5. Discover the services available on Azure to detect anomalies in the time-series or real-time data.

Syllabus:

UNIT I **8HRS**

Microsoft Azure AI Fundamentals: Get started with artificial intelligence Introduction to AI, understand machine learning, understand anomaly detection, understand computer vision, Understand natural language processing, Understand knowledge mining, Challenges and risks with AI, Understand Responsible AI.

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UNIT II **9 HRS**

Microsoft Azure AI Fundamentals: Explore visual tools for machine learning. What is machine learning?, What is Azure Machine Learning studio?, What is Azure Automated Machine Learning?, Understand the AutoML process, Identify regression machine learning scenarios, What is Azure Machine Learning?, What is Azure Machine Learning designer?, Understand steps for regression, Identify classification machine learning scenarios, What is Azure Machine Learning?, What is Azure Machine Learning designer?, Understand steps for classification, Identify clustering machine learning scenarios, What is Azure Machine Learning?, What is Azure Machine Learning designer, Understand steps for clustering

UNIT III **8HRS**

Microsoft Azure AI Fundamentals: Explore computer vision Get started with image analysis on Azure, understand classification, Get started with image classification on Azure, what is object detection? Get started with object detection on Azure, Get started with Face analysis on Azure, Get started with the Read API on Azure, Get started with receipt analysis on Azure.

UNIT IV **8HRS**

Microsoft Azure AI Fundamentals: Explore natural language processing Explore text mining and text analysis with the Language service's Natural Language Processing (NLP) features. Recognize and synthesize speech by using Azure Cognitive Services. Translate Speech and Text. Create a language model with Conversational Language Understanding

UNIT V **7HRS**

Microsoft Azure AI Fundamentals: Explore decision support What is Anomaly Detector? How Anomaly Detector works, when to use Anomaly Detector.

Text Book:

1. Exam Ref AI-900 Microsoft Azure AI by Julian Sharp
2. Microsoft Azure AI Fundamentals Certification Exam Preparation Guide - (AI-900): Microsoft AI-900 Certification Exam Guide by Raman Publications, R. Raman
3. Microsoft Azure AI Fundamentals AI-900 Over 100 Practice Questions: Exam AI-900
4. First Edition (Azure Certifications Journey Book 3) by Abhishek Chaudhary

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References:

1. https://learn.microsoft.com/en-us/certifications/exams/ai-900/
2. https://learn.microsoft.com/en-us/training/paths/explore-fundamentals-of-decision-support/
3. https://learn.microsoft.com/en-us/training/paths/explore-fundamentals-of-knowledge-mining/
4. https://learn.microsoft.com/en-us/training/paths/get-started-with-artificial-intelligence-on-azure/
5. https://learn.microsoft.com/en-us/training/paths/create-no-code-predictive-models-azure-machine-learning/
6. https://learn.microsoft.com/en-us/training/paths/explore-computer-vision-microsoft-azure/

Suggested List of Practicals:

1. Explore Cognitive Services.
2. Explore Automated Machine Learning in Azure ML.
3. Explore regression with Azure Machine Learning Designer.
4. Explore classification with Azure Machine Learning Designer.
5. Explore clustering with Azure Machine Learning Designer.
6. Explore Computer Vision.
7. Explore image classification.
8. Explore object detection.
9. Explore face recognition.
10. Explore optical character recognition.
11. Explore form recognition.
12. Explore text analytics.
13. Explore speech.
14. Explore translation.
15. Explore language understanding.
16. Explore question answering.
17. Explore knowledge mining.

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BTIT410M	SEC	Advanced Concepts in JAVA	0	0	0	30	20	0	0	4	2

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Course Educational Objectives (CEOs):
The student will have ability to:
1. Understand Event Handling.
2. Understand structured and unstructured queries**.**
3. Design and develop Web applications**.**
4. Designing Enterprise based applications by encapsulating an application's business logic.
5. Designing applications using pre-built frameworks.

Course Outcomes (COs):
After completion of this course the students are expected to be able to demonstrate the following knowledge, skills, and attitudes.
The students will be able to
1. Design full set of UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (AWT) & Swings and JavaFX**.**
2. Learn to access **databases** through Java programs, using SQL and No-SQL**.**
3. Create dynamic web pages, using Servlets and JSP**.**
4. Make a reusable software component, using advanced Frameworks**.**
5. Invoke the remote methods in an application using Remote Method Invocation (RMI)**.**

Syllabus:

UNIT I **10HRS**
J2EE Event Handling & GUI Design Event handling, AWT: Windows, Graphics, Text, AWT Controls, Layout Managers, and Menus, Images, GUI Programming with Swing, Exploring Swing, Swing Menu

UNIT II **9HRS**
Java Servlet Overview, Servlet Interface, Request, Servlet context, response, Session, Dispatching request, Web Application

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UNIT III **8HRS**

JDBC Standard Extension 2.0 Introduction to databases (SQL, No - SQL) Connecting to Databases – JDBC principles – Databases access – Interacting – Database search – Database support in Web applications MySQL, Model View Controller, JSP , HTML , CSS.

UNIT IV **7HRS**

ORM and J2EE Frameworks: Introduction to Frameworks: - Struts, Spring basics, Spring AOP, Introduction to JavaScript and JQuery.

UNIT V **8HRS**

Advance J2EE Topic: JavaMail 1.2(Sending and Receiving Mail, Mail body design, different components), Java Messaging Service (JMS) 1.0.2 (Architecture, Programming Model, Connection, Session, Producer, Consumer), Java API for XML Parsing (JAXP) 1.1 (Introduction, Parsing and XML, when to use SAX).

Text Book:

1. Arnold, Ken, James Gosling, and David Holmes. The Java programming language. Addison Wesley Professional, 2005.

Refrences:

1. Kito D. Mann, “Java Server Faces in Action”,2nd Edition, Dreamtech Press, 4 January 2005.
2. Maydene Fisher, Jon Ellis, Jonathan Bruce, Addison Wesley, “JDBC™ API Tutorial and Reference” Third Edition, Addison Wesley, 11 June 2009).
3. GiulioZambon , “Beginning JSP, JSF and Tomcat”, 2nd Edition , Apress ,29 September 2012.
4. AnghelLeonard , “JSF2.0 CookBook” ,3rd Edition , PACKT publication ,2010.
5. Bryan Basham, Kathy Sierra & Bert Bates, “Head First Servlets and JSP”, 3rd Edition, O'Reilly Media,2012.
6. Keogh, James. "The Complete Reference J2ME." published by McGrawHill OSBORNE Edition (2003).

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7. Allamaraju, Subrahmanyam, et al. "Professional Java Server Programming J2EE 1." (2001).
8. Deshmukh, Hanumant, and Jignesh Malavia. SCWCD exam study kit: Java web component developer certification. Manning Publications Co., 2002.
9. Cay, Horstmann, and Cornell Gary. "Core Java 2, Volume II–Advanced Features." (2005).

Suggested List of Experiment: -

1. How to set up multiple panels, compound borders, combo boxes.
2. Write a Program to implement Event handling.
3. Write a Program to develop Java Servlet and use request and response
4. Write a Program which allows the user to enter data in a jsp form and display in webpage
5. Show basic JDBC operation.
6. Create Servlet file which contains following function:
   1) Connect 2) Create Database 3) Create table 4) Insert records into respective table
   5) Update records of table of database 6) Delete records from table
   7) Delete table and Database.
7. Write a program to demonstrate Spring.
8. Write a program to demonstrate Spring JDBC operation.
9. Write a program to demonstrate Java Mail functionalities.
10. Write to a program to demonstrate JMS queues.