Krantiguru Shyamji Krishna Verma Kachchh University

CURRICULAM AND CREDIT FRAMEWORK FOR

MSc(CA&IT) 3 YEARS AND 4 YEARS PROGRAMMES

Semester 3 and 4 (Effective from 2024-25)

AS PER THE NEP 2020

Semester	Course Type	Course Code	Name of the Subject	Theory/ Practical	Marks		Credits
					IA	UA	
3	Major	CAIT-301	Data Structures and Algorithm	Theory	25	25	2
		CAIT -301-P	Lab : Practical based on CAIT-301	Practical	25	25	2
	Major	CAIT -302	Object Oriented Programming with C++	Theory	25	25	2
		CAIT -302-P	Lab : Practical based on CAIT-302	Practical	25	25	2
	Minor	CAIT -303	System Analysis and Design	Theory	50	50	4
	MDC	CAIT -304	Computer Oriented Numerical Methods	Theory	50	50	4
	Ability Enhancement Courses (AEC)	CAIT -305	Email Etiquette and Training	Theory	25	25	2
	Value-Added courses (VAC)(IKS) (Any One)	CAIT -306 – A CAIT -306 – B	Indian Thinkers and Philosphers Nyaya Sastras for Mathematical Logic	Theory	25	25	2
	Skill Enhancement Courses(SEC)	CAIT -307-P	Practical Skills in Web development Using Word press	Practical	25	25	2
					275	275	22
4	Major	CAIT-401	Database Management System	Theory	25	25	2
		CAIT-401-P	Lab: Practical Based on CAIT-401	Practical	25	25	2
	Major	CAIT-402	Object Oriented Programming with Java	Theory	25	25	2
		CAIT-402-P	Lab: Practical Based on CAIT-402	Practical	25	25	2
	Major	CAIT-403	Operating Systems	Theory	50	50	4
	Minor	CAIT-404	Computer Network – I	Theory	50	50	4
	Ability Enhancement Courses	CAIT-405	Presentation Skills	Practical	25	25	2
	Value-Added courses (Any One)	CAIT-406-A CAIT-406-B	Digital Enhancement Cyber Security	Theory	25	25	2
	Skill Enhancement Courses	CAIT-407	Practical Skills in Linux	Practical	25	25	2
	For Diploma in Computer Application	*CAIT-002*	*Summer Internship and Viva*				*4*

External Exam Hours: 2 Hrs – 4 Credit Course – 50 Marks   1 Hr – 2 Credit Course – 25 Marks
Passing Marks: 40%

External evaluation will be based on Semester End Evaluation (SEE) pattern.

	MSc (CA&IT) – 3 Years and 4 Years Programme **Structure of the University or External Exam for 4 Credit Course**	
Q-1 All Units	Objective Questions (It can include: definitions, FIBs, True or false, one line answers, MCQs etc)	10
Q-2 (Unit -1)	Answer two short questions carrying 2 marks respectively (Compulsory) Answer two questions, Short notes carrying 3 marks respectively (3 out of 4)	10
Q-3 (Unit -2)	Answer two short questions carrying 2 marks respectively (Compulsory) Answer two questions, Short notes carrying 3 marks respectively (3 out of 4)	10
Q-4 (Unit -3)	Answer two short questions carrying 5 marks respectively OR Any one question which could be a long question, case study, application of concepts, practical problem etc carrying 10 marks	10
Q-5 (Unit -4)	Answer two short questions carrying 5 marks respectively OR Any one question which could be a long question, case study, application of concepts, practical problem etc carrying 10 marks	10
Note - University examination will be of 50 Marks and 2 Hrs.)		

MSc (CA&IT) – 3 Years and 4 Years Programme		
Structure of the University or External Exam for 2 Credit Course**		
Q-1 All Units	Objective Questions (It can include: definitions, FIBs, True or false, one line answers, MCQs etc)	05
Q-2 (Unit -1)	Answer two short questions carrying 2 marks respectively (Compulsory) Answer two questions, Short notes carrying 3 marks respectively (3 out of 4)	10
Q-3 (Unit -2)	Answer two short questions carrying 2 marks respectively (Compulsory) Answer two questions, Short notes carrying 3 marks respectively (3 out of 4)	10
Note - University examination will be of 25 Marks and 1Hr *** For VAC and AEC structure can vary according to subject criteria*		

Structure of the University or External Practical Exam for 2 Credit Course		
Sr.No	**Contents**	**Marks**
1.	Practical	15
2.	Viva	10
Total		**25**

MSC (CA&IT) - Semester: III
(Effective from year 2024-25)

Course Code:	CAIT-301	Course Title:	Data Structure and Algorithm
Course Credits:	02	Hour of Teaching/Week:	02
Internal Assessment Marks:	25	External Exam Marks:	25
Exam Duration	2 Hrs		

Unit	Contents
1.	Algorithm Specifications: Performance Analysis and Time and space analysis of algorithms- Average, best and worst case analysis. Types of Data Structures- Linear and Non-Linear. Data types – primitive and non-primitive. Array: Representation of arrays, Applications of arrays, Stack: Stack-Definitions, sparse matrix and its representation., & Concepts, Operations On Stacks, Applications of Stacks, Polish Expression, Reverse Polish Expression. Queue: Representation Of Queue, Operations On Queue, Recursion, Tower of Hanoi, Circular Queue, Priority Queue, Array representation of Priority Queue, Double Ended Queue, Applications of Queue.
2.	Linked List: Singly Linked List, Doubly Linked list, Circular linked list ,Linked implementation of Stack, Linked implementation of Queue, Applications of linked list. Tree-Definitions and Concepts, Representation of binary Applications Of Trees- Some balanced tree mechanism, Conversion of General Trees To Binary Trees, Binary search trees, Threaded binary tree, tree, Binary tree traversal (Inorder, postorder, preorder), eg. AVL trees, 2-3 trees, Height Balanced, Weight Balance Searching & Sorting: Linear Search, Binary Search, Bubble Sort, Selection Sort, Insertion Sort, Quick Sort and Merge Sort

References

1. An Introduction to Data Structures with Applications. by Jean-Paul Tremblay & Paul G. Sorenson Publisher-Tata McGraw Hill.

2. Data Structures using C & C++ -By Ten Baum Publisher – Prenctice-Hall International.

3. Fundamentals of Computer Algorithms by Horowitz, Sahni,Galgotia Pub. 2001 ed.

4. Fundamentals of Data Structures in C++-By Sartaj Sahani.

5. Data Structures: A Pseudo-code approach with C -By Gilberg & Forouzan Publisher-Thomson Learning

MSC (CA&IT) - Semester: III

(Effective from year 2024-25)

Course Code:	CAIT-301-P	Course Title:	Lab: Practical based on CAIT-301
Course Credits:	02	Hour of Teaching/Week:	04
Internal Assessment Marks:	**25**	External Exam Marks:	25
Exam Duration	1Hr		

Sample List of Experiments (Programming Language can be Python or C)

1. Stack operations:

    Write a program to perform PUSH, POP, PEEP & CHANGE operations on Stack.

2. Queue Operations:

    Write a program to implement insertion & deletion in a queue.

3. Circular Queue Operations:

    Write a program to implement insertion & deletion in a circular queue

4. Write a program for linked list insertion, deletion & copy

5. Sorting and searching:

    Write a program to perform Sequential and binary search

    Quick sort, Merge sort, bubble sort, Selection sort

MSC (CA&IT) - Semester: III
(Effective from year 2024-25)

Course Code:	**CAIT-302**	Course Title:	Object Oriented Programming with C++
Course Credits:	02	**Hour of Teaching/Week:**	02
Internal Assessment Marks:	**25**	**External Exam Marks:**	25
Exam Duration	1 Hr		

Unit	Contents
1.	Principles of Object Oriented Programming (OOP), A Look at Procedure-Oriented Programming, OOP Paradigm, Basic Concepts of OOP, Benefits of OPP, Application of OOP. What is C++, A simple C++ Program, More C++ statements, Structure of C++ Program. data types ,variables, constants, expressions, statements and operators, Usage of header files ,Control flow statements : if else, for loop, while loop, do while loop, switch, break and continue Arrays in C++ : introduction, declaration, initialization of one , two and multi-dimensional arrays, operations on arrays Working with strings : introduction, declaration, string manipulation and arrays of string Classes and objects in C++ Constructors : default, parameterized, copy, constructor overloading and destructor
2.	Access specifiers, implementing and accessing class members Working with objects: constant objects, nameless objects, live objects, Introduction to functions, library and user-defined functions, parameters passing, default arguments. Functions overloading , inline functions, friend functions and virtual functions Inheritance: Introduction, derived class declaration, forms of inheritance, Inheritance and member access ability,

References

1.Object Oriented Programming with C++ by E. Balagurusamy, Tata McGraw-Hill.

2. Object Oriented Programming in Turbo C++ by Rob

3. Object Oriented Programming in C++ by Robert Lafore Techmedia Publication.

4. Object Oriented Programming in C++ R Rajaram New Age International Publishers 2nd

MSC (CA&IT) - Semester: III

(Effective from year 2024-25)

Course Code:	CAIT-302-P	Course Title:	Lab : Practical based on CAIT-302
Course Credits:	02	Hour of Teaching/Week:	04
Internal Assessment Marks:	25	External Exam Marks:	25
Exam Duration	1 Hr		

Sample List of Programs

1. Implementation of a scope resolution operator, Manipulators and reference variable

2. Implementation of feature of a inline function.

3. Implementation of user defined functions and its various features

4. Implementation of Class and its basic feature

5. Implantation of arrays within a class.

6. Show use of "Static Member Function".

7. Concept of "Array of Object".

8. Concept of "Object as a Arguments".

9. Implementation of a friend function and its various features.

10. Concept of a returning objects.

11. Implementation of constructors and its various features.

12. Concept of constructing matrix objects.

13. Implementation of destructors.

14. Implantation of overloading various operators

15. Implementation of inheritance and its types

16. Concept of virtual base class.

17. Implementation of pointers to objects.

18. Implementation of this pointer.

19. Implementation of virtual function.

20. Implantation of file and its various operations

MSC (CA&IT) - Semester: III
(Effective from year 2024-25)

Course Code:	CAIT-303	Course Title:	System Analysis and Design
Course Credits:	04	Hour of Teaching/Week:	04
Internal Assessment Marks:	50	External Exam Marks:	50
Exam Duration	2 Hrs		

Unit	Contents
1	System definition, Need for system development, Types of system, Types of user, System development strategies, SDLC, Feasibility study, Structured Analysis Development Strategies, Physical and Logical DFD, Data Dictionary, System Prototype Method, Role of system analyst, System investigation :- Fact Finding Techniques, Tools for Documenting Procedure & Decision ,Decision Tree, Decision Table, Structured English. Academic and personal qualification of a system analyst, the multifaceted role of the system analyst: change agent, investigator and motivator .Architect psychologist, and politician. The analyst and user interface; behavioral issues, conflict resolution
2.	Cost benefit analysis: cost and benefits determination. The system proposal. File structure, file organization: sequential organization, indexed sequential organization, inverted list organization. Direct access organization. Database design. Objectives of database, Key terms, normalization, role of database administrator.
3.	System Engineering and Quality Assurance, Design of software, Software design and documentation tools, Structured Flowchart, HIPO, Warnier/Orr Diagrams, Testing and validation, types of testing, Documentation, Managing System Implementation, Training, Conversion methods. Quality assurance: quality assurance goals of the systems life cycle, levels of quality assurance. Approaches to reliability: error avoidance, error detection
4.	Introduction to UML, OO Development Life cycle and Modeling, static and Dynamic modeling, Comparison of OO and Module-Oriented Approach, Modeling using UML. Audit of Computer System Usage, Types of threats to Computer System and Control measures: Threat and Risk Analysis, Disaster recovery and Contingency Planning, Viruses.

References:

1. James, A.S, Analysis and design of information systems, Mc Graw hill, New York, 1997

2. 'A' Level made simple Structured System Analysis and Design, BPB publications: Dr.Madhulika Jain,Vineeta Pillai, Shashi Singh, Satish Jain

3. Effective Methods for Software Testing,William E.Perry 4. Venkata rao,v., System Analysis, design & MIS,BPB publications, 2000 5. Awad, Elias.,analysis and design, Galgotia publications pvt.Ltd.1998

MSC (CA&IT) - Semester: III

(Effective from year 2024-25)

Course Code:	CAIT-104	Course Title:	Scientific and Statistical Computing
Course Credits:	04	Hour of Teaching/Week:	04
Internal Assessment Marks:	50	External Exam Marks:	50
Exam Duration	2 Hrs		

Unit	Contents
1	Computer Arithmetic Number System, Conversion of Numbers, Representation of numbers, Floating point representation, Arithmetic operations with Normalized Floating point Numbers, consequences of normalization, pitfalls in computing. Approximation and Errors Significant digits, Types of errors, absolute and relative error
2.	Numerical Solution of Non-Linear Equations: Bisection Methods, Iteration Method, False – Position Method, Secant Method, Newton – Raphson Method
3.	Introduction to Correlation and Regression: Definitions, Types of Correlation, Methods of Determining Correlation coefficient: Scatter Diagram , Karl Person's product moment, Rank Correlation. Difference of correlation and regression, Lines of Regression
4.	Probability: Definitions, Mathematical Probability, Subjective Probability, Bayes' Theorem

References:

1. V. Rajaraman, Computer Oriented Numerical Methods, Prentice Hall, India.
2. S. S. Sastry, Introductory Methods of Numerical Analysis.
3. M. K. Jain, S.R.K. Iyengar & R. K. Jain, Numerical Methods for Scientific and Engineering Computation.
4. Balagurusamy, E., Numerical Methods, Tata McGraw Hill, 1999.
5. Rajaraman V., Computer Oriented Numerical Methods, 3rd Edition, Prentice Hall India, New Delhi, 1998.

MSC (CA&IT) - Semester: III
(Effective from year 2024-25)

Course Code:	CAIT-305	Course Title:	Email Etiquette and Training
Course Credits:	**02**	Hour of Teaching/Week:	02
Internal Assessment Marks:	**25**	External Exam Marks:	25
Exam Duration	**1Hr**		

Unit	Contents
1.	Introduction to E-mail Etiquette, Evaluate Your Email Usage, E-mail Misuse and Abuse, Email is easily misinterpreted. Create structure for success, Email Structure, Forward – To – CC – BCC. High Importance Vs Low Importance, Salutation, Introduction – Body – Conclusion, Signature, Draft, Time Delays. Do and Don's in first email writing. Essential e-mail etiquette at workplace. Case studies: Write an email for job application. Write an email for leave application as an employee and various forms of e-mail.
2.	Rules of Thumb, Effective Subject Lines: Tips and Tracks, Keep as short as possible, Avoid Extra Words, 2,3 lines per paragraph maximum, Grammar perfect, Using Spell Checker, Check for simple sentences, Use the active voice, Punctuation, Text talks. Managing Your Inbox, Spam Mail, Handling primary and secondary email. Case studies of Gmail suits and others.

References

1. https://www.tcsion.com/courses/tcs-ion/email-etiquette/ and Other Online Resources

MSC (CA&IT) - Semester: III
(Effective from year 2024-25)

Course Code:	CAIT-306-A IKS – 301	Course Title:	Indian Thinkers and Philosophers
Course Credits:	02	Hour of Teaching/Week:	02
Internal Assessment Marks:	25	External Exam Marks:	25
Exam Duration	1Hr		

Unit	Contents
1	Introduction to Indian Figures – I 1. Kapila 2. Kanada 3. Patanjali 4. Mahavira
2.	Introduction to Indian Figures – II 1. Gautam Buddha 2. Gargi 3. Bhartrihari 4. Adi Sankara

University Exam Format

Question No.	Unit	Type of Questions	Marks
1	1	Essay question with choice OR Short Notes	10
2	2	Essay question with choice OR Short Notes	10
3	1-2	Objective Type Questions/ Definitions/ Fill in the blanks/ Short questions/ True- False/ Match the Columns	5

Suggested Reading:

Mukund Rao	Indian Book of Big Ideas

MSC (CA&IT) - Semester: III
(Effective from year 2024-25)

Course Code:	CAIT-306-B (IKS)	Course Title:	Nyaya Sastras for Mathematical Logic
Course Credits:	02	Hour of Teaching/Week:	02
Internal Assessment Marks:	25	External Exam Marks:	25
Exam Duration	1Hr		

Unit	Contents
1	Overview of Nyaya Shastra and its relevance in the modern context. Propositional Logic: Syntax, semantics, and truth tables - Predicate Logic. Quantifiers, variables, and logical connectives. Inference Rules and Proofs in Mathematical Logic. Introduction to Computer Logic,Boolean Algebra and Logic Gates Combinational Circuits and their applications in Nyaya Shastra. Sequential Circuits and their relevance in Nyaya Shastra methodologies.
2.	Overview of Nyaya Shastra principles and methodologies. Formal analysis of Nyaya Sha syllogisms and reasoning Logical fallacies and error detection in Nyaya Shastra texts Symbolic representation and analysis of Nyaya Shastra arguments. Modal operators: Possibility, necessity, and contingency in Nyaya Shastra Application of Modal Logic in analyzing Nyaya Shastra concepts (1 hour). Formal representation of Nyaya Shastra modal arguments. Comparative study of Nyaya Shastra with Western philosophical logic. Examining the intersections and divergences between Nyaya Shastra and contemporary logic.

References:

1. न्यायसूत्रम् वात्स्यायनभाष्यसहहतम्– महर्षिगौतमः, वात्स्यायनश्च.

2. तत्सवहहन्तामणौपराथाॱनुमानप्रकरणम्– गंगेशोपाध्यायः

3. Mathematical Logic by Stephen Cole Kleene
4. Introduction to Logic by Irving M. Copi and Carl Cohen
5. A Concise Introduction to Mathematical Logic by Wolfgang Rautenberg
6. Logic in Computer Science: Modelling and Reasoning about Systems by Michael Huth and Mark Ryan
7. Computability and Logic by George S. Boolos, John P. Burgess, and Richard C. Jeffrey
8. Mathematical Logic for Computer Science by Mordechai Ben-Ari
9. Handbook of Practical Logic and Automated Reasoning by John Harrison

University Exam Format

Question No.	Unit	Type of Questions	Marks
1	1	Essay question with choice OR Short Notes	10
2	2	Essay question with choice OR Short Notes	10
3	1-2	Objective Type Questions/ Definitions/ Fill in the blanks/ Short questions/ True- False/ Match the Columns	5

MSC (CA&IT) - Semester: III

(Effective from year 2024-25)

Course Code:	CAIT-307-P	Course Title:	Practical Skills in Web Development using Word press
Course Credits:	02	Hour of Teaching/Week:	04
Internal Assessment Marks:	25	External Exam Marks:	25
Exam Duration	1Hr		

Practical Based on the Following Topics

A brief overview of how WordPress works , An introduction to how a web server works with WordPress , The WordPress file system , Creating basic things like posts, pages, and users, and changing settings , Permalinks, and how they work with the rewrite module on both Apache and Nginx , How a dashboard page request loads , How a front-end page request loads Brief Introduction to all the menus on the Administration Screen, Installing and handling themes,

Editing the appearance of themes, theme configurations, adjusting different elements of installed themes like slideshow, post, pages Adding new post, Modifying existing posts, placing images, videos to the posts, adding categories to publishing the posts on the websites. Including custom fields. Adding Tags to the pages

Adding New webpages , Modifying pages, Editing pages, Placing images,videos,mp3 to the pages,

Publishing the pages on the websites, creating static home pages. Creating Custom Menus, modifying themes default menu, Uploading pictures, videos, editing images, publishing them on the websites, embedding videos from Youtube to your website. Adding New links , Editing the links, Adding categories to the links. Managing Categories, Comment Moderation, Approving

comments, removing spam.

Text Books

1. WordPress Complete - Sixth Edition Paperback by Karol

2. Wordpress for Beginners Paperback by Michael McGinnis

MSC (CA&IT) - Semester: IV

(Effective from year 2024-25)

Course Code:	CAIT-401	Course Title:	Database Management System
Course Credits:	02	Hour of Teaching/Week:	02
Internal Assessment Marks:	25	External Exam Marks:	25
Exam Duration	1Hr		

Unit	Contents
1.	**Database Management System** Introduction of DBMS, File processing system Vs DBMS **Data Models** Introduction, Object Based Logical Model, Record Base Logical Model, Relational Model, Network Model, Hierarchical Model, Entity Relationship Model, Entity Set, Attribute, Relationship Set, Entity Relationship Diagram (ERD) **Relational Databases** Introduction, Terminology: Relation, Tuple, Attribute, Cardinality, Degree, Domain Keys - Super Key, Candidate Key, Primary Key, Foreign Key Relational Algebra Operations - Select, Project, Union, Difference, Intersection, Cartesian, Product, Natural Join
2.	**Relational Database Design** Introduction, Anomalies of un normalized database, Normalization, Normal Forms: 1 NF, 2 NF, 3 NF, 4 NF, BCNF **SQL (Structured Query Language)** Introduction, Basic Structure, DDL Commands: CREATE, ALTER, DROP, TRUNCATE DML Commands: SELECT, INSERT, UPDATE, DELETE Clauses : FROM, GROUP BY, HAVING, ORDER BY, IN Aggregate Functions: AVG, COUNT, FIRST, LAST, MIN, MAX, SUM, Simple Queries and Nested Queries

References:

1. Database System Concepts By Henry Korth and A. Silberschatz
2. An Introduction to Database System by Bipin Desai
1. SQL, PL/SQL the Programming Language of Oracle,Ivan Bayross,BPB Publications
2. *Fundamentals of Database Systems* · Shamkant Navathe

MSC (CA&IT) - Semester: IV

(Effective from year 2024-25)

Course Code:	CAIT-401-P	Course Title:	Lab: Practical Based on CAIT-401
Course Credits:	02	Hour of Teaching/Week:	04
Internal Assessment Marks:	25	External Exam Marks:	25
Exam Duration	1Hr		

List of Sample Programs

1. Write a SQL statement that performs DDL Queries.
2. Write a SQL statement that displays all the information about all salespeople.

   Sample table: salesman

   ```
   salesman_id |   name   |  city   | commission
   -------------+------------+----------+------------
       5001 | James Hoog | New York |     0.15
       5002 | Nail Knite | Paris    |     0.13
       5005 | Pit Alex   | London   |     0.11
       5006 | Mc Lyon    | Paris    |     0.14
       5007 | Paul Adam  | Rome     |     0.13
   ```

3. Write a SQL statement to display a string "This is SQL Exercise, Practice and Solution".
4. Write a SQL query to display three numbers in three columns.
5. Write a SQL query to display the sum of two numbers 10 and 15 from the RDBMS server.
6. Write an SQL query to display the result of an arithmetic expression.
7. Write a SQL statement to display specific columns such as names and commissions for all salespeople.
   Sample table: salesman
8. salesman_id | name | city | commission

   ```
   -------------+------------+----------+------------
       5001 | James Hoog | New York |     0.15
       5002 | Nail Knite | Paris    |     0.13
       5005 | Pit Alex   | London   |     0.11
       5006 | Mc Lyon    | Paris    |     0.14
       5007 | Paul Adam  | Rome     |     0.13
   ```

```
5003 | Lauson Hen | San Jose |     0.12
```

9. Write a query to display the columns in a specific order, such as order date, salesman ID, order number, and purchase amount for all orders.
    Sample table: orders

```
ord_no    purch_amt ord_date   customer_id salesman_id
---------- ---------- ---------- ----------- -----------
70001     150.5     2012-10-05 3005        5002
70009     270.65     2012-09-10 3001         5005
70002     65.26     2012-10-05 3002        5001
70004     110.5     2012-08-17 3009        5003

70007     948.5     2012-09-10 3005        5002
```

10. From the following table, write a SQL query to identify the unique salespeople ID. Return salesman_id.
    Sample table: orders

```
ord_no    purch_amt  ord_date   customer_id salesman_id
---------- ---------- ---------- ----------- -----------
70001     150.5     2012-10-05 3005        5002
70009     270.65     2012-09-10 3001         5005
70002     65.26     2012-10-05 3002        5001
70004     110.5     2012-08-17 3009        5003
70007     948.5     2012-09-10 3005        5002
```

MSC (CA&IT) - Semester: IV

(Effective from year 2024-25)

Course Code:	CAIT-402	Course Title:	Object Oriented Programming with Java
Course Credits:	02	Hour of Teaching/Week:	02
Internal Assessment Marks:	25	External Exam Marks:	25
Exam Duration	1Hr		

Unit	Contents
1.	Introduction to OOP, Features and Evolution of JAVA, Bytecode and JVM, Applications, Applets, Classes, Objects, Encapsulation, Garbage Collection, C++ v/s. JAVA, Data types, Variables, Operators, Associatively and Precedence, Expressions, Type Conversion, Comments, Arrays, Keywords, Methods, Arguments and Return Values, Static v/s. Instance Members, Command-Line Arguments, Escape sequences. Control Structures (if, switch...case), Loops(for, while, do...while), Constructors.
2.	Access Specifiers, Subclasses, Inheritance, Method Overriding, Interfaces and Packages, Java Classes (Abstract classes, Static classes, Inner classes, Packages, Wrapper classes, Interfaces, This, Super) , Access Control and Packages. Exception Handling, Custom Exceptions, Database Drivers, jdbc-odbc bridge, connection. Performing the Basis SQL commands, CRUD Operations, Result set Interface, Prepared Statement, Mapping SQL types to java. Overview of JSP, Multithreaded Programming, Synchronization, Deadlock, Thread Communication.

References

1.Balagurusamy, Programming with Java: A printer-Second Edition, Tata McGraw-Hill,2000

2. Naughton & Schildt, JAVA: The Complete Reference, Tata McGraw Hill.

3. The complete reference JAVA2, Hervert schildt. TMH.

4. Big Java, Cay Horstmann 2nd edition, Wiley India Edition.

5. Core Java, Dietel and Dietel

MSC (CA&IT) - Semester: IV

(Effective from year 2023-24)

Course Code:	CAIT-402-P	Course Title:	Lab: Practical Based on CAIT-402
Course Credits:	02	Hour of Teaching/Week:	04
Internal Assessment Marks:	25	External Exam Marks:	25
Exam Duration	2Hrs		

Sample Program List

1. Write a Simple Application to print any trigonometric / mathematical formula.

2. Find the greatest of numbers.

3. Write a program to display a table in the format n x i = m

4. Create a program using switch case statement to identify the day of the week.

5. Write a program to find greatest and smallest element of an array.

6. Write a program to sort the array using bubble sort.

7. Write a program to accept string as a command line argument and display the string in reverse order.

8. Write a small program that accepts an argument from the user and cheeks it for the palindrome.

9. Write a program to check the format of email address given by the user as command line argument.

10. Create a class, which has a method to calculate the area of a triangle and use it.

11. Create a class with two methods for calculating area and parameter of triangle. Create another class and initialize the instance of the former class and calculate the area and perimeter.

12. Create a class with a method, which accept an object of the same class as a parameter and calculates the addition of two matrices.

13. Create a class quadrilateral and create two methods each for calculating area and perimeter of the quadrilateral with one and two parameters respectively.

14. Create a class with a constructor, which initializes all the class level variable and display the values of the variables.

15. Create a base class called vehicle which contains properties called color, wheels. Create a child class car and which has properties called model no and make. Use the object of the child class which will define the different properties of a car.

16. Create a method to calculate the area and perimeter of a circle. Extend the semicircle class child of circle class and override the method to calculate the area and perimeter of a semicircle (if possible use this and super keywords)

17. Create a class, which has two methods each of static and non-static nature. Try to use them in any class of your choice and enlist the different interfaces and packages.

18. Create an interface called arithmetic, which defines methods for sum, multiplication, division, subtraction, percentage and implement of them.

19. Create a package, which holds the class and an interface defined in the previous question and use them in your main method/class.

20. Create an abstract class and try to use if. Enlist the problems that come. Create an abstract class inherit it and implement the methods of the abstract class, e.g. People – Student.

21. Create an inner class shape which has a method called pyramids to create a pyramid scheme. Use this method in the outer class.

22. Write a program to handle an exception using try and catch block (Zero division problem)

23. Define an exception "Not Found" that is thrown when a string is not equal to "India" write a program that uses this exception.

24. Write a program, which displays the use of finally. Explain how it is different or similar to catch.

25. Write a program, which shows use of array out of band exception.

Course Code:	CAIT-403	Course Title:	Operating Systems
Course Credits:	04	Hour of Teaching/Week:	04
Internal Assessment Marks:	50	External Exam Marks:	50
Exam Duration	2 Hrs		

Unit	Contents
1	Introduction, Uses of OS, Functions of OS, Objective of OS, Types of OS, To choose best OS, Example of OS. Batch Processing Operating System (BPOS), Features of BPOS, Working, Advantages and Disadvantages of BPOS, Multiprogramming OS, Features of Multiprogramming, Advantages and disadvantages of multiprogramming, Working of Multiprogramming OS, Time Sharing System, Advantages and disadvantages of Time Sharing Systems, Network Operating Systems, Real Time Operating Systems.
2.	Process Management: Introduction, Process Table and Process Control Block (PCB), Operations on Process, Process Schedulers in Operating Systems, Intern Process Communication, Context Switching in Operating System, Preemptive and Non-Preemptive Scheduling, CPU Scheduling and its Criteria, CPU Scheduling Algorithms: FCFS, SJF, LJF, Priority, RR
3.	Deadlock and Deadlock Handling Methods: Introduction and Example, Conditions of Deadlock, Bankers' Algorithm, Deadlock detection in distributed systems, Handling Deadlocks, Deadlock Prevention and Avoidance, Deadlock detection and recovery, Deadlock ignorance, Recovery from deadlock.
4.	Memory Management in OS: Main Memory, Logical and Physical Address Space, Static and Dynamic Loading, Static and Dynamic Linking, Swapping, Logical Vs Physical Address Space, Contigous Memory Space, Memory Allocation – First Fit, Best Fit and Worst Fit, Fragmentation – Internal and External, Paging and Page replacement algorithm.
References	

1. Andrew S. Tanenbaum: Operating System deign & Implementation, Prentice Hall International

2. James Peterson and Abraham Silberschatz: Operating System Concept, Addition Wesley

MSC (CA&IT) - Semester: IV
(Effective from year 2024-25)

Course Code:	CAIT-404	Course Title:	Computer Network – I
Course Credits:	04	Hour of Teaching/Week:	04
Internal Assessment Marks:	50	External Exam Marks:	50
Exam Duration	2 Hrs		

Unit	Contents
1	Basics of Computer Networking, Basic terminologies of Computer Networks, Types of Enterprise Computer Network : LAN, WAN, Cloud Networks, Types of Computer Network Architecture : Client – Server Architecture, Peer – to – Peer Architecture, Network Devices : Repeater, Hub, Bridge, Switch, Router, Gateway, Brouter, NIC.
2.	Network Topology: Point-to-Point, Mesh, Star, Bus, Ring, Tree, Hybrid, Advantages and disadvantages of all the topology and their comparision. OSI Model : Introduction to all seven layers and their functionality.
3.	Physical Layer in OSI Model: Introduction, functions, topologies, Line configuration, Modes of transmission: Simplex, half duplex, Full Duplex. Physical layes protocols. Data Link Layer in OSI Model: Introduction, functions: Framing, addressing, flow control, access control – CSMA/CD, CSMA/CA, Protocols of data link layer: SDLC, HDLC
4.	Network Layer: Features of Network Layer, Services by network layer: Packetizing, Routing, Forwarding, Difference between routing and forwarding, Error control, Flow control, Congestion Control. Advantages and disadvantages of Network Layer. Introduction to CISCO Packet Tracer.
References	
1. Computer Networks 4th Edition - Andrew Tanenbaum	
2. Computer Networking: A Top-Down Approach Featuring the Internet By James F.Kurose , Keith W.Ross	
3. Data Communication & Networking 4th Edition By Behrouz A.Forouzan	

MSC (CA&IT) - Semester: IV

(Effective from year 2024-25)

Course Code:	CAIT-405	Course Title:	Presentation Skills
Course Credits:	02	Hour of Teaching/Week:	02
Internal Assessment Marks:	25	External Exam Marks:	25
Exam Duration	1Hr		

Unit	Contents
1.	1. Greetings 2. Introducing self and peers 3. Asking and sharing information 4. Expressing points of view 5. Discussions 6. Facing viva voce 7. Group discussions 8. Facing an interview (interview skills)
2.	1. Introduction to effective presentation skills 2. Preparing the presentation (Collection of Data/Information, exploring the topic etc.) 3. Using ICT for the presentation 4. Getting ready for the presentation 5. Effective body language 6. Effective pronunciation 7. Interacting with the audience (Q & A) 8. Practice (with video recording) 9. Feedback and Suggestions

References:

1. Select TED Talks
2. Select INK Talks
3. Select Toastmasters Videos
4. 4. Select Courtroom Dramas
5. 5. Select Videos of speakers like Steve Jobs, Sundar Pichai etc.

MSC (CA&IT) - Semester: IV
(Effective from year 2024-25)

Course Code:	CAIT-406-A	Course Title:	Digital Enhancement
Course Credits:	02	Hour of Teaching/Week:	02
Internal Assessment Marks:	25	External Exam Marks:	25
Exam Duration	1Hr		

Unit	Contents
1.	Digital Inclusion and Digital Empowerment Needs and Challenges, Vision of Digital India : Digilocker, E-hospitals, E-pathshala, BHIM, Swayam Portal, e-Kranti (Electronic Delivery of Services), e-health Campaign, Digital Signature. Public utility portals of Govt. of India such as RTI, Health, Finance, Education, SSI-ID. Communication and Collaboration in Cyber Space: Electronic Communication: e-mail, blogs, social media tools Collaborative Digital Platforms, Tools and platform for online learning. Collaboration using file sharing, messaging, video conferencing
2.	Digital Safety Measurement Tools: Online Security and privacy, Threats to the cyber world, various forms of viruses, Data breach and cyber attacks.Overview of block chain technology Security initiatives by government of India. Ethical Issues in Digital World: Misuse of Personal Information, Mis-Information and Deep fakes, Lack of oversight and responsibility. Uses and misuses of Artificial Intelligence

References:

1. Understanding digital literacy's: A Practical Introduction by Rodney Jones and Christofer Hafner
2. https:/digitalindia.gov.in
3. https:/digilocker.gov.in
4. https:/cybercrime.gov.in
5. https:/cybersafeindia.gov.in
1. https:/meity.gov.in and other online resourses

MSC (CA&IT) - Semester: IV
(Effective from year 2024-25)

Course Code:	CAIT-406-B	Course Title:	Cyber Security
Course Credits:	02	Hour of Teaching/Week:	02
Internal Assessment Marks:	25	External Exam Marks:	25
Exam Duration	1Hr		

Unit	Contents
1.	Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet Society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security.Classification of cyber crimes, Common cyber crimes- cyber crime targeting computers and mobiles, cyber crime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks. Legal perspective of cyber crime, IT Act 2000 and its amendments.
2.	Introduction to Social networks. Types of Social media, Social media platforms Security , issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media. Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in unauthorized banking transactions

References:

1. Cyber Crime Impact in the New Millennium, by R. C Mishra , Auther Press. Edition 2010.
2. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal
Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011)
3. Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A.
Oliver, Create Space Independent Publishing Platform. (Pearson , 13th November, 2001)
4. Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd.
5. Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers.
6. Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd.

MSC (CA&IT) - Semester: II

(Effective from year 2023-24)

Course Code:	CAIT-407-P	Course Title:	Practical Skills in Linux
Course Credits:	02	Hour of Teaching/Week:	04
Internal Assessment Marks:	25	External Exam Marks:	25
Exam Duration	1Hr		

Practical based on following linux commands and Shell Scripts:

Basic Commands:

login, logout, date, man, pwd, who, whoami, dir, ls, cd, mkdir, rmdir.

Use of Wild card characters and introduction to vi editor Introduction to environment variable like HOME, PATH, PS1 Types of FAP, use of chmod command.

Basic commands like cp, mv, rm, rev, file redirection, grep, cut, paste, find sort commands with example.

Introduction to shell script: `

execution of it, shell script variable, expr, test commands.

Control structure: if, if..else, case structure

Iteration: while, for construct, break, continue, exit commands

Program based on Shell Script

MSC (CA&IT) - Semester: IV

(Effective from year 2023-24)

Course Code:	CAITEX-002	Course Title:	Summer Internship and Viva
Course Credits:	04	Hour of Teaching/Week:	-
Internal Assessment Marks:	-	External Exam Marks:	100
Exam Duration	NA		

- Summer Internship shall be of 60 Hours.
- This course shall be application for those students who wish to exit from the course and wants avail certificate after successful completion of one year
- Summer Internship can be Online, subject to the approval from the authority in special case.
- At the end of the Internship students has to submit a project report and face a viva to avail a certificate.
- In special circumstances, if any students fail to get a suitable summer internship then he/she should be allowed to perform in-house project, subject to approval from the authority.