B. Tech in Artificial Intelligence and Machine Learning

Scheme of Studies/Examination

Semester III

(w.e.f. session 2023-2024)

S. No.	Course No.	Subject	L:T:P	Hour/ Week	Credits	Examination Schedule				Duration of Exam (Hrs.)
						Major Test	Minor Test	Practical	Total	
1	PC-AI-201A	Data Structure & Applications	3:0:0	3	3	75	25	0	100	3
2	PC-AI-203A	Introduction to Object oriented Programming	3:0:0	3	3	75	25	0	100	3
3	PC-AI-205A	Digital Electronics	3:0:0	3	3	75	25	0	100	3
4	PC-AI-207A	Statistical Analysis for AI & ML	3:0:0	3	3	75	25	0	100	3
5	PC-AI-209A	Introduction to AI	3:0:0	3	3	75	25	0	100	3
6	HM-902A	Business Intelligence & Entrepreneurship	3:0:0	3	3	75	25	0	100	3
7	PC-AI-211LA	Data Structure Lab	0:0:4	4	2	0	40	60	100	3
8	PC-AI-213LA	Object oriented Programming Lab	0:0:4	4	2	0	40	60	100	3
9	PC-AI-215LA	AI &ML workshop-I	0:0:4	4	2	0	40	60	100	3
		Total		**30**	**24**	**450**	**270**	**180**	**900**	
11	SIM-201A*	Seminar on Summer Internship	2:0:0	2	0	0	50	0	50	

***Note: SIM-201A* is a mandatory credit-less course in which the students will be evaluated for the Summer Internship (training) undergone after 2nd semester and students will be required to get passing marks to qualify.**

1. Regarding the course SIM-201A* (Seminar on Summer Internship) is a part of the curriculum of B.Tech – 2nd Semester. Since the students are admitted directly through LEET (Lateral Entrance Examination Test) in the B.Tech. – 3rd Semester, therefore, they need not to undergothiscourse.
2. In the D.M.C for LEET students it may bementioned
   *NOT APPLICABLE
   * ADMITTED UNDER LEET

PC-AI- 201A	Data Structure & Applications						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	To introduce the principles and paradigms of Data Structures for design and implement the software systems logically and physically.						
Course Outcomes (CO)							
CO 1	To introduce the basic concepts of Data structure, basic data types, searching and sorting based on array data types.						
CO 2	To introduce the structured data types like Stacks and Queue and its basic operations and implementation.						
CO 3	To introduce dynamic implementation of linked list.						
CO 4	To introduce the concepts of Tree and graph and implementation of traversal algorithms.						

Unit-I

Introduction to Data Structures, Data Types, Built in and User Defined Data Structures, Applications of Data Structure, Algorithm Analysis, Worst, Best and Average Case Analysis, Notations of Space and Time Complexity, Basics of Recursion.

Arrays, One Dimensional Arrays, Two Dimensional Arrays and Multi-Dimensional Arrays, Sparse Matrices, searching from array using Linear and Binary Searching Algorithm, Sorting of array using Selection, Insertion, Bubble, RadixAlgorithm

Unit-II

Stacks: Definition, Implementation of Stacks and Its Operations, Evaluation of Infix, prefix and Postfix Expression, Inter-conversion of Infix, Prefix and Post-Fix Expression, Implementation of Merge Sort and Quick Sort Algorithm.

Queues: Definition, Sequential Implementation of Linear Queues and Its Operations, Circular Queue and Its Implementation, Priority Queues and Its Implementation, Applications of queues.

Unit-III

Linked Lists: Need of Dynamic Data Structures, Single Link List and Its Dynamic Implementation, Traversing, Insertion, Deletion Operations on Single Link Lists. Comparison between Static and Dynamic, Implementation of Linked List. Circular Link Lists and Doubly Link List, Dynamic Implementation of Primitive Operations on Doubly Linked Lists and Circular Link List. Dynamic Implementation of Stacks andQueues.

Unit-IV

Trees: Definition, Basic Terminology, Binary Tree, External and Internal Nodes, Static and Dynamic Implementation of a Binary Tree, Primitive Operations on Binary Trees, Binary Tree Traversals: Pre-Order, In-Order and Post-Order Traversals. Representation of Infix, Post-Fix and Prefix Expressions using Trees.

Introduction to Binary Search Trees: B+ trees, AVL Trees, Threaded Binary trees, Balanced Multi-way search trees, Implementation of Heap Sort Algorithm.

Graphs: Basic Terminology, Definition of Undirected and Directed Graphs, Memory Representation of Graphs, Minimum-Spanning Trees, Warshal Algorithm, Graph Traversals Algorithms: Breadth First and Depth First.

Suggested books:

1. Theory and Problems of Data Structures by Jr. SymourLipschetz, Schaum's outline,TMH.
2. Data Structures and Algorithms by PAI,TMH.
3. Fundamentals of Data structures by Ellis Horowitz and Sartaj Sahni, Pub, 1983,AW.
4. Data Structures and Algorithms by A.V. Aho, J.E. Hopcroft and T.D. Ullman, Original edition, Addison-Wesley, 1999, Low PricedEdition.
5. Data Structures and Program Design in C by Robert Kruse, PHI.
6. Shukla, Data Structures using C++, WileyIndia

7. Introduction to Computers Science -An Algorithms Approach, Jean Paul Tremblay, Richard B. Bunt, 2002, T.M.H.
8. Data Structure and the Standard Template library – William J. Collins, 2003,T.M.H.

PC-AI- 203A	Introduction to Object-Oriented Programming						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hours**
Purpose	To introduce the principles and paradigms of Data Structures for design and implement the software systems logically and physically.						
Course Outcomes (CO)							
CO 1	To introduce the basic concepts of object-oriented programming language and the its representation.						
CO 2	To allocate dynamic memory, access private members of class and the behavior of inheritance and its implementation.						
CO 3	To introduce polymorphism, interface design and overloading of operator.						
CO 4	To handle backup system using file, general purpose template and handling of raised exception during programming.						

Unit–I

Introduction to C++, C++ Standard Library, Illustrative Simple C++ Programs. Header Files, Namespaces, Application of object-oriented programming.

Object Oriented Concepts, Introduction to Objects and Object-Oriented Programming, Encapsulation, Polymorphism, Overloading, Inheritance, Abstract Classes, Access modifiers (public/ protected/ private), Class Scope and Accessing Class Members, Controlling Access Function, Constant, Class Member, Structure and Class.

Unit-II

Friend Function and Friend Classes, This Pointer, Dynamic Memory Allocation and Deallocation (New and Delete), Static Class Members, Constructors, Parameter Constructors and Copy Constructors, Destructors, Introduction of inheritance, Types of Inheritance, Overriding Base Class Members in a Derived Class, Public, Protected and Private Inheritance, Effect of Constructors and Destructors of Base Class in DerivedClasses.

Unit-III

Polymorphism, Pointer to Derived class, Virtual Functions, Pure Virtual Function, Abstract Base Classes, Static and Dynamic Binding, Virtual Destructors.

Fundamentals of Operator Overloading, Rules for Operators Overloading, Implementation of Operator Overloading Like <<,>> Unary Operators, Binary Operators.

Unit-IV

Text Streams and binary stream, Sequential and Random-Access File, Stream Input/ Output Classes, Stream Manipulators.

Basics of C++ Exception Handling, Try, Throw, Catch, multiple catch, Re-throwing an Exception, Exception specifications.

Templates: Function Templates, Overloading Template Functions, Class Template, Class Templates and Non- Type Template arguments.

Suggested books:

1. The complete reference C ++ by Herbert shield Tata McGrawHill.
2. Object Oriented Programming in Turbo C++ by Robert Lafore, 1994, The WAITE GroupPress.
3. Shukla, Object Oriented Programming in c++, WileyIndia.
4. C++ How to Program by H M Deitel and P J Deitel, 1998, PrenticeHall.
5. Programming with C++ By D Ravichandran, 2003,T.M.H.

PC-AI-205A	Digital Electronics						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	To learn the basic methods for the design of digital circuits and provide the fundamental concepts used in the design of digitalsystems.						
Course Outcomes (CO)							
CO1	To introduce basic postulates ofBoolean algebra and shows the correlation between Booleanexpressions						
CO2	To introduce the methods for simplifying Boolean expressions						
CO3	To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits						
CO4	To introduce the concept of memories and programmable logic devices.						

UNIT I

MINIMIZATION TECHNIQUES AND LOGIC GATES: Binary Digits, Logic Levels, and Digital waveforms, Logic Systems-Positive and negative, Logic Operations, Logical Operators, Logic Gates-AND, OR, NOT, NAND, NOR, Exclusive-OR and Exclusive-NOR, Active high and Active low concepts, Universal Gates and realization of other gates using universal gates, Gate Performance Characteristics and Parameters. Boolean Algebra: Rules and laws of Boolean algebra, Demorgan's Theorems, Boolean Expressions and Truth Tables, Standard SOP and POS forms; Minterm and Maxterms, Canonical representation of Boolean expressions, Duality Theorem, Simplification of Boolean Expressions, Minimization Techniques for Boolean Expressions using Karnaugh Map and Quine McCluskey Tabular method.

UNIT II

COMBINATIONAL CIRCUITS: Introduction to combinational Circuits, Adders-Half-Adder and Full-Adder, Subtractors- Half and Full Subtractor; Parallel adder and Subtractor; Look-Ahead Carry Adders. BCD adder, BCD subtractor, Parity Checker/Generator, Multiplexer, Demultiplexer, Encoder, Priority Encoder; Decoder, BCD to Seven segment Display Decoder/Driver, LCD Display, andComparators.

UNIT III

SEQUENTIAL CIRCUITS: Introduction to Sequential Circuits, Flip-Flops: Types of Flip Flops -RS, T, D, JK; Edge triggering, Level Triggering; Flip Flop conversions; Master-Salve JK. Introduction to shift registers, Basic Shift Register Operations, types of shift registers, Bidirectional Shift Registers, Shift Register Counters. Introduction to counters, Types of Counters-Asynchronous and synchronous counters, Up/Down Synchronous Counters, Modulo-n Counter, State table, excitation table concepts, Design of asynchronous and synchronous counters, Ring Counter, Applications ofcounters.

UNIT IV

CONVERTER AND MEMORY DEVICES: Digital to Analog Converter, Weighed Register: R-2R Ladder Network: Analog to Digital Conversion, Successive Approximation Type, Dual Slope Type. Classification of memories - ROM: ROM organization, PROM, EPROM, EEPROM, EAPROM, RAM: - RAM organization - Write operation, Read operation, Memory cycle, Timing wave forms, memory expansion, Static RAM Cell, MOSFET RAM cell structure, Dynamic RAM cell structure, Programmable Logic Devices - Programmable Logic Array (PLA), Programmable Array Logic (PAL), Implementation of PLA, PAL usingROM.

Suggested Books:

1. Donald P. Leach and Albert Paul Melvino, Digital Principles and Applications, 8th Edition, TMH, 2003.M.
2. Morris Mano, Digital Design, 3rd Edition, Prentice Hall of India Pvt. Ltd., 2003 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
3. ALI, Digital Switching Systems, ,TMH
4. A.K. Maini, Digital Electronics, WileyIndia
5. John F. Wakerly, Digital Design, Fourth Edition, Pearson/PHI,2006
6. John. M Yarbrough, Digital Logic Applications and Design, Thomson Learning,2002.
7. S. Salivahanan and S. Arivazhagan, Digital Circuits and Design, 3rd Edition., Vikas Publishing House Pvt. Ltd, New Delhi,2006
8. William H. Gothmann, Digital Electronics, 2nd Edition, PHI,1982.
9. Thomas L. Floyd, Digital Fundamentals, 8th Edition, Pearson Education Inc, New Delhi,2003
10. Donald D. Givone, Digital Principles and Design, TMH,2003.

PC-AI- 207A	Statistical Analysis for AI & ML						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	To gain a broad understanding of the statistical analysis in Artificial Intelligence.						
Course Outcomes (CO)							
CO 1	To study the Statistical Analysis concepts with their relationships and process.						
CO 2	To familiarize with describing data, transforming, and summarizing.						
CO 3	To understand testing hypothesis with real time applications.						
CO 4	To apply the examining relationships to find the correlation and regression.						

UNIT – I

Introduction, Meaning of Statistics, The Scientific Method, Basic Steps of the Research Process, Experimental Data and Survey Data, Populations and Samples, Census and Sampling Method, Parameter and Statistic, Independent and Dependent Variables, Examining Relationships, Introduction to SPSS Statistics.

UNIT – II

Introduction, Types of Data, Data Transformation, Summarizing Data: Graphical Methods, Summarizing Data: Measures of Central Tendency, Summarizing Data: Measures of Dispersion, Levels of Measurement, Random Variables and Probability Distributions, Discrete and Continuous Random Variable, Making Inferences about Populations from samples, Estimator and Estimate, Confidence Interval for Population Mean (Large Sample).

UNIT – III

Introduction, Null and Alternative Hypothesis, Type I and Type II Error, The Procedure of Hypothesis Testing; Hypothesis Testing of a Population Mean: Sample, Proportion(One Sample), Population Variance, Population Mean: Two Independent Samples(), Dependent Samples (Paired Samples), Two Population Proportion, Two Population Variances; Analysis of Variance(ANOVA).

UNIT – IV

Introduction, Types of Correlation, Karl Pearson Coefficient Correlation, Spearman's Rank Order Correlation, Partial Correlation, Residuals and Plots, Simple Linear Regression, Multiple Regression Model, Repeated Measures, Non-linear Regression, Polynomial Regression Models, Decision Trees, Neural Networks, Cluster Analysis, FactorAnalysis.

Suggested books:

1. Probability for Statistics and Machine Learning: Anirban DasGupta -2011
2. An Introduction to Statistics with Python with Applications in the Life Sciences By Thomas Haslwanter,2016
3. Applied Statistics: A handbook of techniques- Zenon Reynarowych, springerverlag
4. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly MediaMedia.
5. Jain V.K., "Data Sciences", Khanna Publishing House,Delhi.
6. Applied Statistics-principles and Examples-D.R.Cox and E.J.Snell.
7. Applied statiscal methods, Irving W. Burr, Academicpress.
8. Probability, Statistics and Random process, Dr.K.Murugesan&P.Gurusamy by Anuradha Agencies, Deepthi publications.
9. Jain V.K., "Big Data and Hadoop", Khanna Publishing House,Delhi.
10. Jiawei Han and Jian Pei, "Data Mining Concepts and Techniques", Third Edition, Morgan Kaufmann Publishers.

PC-AI- 209A	Introduction to AI						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	To gain a broad understanding of the discipline of Artificial Intelligence and its scope in various emerging areas.						
Course Outcomes (CO)							
CO 1	Demonstrate fundamental understanding of Artificial Intelligence (AI) and its foundation						
CO 2	Demonstrate basic concepts of problem solving, searching, inference, perception						
CO 3	Demonstrate proficiency in applying AI techniques in various domains						
CO 4	Apply basic principles of AI in solutions that require real world knowledge representation and learning.						
CO5	Demonstrate the real life examples of Artificial Intelligence.						
CO6	Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications						

UNIT – I

Scope of AI: Introduction to Artificial Intelligence, History of Artificial Intelligence, Artificial Intelligence Languages, Multi Agent Systems, natural language processing, vision and speech processing, robotics, expert systems, Case study: Google Duplex, Dialog flow.

UNIT – II

Problem Solving, Searching and Planning: Problem spaces and search, Heuristic and Informed search strategies, Minmax search, Alpha-beta pruning.

Search and optimization (gradient descent), Adversarial search, Planning and scheduling, Case study: Health CareSystem.

UNIT – III

Knowledge Engineering, Representation, Reasoning and finding Optimal Paths: Knowledge and Knowledge based system, Knowledge and rationality, Logic and inference, Propositional and predicate logic, Ontologies, Bayesian Reasoning, Temporal reasoning, Knowledge Discovery: Data and Web Mining Case study: Medical diagnosis .

UNIT – IV

Applications of AI in Various domains: AI in Marketing, AI in Banking, AI in Finance, AI in Agriculture, AI in Health Care, AI in Gaming, AI in Space Exploration, AI in Autonomous vehicles, AI in Chatbots, AI inCreativity.

Suggested books:

1. E. Rich and K. Knight, “Artificial Intelligence”, TMH, 2nd Ed.,1992.
2. N. J. Nilsson, “Principles of AI”,Narosa Publ. House,1990.
3. M. N. Hoda, “Foundation Course in Artificial Intelligence”, Vikas Pub.,2004.
4. Artificial Intelligence“ RBMishra,PHI
5. Knowledge and Knowledge based System“Russell.
6. Artificial intelligence, Patrick Henry Winston: 1992, Addition Wesley 3Ed.
7. Stuart Russell and Peter Norvig, “Artificial Intelligence: A Modern Approach” , 3rd Edition, Prentice Hall.
8. P. H. Winston, "Artificial Intelligence", Pearson Education, 3rd Edition, 2002. ArtificialIntelligence.
9. D. W. Patterson, “Introduction to AI and Expert Systems”, PHI,1992.
10. R. J. Schalkoff, “Artificial Intelligence – An Engineering Approach”, McGraw Hill Int. Ed. Singapore, 1992.

11. M. Sasikumar, S. Ramani, “Rule Based Expert Systems”,Narosa Publishing House, 1994. 5. Tim Johns, “Artificial Intelligence, Application Programming, Wiley Dreamtech,2005.
12. Trivedi, M.C., “A Classical Approach to Artificial Intelligence”, Khanna Publishing House,Delhi.
13. Saroj Kaushik, “Artificial Intelligence”, Cengage Learning India,2011.
14. David Poole and Alan Mackworth, “Artificial Intelligence: Foundations for Computational Agents”, Cambridge University Press2010.

HM-902A	Business Intelligence and Entrepreneurship						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	To make the students conversant with the basics concepts in management thereby leading to nurturing their managerial skills.						
Course Outcomes (CO)							
CO1	Students will be able understand who the entrepreneurs are and what competences needed to become an entrepreneur.						
CO2	Students will be able understand insights into the management, opportunity search, identification of a Product; market feasibility studies; project finalization etc. required for small businessenterprises.						
CO3	Students can be able to write a report and do oral presentation on the topics such as product identification, business idea, export marketing etc.						
CO4	Students will be able to know the different financial and other assistance available for the small industrial units.						

UNIT – I

Entrepreneurship: Concept and Definitions; Entrepreneurship and Economic Development; Classification and Types of Entrepreneurs; Entrepreneurial Competencies; Factor Affecting Entrepreneurial Growth – Economic, Non-Economic Factors; EDP Programs; Entrepreneurial Training; Traits/Qualities of an Entrepreneurs; Manager Vs. Entrepreneur, Entrepreneurial challenges.

UNIT – II

Opportunity / Identification and Product Selection: Entrepreneurial Opportunity Search and Identification; Criteria to Select a Product; Conducting Feasibility Studies; Sources of business ideas, Marketing Plan : Conducting of Marketing Research, Industry Analysis, Competitor analysis, market segmentation and positioning, building a marketing plan, marketing mix, launching a new product; export marketing, Methods of Project Appraisal, Project Report Preparation; Specimen of Project Report; Project Planning and Scheduling using Networking Techniques of PERT /CPM.

UNIT – III

Small Enterprises and Enterprise Launching Formalities: Definition of Small Scale; Rationale; Objective; Scope; SSI; Registration; NOC from Pollution Board; Machinery and Equipment Selection , Role of SSI in Economic Development of India; major problem faced by SSI,MSMEs – Definition and Significance in IndianEconomy; MSME Schemes, Challenges and Difficulties in availing MSMESchemes.

UNIT – IV

Role of Support Institutions and Management of Small Business: DIC; SIDO; SIDBI; Small Industries Development Corporation (SIDC); SISI; NSIC; NISBUD; State Financial Corporation SIC; Venture Capital: Concept, venture capital financing schemes offered by various financial institutions in India. **Special Issues for Entrepreneurs**: Legal issues – Forming business entity, requirements for formation of a Private/Public Limited Company, Entrepreneurship and Intellectual Property Rights: IPR and their importance. (Patent, Copy Right, Trademarks) , Case Studies-At least one in wholecourse.

Note:

• Case studies of Entrepreneurs – successful, failed, turnaround ventures should be discussed in theclass.

• Exercises / activities should be conducted on „generating business ideas" and identifying problems and opportunities.

• Interactive sessions with Entrepreneurs, authorities of financial institutions, Government officials should be organized

Suggested books:

1. “Entrepreneurship development small business enterprises”, Pearson, Poornima MCharantimath,2013.
2. Roy Rajiv, “Entrepreneurship”, Oxford University Press, 2011.
3. “Innovation and Entrepreneurship”, Harper business- Drucker, Peter,2006.
4. “Entrepreneurship”, Tata Mc-graw Hill Publishing Co. Ltd New Delhi- Robert D. Hisrich, Mathew J. Manimala, Michael P Peters and Dean A. Shepherd, 8th Edition,2012.
5. Enterpreneurship Development- S.Chand and Co.,Delhi- S.S.Khanka1999
6. Small-Scale Industries and Entrepreneurship. Himalaya Publishing House, Delhi –Vasant Desai2003.
7. Entrepreneurship Management -Cynthia, Kaulgud, Aruna, Vikas Publishing House, Delhi,2003.

PC-AI-211LA	Data Structure Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Minor Test**	**Practical**	**Total**	**Time**
0	**0**	**4**	**2**	**40**	**60**	**100**	**3 Hour**
Purpose	To introduce the principles and paradigms of Data Structures for design and implement the software systems logically and physically.						
Course Outcomes (CO)							
CO1	Implement linear and nonlinear data structures using linked list.						
CO2	Apply various data structures such as stack, queue, and tree to solve the problems.						
CO3	Implement various searching and sorting techniques.						
CO4	Choose appropriate data structure while designing the applications and analyze the complexity of the algorithms.						

LIST OF PRACTICALS

1. Write a program for Binary searchmethods.
2. Write a program for insertion sort, selection sort and bubblesort.
3. Write a program to implement Stack and itsoperation.
4. Write a program for quicksort.
5. Write a program for mergesort.
6. Write a program to implement Queue and itsoperation.
7. Write a program to implement Circular Queue and itsoperation.
8. Write a program to implement singly linked list for the following operations: Create, Display, searching, traversing anddeletion.
9. Write a program to implement doubly linked list for the following operations: Create, Display, inserting, counting, searching, traversing anddeletion.
10 Write a program to implement circular linked list for the following operations: Create, Display, inserting, counting, searching, traversing anddeletion.
11. Write a program to implement insertion, deletion and traversing in B tree

NOTE:A student has to perform at least ten experiments. Seven experiments should be performed from the above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

PC-AI-213LA	Object Oriented Programming Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Minor Test**	**Practical**	**Total**	**Time**
0	**0**	**4**	**2**	**40**	**60**	**100**	**3 Hour**
Purpose	To introduce the principles and paradigms of Object Oriented Programming Language for design and implement the Object Oriented System.						
Course Outcomes (CO)							
CO1	To familiarize with the class and objects						
CO2	To implement the concept of constructors						
CO3	To familiarize the concept of operator overloading						
CO4	To implement the concepts of Inheritance						

LIST OF PRACTICALS

1. Raising a number n to a power p is the same as multiplying n by itself p times. Write a function called power( ) that takes a double value for n and an int value for p, and returns the result as double value. Use a default argument of 2 for p, so that if this argument is omitted, the number will be squared. Write a main ( ) function that gets values from the user to test thisfunction.

2. A point on the two dimensional plane can be represented by two numbers: an X coordinate and a Y coordinate. For example, (4,5) represents a point 4 units to the right of the origin along the X axis and 5 units up the Y axis. The sum of two points can be defined as a new point whose X coordinate is the sum of the X coordinates of the points and whose Y coordinate is the sum of their Y coordinates. Write a program that uses a structure called point to model a point. Define three points, and have the user input values to two of them. Then set the third point equal to the sum of the other two, and display the value of the new point. Interaction with the program might look like this:

Enter coordinates for P1: 3 4

Enter coordinates for P2: 5 7

Coordinates of P1 + P2 are : 8, 11

3. Create the equivalent of a four function calculator. The program should request the user to enter a number, an operator, and another number. It should then carry out the specified arithmetical operation: adding, subtracting, multiplying, or dividing the two numbers. (It should use a switch statement to select the operation). Finally it should display the result. When it finishes the calculation, the program should ask if the user wants to do another calculation. The response canbe „Y“ or „N“. Some sample interaction with the program might look like this.

Enter first number, operator, and second number: 10/ 3

Answer = 3.333333

Do another (Y/ N)? Y

Enter first number, operator, second number 12 + 100

Answer = 112

Do another (Y/ N) ? N

4. A phone number, such as (212) 767-8900, can be thought of as having three parts: the area code (212), the exchange (767) and the number (8900). Write a program that uses a structure to store these three parts of a phone number separately. Call the structure phone. Create two structure variables of type phone. Initialize one, and have the user input a number for the other one. Then display both numbers. The interchange might look likethis:

· Enter your area code, exchange, and number: 415 555 1212

· My number is (212) 767-8900

· Your number is (415) 555-1212

5. Create two classes DM and DB which store the value of distances. DM stores distances in metres and centimeters and DB in feet and inches. Write a program that can read values for the class objects and add one object of DM with another object of DB. Use a friend function to carry out the addition operation. The object that stores the results maybe a DM object or DB objects, depending on the units in which the results are required. The display should be in the format of feet and inches or meters and centimeters depending on the object ondisplay.

6. Create a class rational which represents a numerical value by two double values- NUMERATOR and DENOMINATOR. Include the following public memberFunctions:

• constructor with no arguments(default).

• constructor with twoarguments.

• void reduce( ) that reduces the rational number by eliminating the highest common factor between the numerator and denominator.

• Overload + operator to add two rational number.

• Overload >> operator to enable input throughcin.

• Overload << operator to enable output through cout.

Write a main ( ) to test all the functions in theclass.

7. Consider the following class definition

class father{

protected : int age;

public;

father (int x) {age = x;}

virtual void iam( )

{ cout<< "I AM THE FATHER, my age is : "<< age<< end1:}

Derive the two classes son and daughter from the above class and for each, define iam( ) to write our similar but appropriate messages. You should also define suitable constructors for these classes. Now, write a main ( ) that creates objects of the three classes and then calls iam ( ) for them. Declare pointer to father. Successively, assign addresses of objects of the two derived classes to this pointer and in each case, call iam ( ) through the pointer to demonstrate polymorphism in action.

8. Write a program that creates a binary file by reading the data for the students from the terminal. The data of each student consist of roll no., name (a string of 30 or lesser no. of characters) and marks.

9. A hospital wants to create a database regarding its indoor patients. The information to store include

a) Name of thepatient

b) Date ofadmission

c) Disease

d) Date ofdischarge

Create a structure to store the date (year, month and date as its members). Create a base class to store the above information. The member function should include functions to enter information and display a list of all the patients in the database. Create a derived class to store the age of the patients. List the information about all the to store the age of the patients. List the information about all the pediatric patients (less than twelve years inage).

10. Make a class **Employee** with a name and salary. Make a class **Manager** inherit from **Employee**. Add an instance variable, named department, of type string. Supply a method to **to String** that prints the manager"s name, department and salary. Make a class **Executive** inherits from **Manager**. Supply a method **to String** that prints the string **"Executive"** followed by the information stored in the **Manager** superclass object. Supply a test program that tests these classes andmethods.

11. Imagine a tollbooth with a class called toll Booth. The two data items are a type unsigned int to hold the total number of cars, and a type double to hold the total amount of money collected. A constructor initializes both these to 0. A member function called payingCar( ) increments the car total and adds 0.50 to the cash total. Another function, called nopayCar( ), increments the car total but adds nothing to the cash total. Finally, a member function called displays the two totals. Include a program to test this class. This program should allow the user to push one key to count a paying car, and another to count a nonpaying car. Pushing the ESC kay should cause the program to print out the total cars and total cash and thenexit.

12. Write a function called reversit( ) that reverses a string (an array of char). Use a for loop that swaps the first and last characters, then the second and next to last characters and so on. The string should be passed to reversit( ) as an argument. Write a program to exercise reversit( ). The programshouldgetastringfromtheuser,callreversit(),andprintouttheresult.Useaninput

method that allows embedded blanks. Test the program with Napoleon‟s famous phrase, “Able was I ere I sawElba)”.

13. Create some objects of the string class, and put them in a Deque-some at the head of the Deque and some at the tail. Display the contents of the Deque using the forEach( ) function and a user written display function. Then search the Deque for a particular string, using the first That ( ) function and display any strings that match. Finally remove all the items from the Deque using the getLeft( ) function and display each item. Notice the order in which the items are displayed: Using getLeft( ), those inserted on the left (head) of the Deque are removed in “last in first out” order while those put on the right side are removed in “first in first out” order. The opposite would be true if getRight ( ) wereused.

14. Assume that a bank maintains two kinds of accounts for customers, one called as savings account and the other as current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge isimposed.

Create a class account that stores customer name, account number and type of account. From this derive theclasses

cur_acct and sav_acct to make them more specific to their requirements. Include necessary member functions in order to achieve the following tasks:

a) Accept deposit from a customer and update thebalance.

b) Display thebalance.

c) Compute and depositinterest.

d) Permit withdrawal and update thebalance.

e) Check for the minimum balance, impose penalty, necessary and update the balance. f) Do not use any constructors. Use member functions to initialize the classmembers.

15. Create a base class called shape. Use this class to store two double type values that could be used to compute the area of figures. Derive two specific classes called triangle and rectangle from the base shape. Add to the base class, a member function get_data( ) to initialize baseclass data members and another member function display_area( ) to compute and display the area of figures. Make display_area( ) as a virtual function and redefine this function in the derived classes to suit their requirements. Using these three classes, design a program that will accept dimensions of a triangle or a rectangle interactively and display thearea.

Remember the two values given as input will be treated as lengths of two sides in the case of rectangles and as base and height in the case of triangles and used as follows:

Area of rectangle = x * y

Area of triangle = ½ * x * y

NOTE: A student has to perform at least ten experiments. Seven experiments should be performed from the above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

PC-AI-215LA	AI & ML Workshop - I						
Lecture	**Tutorial**	**Practical**	**Credit**	**Minor Test**	**Practical**	**Total**	**Time**
0	**0**	**4**	**2**	**40**	**60**	**100**	**3 Hour**
Purpose	To implement the basic concepts of Python language as well as basic concepts of data quality management using Python.						
Course Outcomes (CO)							
CO1	To learn the basics of Python Language.						
CO2	To learn the data types of python.						
CO3	To learn different packages of python.						
CO4	To learn the data quality management in python.						

LIST OF PRACTICALS

1. Installation of Python, and learning interactively at command prompt and writing simpleprograms.
2. Learning the conditions and iterations in Python by writing and running simple prog
3. Random number generations, and problems based on random numbers
4. Handling tuples and exercises based ontuples.
5. Text processing using python
6. Write a program for defining Array usingNumPy.
7. Write a program to Create data frames in python using Pandas Package and implement its features, how to read csvfile.
8. Write a program for Data cleaning usingpandas.
9. Write a program for data visualization using matplotlib and seabornlibrary.
10. Write a program for classification of an object by implementingscikit-library.

NOTE: A student has to perform at least ten experiments. Seven experiments should be performed from the above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

B. Tech in Artificial Intelligence and Machine Learning

Scheme of Studies/Examination
Semester IV
(w.e.f. session 2023-2024)

S. No.	Course No.	Subject	L: T:P	Hours/ Week	Credits	Examination Schedule				Duration of Exam (Hrs.)
						Major Test	Minor Test	Practical	Total	
1	PC-AI-202A	Programming Language	3:0:0	3	3	75	25	0	100	3
2	PC-AI-204A	Operating Systems	3:0:0	3	3	75	25	0	100	3
3	PC-AI-206A	Database Management System	3:0:0	3	3	75	25	0	100	3
4	PC-AI-208A	Intelligent Systems	3:0:0	3	3	75	25	0	100	3
5	PC-AI-210A	Machine Learning	3:0:0	3	3	75	25	0	100	3
6	PC-AI-212LA	Operating Systems Lab	0:0:4	4	2	0	40	60	100	3
7	PC-AI-214LA	Database Management System Lab	0:0:4	4	2	0	40	60	100	3
8	PC-AI-216LA	AI & ML workshop-II	0:0:4	4	2	0	40	60	100	3
		Total		**27**	**21**	**375**	**245**	**180**	**800**	
9	MC-901A	Environment Sciences	3:0:0	3	0	75	25	0	100	3

***MC-901A is a mandatory credit-less course and student has to get passing marks in order to qualify for the award of B.Tech. Degree.**

PC-AI -202A	Programming Language						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	To introduce the principles and paradigms of programming languages for design and implement the software intensive systems.						
Course Outcomes (CO)							
CO 1	To introduce the basic concepts of programming language, the general problems and methods related to syntax and semantics.						
CO 2	To introduce the structured data objects, subprograms and programmer defined data types.						
CO 3	To outline the sequence control and data control.						
CO 4	To introduce the concepts of storage management using programming languages.						

Unit-I

Introduction, Syntax and Semantics: A brief history, Characteristics of a good programming language, Programming language translators- compiler and interpreters, Elementary data types – data objects, variable and constants, data types. Specification and implementation of elementary data types, Declarations, type checking and type conversions, Assignment and initialization, Numeric data types, enumerations, Booleans, and characters.

SyntaxandSemantics: Introduction,generalproblemofdescribingsyntax,FormalmethodofdescribingSyntax, attribute grammar dynamicsemantic.

Unit-II

Structured data objects, Subprograms and Programmer Defined Data Types: Structured data objects and data types, specification and implementation of structured data types, Declaration and type checking of data structure, vector and arrays, records Character strings, variable size data structures, Union, pointer and programmer defined data objects, sets, files.

Subprograms and Programmer Defined Data Types: Evolution of data type concept, abstraction, encapsulation and information hiding, Subprograms, type definitions, abstract data types, over loaded subprograms, generic subprograms.

Unit-III

Sequence Control and Data Control: Implicit and explicit sequence control, sequence control within expressions, sequence control within statement, Subprogram sequence control: simple call return, recursive subprograms,Exception,andexceptionhandlers,coroutines,sequencecontrol.Concurrency–subprogramlevel concurrency, synchronization through semaphores, monitors and message passing.

Data Control: Names and referencing environment, static and dynamic scope, block structure, Local data and local referencing environment, Shared data: dynamic and static scope, Parameter, and parameter transmission schemes.

Unit-IV

Storage Management and Programming Languages: Major run time elements requiring storage,programmer and system-controlled storage management and phases, Static storage management, Stack based storage management, Heap storage management, variable and fixed sizeelements.

ProgrammingLanguages: Introductiontoprocedural,non-procedural,structured,logical,functionalandobject-oriented programming language, Comparison of C and C++ programminglanguages.

Suggested books:

1. Terrence W. Pratt, Marvin V. Zelkowitz, Programming Languages Design and Implementation,Pearson.
2. Allen Tucker and Robert Noonan, Programming Languages–Principles and Paradigms, Tata McGraw Hill, 2009.
3. Ellis Horowitz, Fundamentals of Programming Languages, Galgotia Publications,2010.
4. C. Ghezzi, Programming Languages Concepts, Wiley Publications,2010.

PC-AI-204A	Operating System						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	To familiarize the students with the basics of Operating Systems.						
Course Outcomes (CO)							
CO1	To understand the structure and functions of Operating system.						
CO2	To learn about processes, threads, and scheduling algorithms.						
CO3	To understand the principle of concurrency and the concept of deadlocks.						
CO4	To understand various memory management scheme and to study I/O management and file systems.						

Unit-I

Introduction: Introduction to OS. Operating system functions, Different types of O.S.: batch process, multi programmed, time-sharing, real-time, distributed, parallel.

System Structure: Computer system operation, I/O structure, storage structure, storage hierarchy, different types of protections, operating system structure (simple, layered, virtual machine), O/S services, system calls.

Unit-II

CPU scheduling: scheduling criteria, preemptive and non-preemptive scheduling, scheduling algorithms, algorithm evaluation, multi-processor scheduling.

Threads: overview, benefits of threads, user and kernel threads.

Process Management: Concept of processes, process states, process control, co-operating processes, inter process communication.

Process Synchronization: background, critical section problem, critical region, synchronization hardware, Classical problems of synchronization, semaphores.

Unit-III

Deadlocks: Conceptofdeadlock,deadlockcharacterization,deadlockprevention,deadlockavoidance,deadlock detection, recovery fromdeadlock.

Memory Management: background, logical vs. physical address space, contiguous memory allocation, paging, segmentation, segmentation with paging, Concept of fragmentation.

Virtual Memory: background, demand paging, concept of page replacement, page replacement algorithms, allocation of frames, thrashing.

Unit-IV

File Systems: file concept, file organization and access methods, allocation methods, directory structure, free-space management

I/O Management: I/O hardware, polling, interrupts, DMA, kernel I/O subsystem (scheduling, buffering, caching, spooling and device reservation)

Disk Management: disk structure, disk scheduling (FCFS, SSTF, SCAN, C-SCAN) , disk reliability, disk Performance parameters

Protection and Security: Goals of protection and security, security attacks, authentication, program threats, system threats, threat monitoring.

Case studies: UNIX file system, Windows file system.

Suggested Books:

1. Operating System Concepts", Abraham Silberschatz, Peter Baer Galvin, and Greg Gagne,Wiley
2. Operating systems: a concept based approach", Dhananjay M. Dhamdhere, McGraw Hill .
3. Operating Systems : Internals and Design Principles, William Stallings,Pearson
4. Operating Systems Design and Implementation" ,(Prentice Hall Software Series) Andrew STanenbaum and Albert SWoodhull.
5. Taub and Schilling, Principles of Communication Systems,TMH.

6. Mithal G K, Radio Engineering, KhannaPub.
7. Sirnon Haykin, Communication Systems, JohnWiley.

PC-AI-206A	Database Management System						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	To familiarize the students with Data Base Management system						
Course Outcomes							
CO 1	To provide introduction to relational model and ER diagrams.						
CO 2	To realize about Query Processing and Transaction Processing.						
CO 3	To comprehend about the concept of functional dependencies.						
CO 4	To learn the concept of failure recovery and concurrency control.						

UNIT I

Introduction: Concept & Overview of DBMS, Data Models-, Network, Hierarchical and Relational Model, Levelsofabstraction.Administrator,DatabaseUsers,ThreeSchemaarchitectureofDBMS,Application.**Entity-RelationshipModel:**Entities,AttributesandEntitySets,RelationandRelationshipssets,MappingConstraints, Keys, Entity-Relationship Diagram, Weak Entity Sets, Extended E-Rfeatures.

UNIT II

Relational Model: Structure of relational Databases, Relational Algebra and Relational Calculus, Operations on Relational Algebra, Operations on Relational Calculus, Tuple Relational Calculus, Domain Relational Calculus.
SQL and Integrity Constraints: Concept of DDL, DML, DCL. Basic Structure, set operations, Aggregate Functions, Null Values, Domain Constraints, Referential Integrity Constraints, assertions, Introduction to views, Querying, Nested Sub queries, Database security application development using SQL, Stored procedures and triggers.

UNIT III

Relational Database Design:
Functional Dependency, Different anomalies in designing a Database., Normalization using functional dependencies,Decomposition,Boyce-CoddNormalForm,3NF,Normalizationusingmulti-valueddependencies, 4NF,5NF.
Internals of RDBMS: Physical data structures, Query optimization: join algorithm, statistics, and cost base optimization. Transaction processing, Concurrency control and Recovery Management: transaction model properties, state serializability, lock base protocols, two phase locking.

UNIT IV

Recovery System: Types of Failures, Recovery Techniques, ARIES.
Concurrency Control: Serial and Serializable Schedules-Conflict Serializability –Enforcing Serializability by Locks-LockingSystemswithSeveralLockModes-ConcurrencyControlbyTimestamps,validation.
Transaction Management: ACID Properties, Transaction states, Serializability and Recoverability-View, Serializability- Resolving Deadlocks-Distributed Databases: Commit andLock

Suggested Books:

1. RamezElmasri,ShamkantB.Navathe,"Fundamentals of Database systems",Pearson
2. Korth, Silberschatz, Sudarshan: database concepts, MGH,
3. R. Ramakrishnan and J. Gehrks database management system; MGH, Internationaledition,
4. C. J. Date, data base systems: 7th edition, Addison Wesley, PearsonEducation,
5. Chakrabarti, Advance database management systems , WileyDreamtech

PC-AI-208A	Intelligent Systems						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	To impart understanding of the main abstractions and reasoning for intelligent systems.						
Course Outcomes							
CO 1	Understand the basic terminologies in artificial intelligence to develop intelligent systems						
CO 2	Apply the random search and heuristic search for intelligent systems.						
CO 3	Understand the abstractions and reasoning for intelligent systems						
CO 4	Apply the rule-based methods in intelligent systems						

UNIT-I

Introduction: Overview of AI Problems, AI problems as NP, NP-Complete, NP-Hard, Strong, and weak, neat and scruffy, symbolic and sub-symbolic, knowledge base and data driven AI.

UNIT-II

Heuristic Search: Best First Search, Hill Climbing, Beam Search, Tabu Search.

Randomized Search: Simulated Annealing, Genetic Algorithm, Ant Colony Optimization, Particle Swarm Optimization, Basics of probability theory and probability distributions, information theory, Bayesian learning, Gaussian Mixture models and the EM algorithm, Factor analysis, Principal components analysis, Independent Component Analysis.

UNIT-III

IntelligentSystems: Knowledgeacquisition,Computationalintelligence,Rule-basedsystems,Forwardchaining (a data-driven strategy), Conflict resolution, Backward chaining (a goal-driven strategy), Sources of uncertainty, Bayesian updating, Certainty theory.

UNIT-IV

Possibility theory: fuzzy sets and fuzzy logic, Object-oriented systems, Data abstraction, Inheritance, Encapsulation, Unified Modeling Language (UML), Dynamic (or late) binding.

Key Application Areas: Expert System, Decision Support Systems,

Deep Learning: Speech and vision, natural Language processing, Information Retrieval, Semantic Web.

Suggested books:

1. Artificial Intelligence" RB Mishra,PHI.
2. Introduction to Artificial Intelligence, Charnaik,Pearson.
3. Artificial Intelligence by Elaine Rich, Kevin Knight and Shivashankar B Nair, TataMcGraw Hill.
4. Introduction to Artificial Intelligence and Expert Systems by Dan W Patterson, PearsonEducation.
5. Artificial Intelligence: Building Intelligent Systems, KULKARNI, Parag , REPRINT, PHI.

PC-AI-210A	Machine Learning						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	To impart understanding of the main abstractions for machine learning.						
Course Outcomes (CO)							
CO 1	To understand the basic terminologies in machine learning and paradigms.						
CO 2	To get an insight of when to apply a particular machine learning approach.						
CO 3	To explore supervised and unsupervised learning paradigms of machine learning.						
CO 4	Extract features that can be used for machine learning approach in various applications.						

UNIT I

Introduction:Machinelearning,Terminologiesinmachinelearning,Typesofmachinelearning,Discriminative Models: Least Square Regression, Gradient Descent Algorithm, Introduction to Regression and classification, Prediction Model, probabilistic interpretation, Regularization, multi class SMOalgorithm,

UNIT II

Generative models: Linear Discriminative Analysis, Naive Bayes classifier, Decision tree, Ensemble models – Bagging and Boosting.

Supervised Learning (Regression/Classification) Basic methods: Distance-based methods, Nearest-Neighbors, Decision Trees, Naive Bayes, Linear models: Linear Regression, Logistic Regression, Generalized Linear Models, Support Vector Machines, Nonlinearity and Kernel Methods

UNIT III

(Unsupervised Learning) Clustering: K-means/Kernel K-means, Dimensionality Reduction: PCA and kernel PCA, Introduction to ICA, Evaluating Machine Learning algorithms and Model Selection

UNIT IV

An Introduction to some other advanced topics, e.g., Semi-supervised Learning, Active Learning,Reinforcement Learning, Inference in Graphical Models, Bayesian Learning and Inference.

Suggested books:

1. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press,2012
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer2009 (freely availableonline)
3. Christopher Bishop, Pattern Recognition and Machine Learning, Springer,2007.

PC-AI- 212 LA	Operating Systems Lab						
Lecture	**Theory**	**Practical**	**Credit**	**Practical**	**Minor Test**	**Total**	**Time**
0	**0**	**4**	**2**	**60**	**40**	**100**	**3 Hour**
Purpose	To familiarize the students with the basics of Operating Systems.						
Course Outcomes (CO)							
CO1	To understand the CPU scheduling.						
CO2	To learn about memory management.						
CO3	To understand system calls.						
CO4	To understand the concept of file operations.						
CO5	To learn various classical problems.						

1. Simulation of the CPU scheduling algorithms a) Round Robin b) SJF c) FCFS d)Priority
2. Program for paging techniques of memorymanagement.
3. Program for page replacementalgorithms
4. Simulation of Bankers Deadlock Avoidance and Preventionalgorithms.
5. Program for Implementation of SystemCalls.
6. Program for File Permissions
7. Program for File Operations.
8. Program for File Copy and Move.
9. Program for Dining PhilosophersProblem.
10. Program For Producer – Consumer Problemconcept.
11. Program for disk schedulingalgorithms.

NOTE: A student has to perform at least ten experiments. Seven experiments should be performed from the above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

PC-AI- 214 LA	Database Management Systems Lab						
Lecture	**Theory**	**Practical**	**Credit**	**Practical**	**Minor Test**	**Total**	**Time**
0	**0**	**4**	**2**	**60**	**40**	**100**	**3 Hour**
Purpose	To implement practically the various concepts of DBMS						
Course Outcomes (CO)							
CO1	To understand& Implement basic DDL commands.						
CO2	To learn & Implement DML and DCL commands.						
CO3	To understand the SQL queries using SQL operators.						
CO4	To understand the concept of relational algebra and implement using examples.						

LIST OF PRACTCALS

1. Create a database and write the programs to carry out the followingoperation:

- Add , Delete and modify a record in thedatabase
- Generatequeries
- Dataoperations
- List all the records of database in ascendingorder.

2. To perform various integrity constraints on relationaldatabase.

3. Create a database and perform the followingoperations:-

- Arithmetic and Relationaloperations
- Group by & havingclauses
- Like predicate for pattern matching indatabase

4. Create a view to display details of employees working on more than oneproject.

5. Create a view to display details of employees not working on anyproject.

6. Using two tables create a view which shall perform natural join, equi join, outerjoins.

7. Write a procedure to give incentive to employees working on all projects. If no suchemployee found give app.Message.

8. Write a procedure for computing amount telephone bill on the basic of followingconditions.

- If Telephone rent Rs. 205 including first 105 freeunits.
- if extra units>0 but <500 then rate is 80 paise perunit.
- if extra units>500 then rate is Rs. 1.20 perunit.

For this purpose create a table with name, Phone No., No. of units consumed, bill amount of a customer.

9. Write a procedure for computing income tax of employee on the basic of followingconditions

- if gross pay<=40,000 then I.T rate is 0%.
- if gross pay>40,000 but <60000 then I.T rate is10%.
- if gross pay>60,000 but <1,00,0000 then I.T rate is20%.
- if gross pay>1,00,0000 then I.T rate is 30%.

For this purpose create a table with name, ssn, gross salary and income tax of the employee.

10. Write trigger for before and after insertion, deletion and updatingprocess.

NOTE: A student has to perform at least ten experiments. Seven experiments should be performed fromtheabovelist.Remainingthreeexperimentsmayeitherbeperformedfromtheabovelistordesigned & set by the concerned institution as per the scope of thesyllabus.

PC-AI- 216 LA	AI & ML Workshop - II						
Lecture	**Theory**	**Practical**	**Credit**	**Practical**	**Minor Test**	**Total**	**Time**
0	**0**	**4**	**2**	**60**	**40**	**100**	**3 Hour**
Purpose	To implement the basic concepts of Artificial Intelligence problems as well as basic concepts of Machine Learning.						
Course Outcomes (CO)							
CO1	To implement the search space problems.						
CO2	To formulate and implement the game problems.						
CO3	To implement the various classifiers on different dataset						
CO4	To implement the clustering algorithms						

LIST OF PRACTCALS

1. Write a program to implement BFS andDFS.
2. Write a program to implement A*algorithm.
3. Write a program to implement AO*algorithm.
4. Write a program to implement Hill ClimbingApproach.
5. Write a program to implement the Min MaxStrategy.
6. Write a program for defining Array usingnumpy.
7. Write a program for classification of an object by implementingscikit-library.
8. Case study of data visualization of timeseries.
9. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a.CSV
10. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm. Output a description of the set of all hypotheses consistent with the trainingexamples.

NOTE: A student has to perform at least ten experiments. Seven experiments should be performed from the above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

MC-901A	Environment Sciences						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**0**	**75**	**25**	**100**	**3 Hour**
Purpose	To learn the multidisciplinary nature, scope and importance of Environmental sciences.						
Course Outcomes (CO)							
CO1	The students will be able to learn the importance of natural resources.						
CO2	To learn the theoretical and practical aspects of eco system.						
CO3	Will be able to learn the basic concepts of conservation of biodiversity.						
CO4	The students will be able to understand the basic concept of sustainable development.						

UNIT 1

The multidisciplinary nature of environmental studies, Definition, Scope and Importance, Need for public awareness, Natural Resources: Renewable and Non-Renewable Resources: Natural resources and associated problems.

a. ForestResources:Useandover-exploitation,deforestation,casestudies.Timbereztraction,mining,dams and their effects on forests and tribalpeople.
b. Water Resources: Use and over-utilization of surface and ground water, floods, drought, conflictsover water, dams-benefits andproblems.
c. MineralResources:Useandexploitation,environmentaleffectsofextractingandusingmineralresources, casestudies.
d. FoodResources:WorldFoodProblems,changescausedbyagricultureandovergrazing,effectsofmodern agriculture, fertilizer-pesticide problems, water logging, salinity, casestudies.
e. EnergyResources:Growingenergyneeds,renewableandnon-renewableenergysources,useofalternate energy sources. Casestudies.
f. Land Resources: Land as a resource, land, degradation, man induced landslides, soil erosionand desertification.

Role of an individual in conservation of natural resources, Equitable use of resources for sustainable lifestyle.

UNIT II

Ecosystem-Concept of an ecosystem. Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological Succession, Food Chains, food webs and ecological pyramids.Introduction,types,characteristicfeatures,structure,andfunctionofthefollowingecosystem:(a)Forest Ecosystem, (b) Grassland Ecosystem, (c) Desert Ecosystem and (d) Aquatic Ecosystems (ponds, streams, lakes, rivers, oceans, estuaries

Field Work : Visit to a local area to document environment assets _ river/forest/grassland/hill/mountain, Visit to a local polluted site – Urban/Rural Industrial/Agricultural, Study of common plants, insects and birds, Study of simple ecosystems-pond, river, hill, slopes etc. (Field work equal to 5 lecture hours).

UNIT III

Biodiversity and its conservation: Introduction, Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aestheticandoptionvalues.Biodiversity ofglobal,National,andlocallevels.Indiaasamega-diversitynationHot spots of Biodiversity, Threats to biodiversity: Habitat loss, poaching of wild life, man-wildlife conflicts, Endangered and endemic species of India, Conservation of Biodiversity- In situ and Ex-Situ conservation ofbiodiversity.

Environmental Pollution Definition: Cause, effects and control measures of (a) Air Pollution (b) Water Pollution (c) Soil Pollution (d) Marine Pollution (e) Noise Pollution (f) Thermal Pollution (g) Nuclear Hazards Solidwastemanagement-cause,effectsandcontrolmeasuresofurbanandindustrialwastes,Roleofanindividual in prevention of pollution, Pollution case studies, Disaster management: floods, earthquake, cyclone and landslides

UNIT IV

Social Issues and the Environment. From unsustainable to sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people: Its problems and concerns, Case Studies: Environmental ethics-issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies: Wasteland Reclamation, Consumerism and waste products, Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public Awareness, Human population and the Environment, Population growth, variation among nations, Population Explosion-Family Welfare Programme, Environment and human health. Human rights, Value Education, HIV/AIDS, Women and Child Welfare, Role of Information Technology in Environment and Human Health, Case Studies, Drugs and their effects; Useful and harmful drugs, Use and abuse of drugs, Stimulant and depressan drugs, Concept of drug de-addiction, Legal position on drugs and laws related to drugs.

Suggested Books

1. Environmental Studies- Deswal and Deswal. Dhanpat Rai and Co.
2. Environmental Science and Engineering Anandan, P. and Kumaravelan, R. 2009. ScitechPublications (India) Pvt. Ltd.,India
3. Environmental Studies. Daniels Ranjit R. J. and Krishnaswamy. 2013. WileyIndia.
4. Environmental Science- Botkin and Keller. 2012. Wiley ,India