# KONGUNADU ARTS AND SCIENCE COLLEGE

# (AUTONOMOUS)

# COIMBATORE – 641 029

## DEPARTMENT OF COMPUTER SCIENCE (PG)

## CURRICULUM AND SCHEME OF EXAMINATIONS (CBCS)

**(2025 - 2026 onwards)**

# KONGUNADU ARTS AND SCIENCE COLLEGE

## (AUTONOMOUS)

### Coimbatore – 641029

**Vision:**

Developing the total personality of every student in a holistic way by adhering to the principles of Swami Vivekananda and Mahatma Gandhi.

**Mission:**

- Imparting holistic and man-making education with emphasis on character, culture value - moral and ethical.
- Designing the curriculum and offering courses that transform its students into value added skilled human resources.
- Constantly updating academic and management practices towards total quality management and promotion of quality in all spheres.
- Extending the best student support services by making them comprehensive and by evolving a curriculum relevant to student community and society at large.
- Taking steps to make education affordable and accessible by extending scholarships to the meritorious and economically disadvantaged students.
- Motivating the teachers in such a way that they become the role models in promoting Higher Education.

## DEPARTMENT OF COMPUTER SCIENCE

**Vision:**

To inculcate Human, Moral and ethical values in the young minds of the students and thereby improving the total personality of the students.

**Mission:**

To produce employable graduates to cater the needs of various industries.

## PROGRAMME OUTCOMES (PO)

**PO1** Understand the basic concepts, fundamental principles and scientific theories that are needed for higher learning and research.

**PO2** Identify, formulate and analyze the complex situations to arrive acceptable solutions by applying domain specific knowledge, acquired through the Programme.

**PO3** Learn moral and ethical values and commit to professional ethics and responsibilities in the associated disciplines. Exercise social concern with the ability to act with awareness of issues in diversified domains to participate in the national development.

**PO4** Ability to design, implement and evaluate a computational system to meet the desired needs within realistic constraints.

**PO5** Realize the need for self and life-long learning to move along with the scientific and technological developments.

**PO6** Ability to communicate and engage effectively with diverse stakeholders.

**PO7** Analyze the impacts of computing on individuals, organizations and society.

**PO8** Acquire skills of observing and drawing logical inferences from the scientific facts.

## PROGRAMME SPECIFIC OUTCOMES (PSO)

**PSO1** Impart the core knowledge in the areas such as Software Engineering, Data Communication, Networking and Security, Database Management, Web Technology, Operating System, Artificial Intelligence and other emerging areas in Computer Science.

**PSO2** Provide well trained professionals to industries by enhancing the programming skills and new computing technologies through theoretical and practical knowledge.

**PSO3** Train to solve real world problems by selecting appropriate techniques and best logic.

**PSO4** Enhance the ability to design and develop software applications, to understand the basic concepts of hardware and to comprehend and apply mathematical and accounting principles.

**PSO5** Make use of Computer Science techniques to one's own work as a member or a leader in a team to arrive conclusions and carryout projects.

**KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)**
COIMBATORE – 641 029

**MASTER OF SCIENCE IN COMPUTER SCIENCE**
Curriculum and scheme of Examination under CBCS

(Applicable to the students admitted during the Academic Year 2025-2026)

| Semester | Subject Code | Title of the Paper | Instruction cycle/ hours | Exam. Marks | | | Duration of Exam (hours) | Credits |
|---|---|---|---|---|---|---|---|---|
| | | | | CIA | ESE | TOTAL | | |
| I | 25PCS101 | Core Paper 1 - Data Structures using Python | 6 | 25 | 75 | 100 | 3 | 4 |
| | 25PCS102 | Core Paper 2 - Advanced Relational Database Management Systems | 6 | 25 | 75 | 100 | 3 | 4 |
| | 25PCS1CL | Core Practical 1- Data Structures using Python Lab | 6 | 40 | 60 | 100 | 3 | 4 |
| | 25PCS1CM | Core Practical 2- Advanced RDBMS Lab | 6 | 40 | 60 | 100 | 3 | 4 |
| | **25PCS1E1** | **Major Elective 1** | **6** | **25** | **75** | **100** | **3** | **5** |
| | **Total** | | **30** | **-** | **-** | **500** | **-** | **21** |
| II | 25PCS203 | Core Paper 3- Advanced Java Programming | 5 | 25 | 75 | 100 | 3 | 4 |
| | 25PCS204 | Core Paper 4- Block Chain Technology | 5 | 25 | 75 | 100 | 3 | 4 |
| | 25PCS205 | Core Paper 5- .Net Framework | 5 | 25 | 75 | 100 | 3 | 4 |
| | 25PCS2CN | Core Practical 3 - Advanced Java Programming Lab | 5 | 40 | 60 | 100 | 3 | 4 |
| | 25PCS2CO | Core Practical 4 – .Net Framework Lab | 5 | 40 | 60 | 100 | 3 | 4 |
| | **25PCS2E2** | **Major Elective 2** | **5** | **25** | **75** | **100** | **3** | **5** |
| | **Total** | | **30** | **-** | **-** | **600** | **-** | **25** |
| III | 25PCS306 | Core Paper 6 – Web Technologies | 6 | 25 | 75 | 100 | 3 | 4 |
| | 25PCS307 | Core Paper 7- Big Data Analytics | 6 | 25 | 75 | 100 | 3 | 4 |
| | 25PCS3CP | Core Practical 5- Web Technologies Lab | 6 | 40 | 60 | 100 | 3 | 4 |
| | 25PCS3CQ | Core Practical 6- Big Data Analytics Lab | 6 | 40 | 60 | 100 | 3 | 4 |
| | **25PCS3N1** | **Non-Major Elective 1** | **4** | **25** | **75** | **100** | **3** | **4** |
| | | **EDC Paper** | **2** | **100** | **-** | **100** | **3** | **2** |
| | **25PCS3IT** | **Internship Training ****** | Grade | | | | | |
| | | **Total** | **30** | **-** | **-** | **600** | **-** | **22** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **IV** | 25PCS408 | Core Paper 8- Internet of Things | 4 | 25 | 75 | 100 | 3 | 4 |
| | 25PCS409 | Core Paper 9 - Advanced Computing | 5 | 25 | 75 | 100 | 3 | 4 |
| | 25PCS4CR | Core Practical 7- Internet of Things Lab | 5 | 40 | 60 | 100 | 3 | 4 |
| | **25PGI4N2** | **Non-Major Elective 2** | **4** | **100** | **-** | **100** | **3** | **4** |
| | **25PCS4Z1** | **Project and Viva voce** | **12** | **20** | **80** | **100** | **-** | **6** |
| | **Total** | | **30** | **-** | **-** | **500** | **-** | **22** |
| **Grand Total** | | | **120** | **-** | **-** | **2200** | **-** | **90** |

**Note:**

CBCS – Choice Based Credit system
CIA – Continuous Internal Assessment
ESE – End of Semester Examinations

**** The students shall undergo Internship training / field work for a minimum period of 14 working days at the end of the second semester during summer vacation and submit the report in the third semester which will be evaluated for 100 marks by the concerned guide and followed by an Internal Viva voce by the respective faculty or HOD as decided by the department. According to their marks, the grades will be awarded as given below.

| Marks % | Grade |
|---|---|
| 85 – 100 | O |
| 70 – 84 | D |
| 60 – 69 | A |
| 50 – 59 | B |
| < 40 | U (Reappear) |

**Major Elective Papers**
**(2 papers are to be chosen from the following 6 of papers)**

1. Network Security and Cryptography
2. Quantum Computing
3. Advanced Artificial Intelligence and Machine Learning
4. Information Retrieval
5. Data Mining and Soft Computing
6. Computer Graphics

**Non-Major Elective Papers**
**(2 papers are to be chosen from the following 4 of papers)**

1. **Information Security #**
2. Management Information System
3. Business Intelligence
4. Social Network Analysis

# to be offered by the respective departments.

**Sub.Code & Title of the Extra Departmental Course (EDC):**

**25PCS3XL– EDC Paper 1 - Internet and Web Designing Lab**

**Note:**

In core subjects, no. of papers both theory and practical are included wherever applicable. However, the total credits and marks for core subjects remain the same as stated below.

**Tally Table:**

| Subject | No. of Subjects | Total Marks | Credit s |
|---|---|---|---|
| Core – Theory/ Practical / Project | 17 | 1700 | 70 |
| Major Elective Papers | 2 | 200 | 10 |
| EDC Paper | 1 | 100 | 2 |
| Non-Major Elective Paper | 2 | 200 | 8 |
| **Grand Total** | **22** | **2200** | **90** |

- 25 % CIA is applicable to all subjects except JOC, ALC and COP which are considered as extra credit courses.
- 100 % CIA for Information Security and EDC.
- The students should complete any **MOOC course available for Online learning platforms like SWAYAM, NPTEL, IIT Bombay Spoken Tutorial, e-Pathshala etc.,** with a minimum of 4 weeks in duration before the completion of the 3rd semester and the course completion certificate should be submitted through the HOD to the Controller of Examinations. Extra credits will be given to the candidates who have successfully completed.
- **Onsite Training** preferably relevant to the course may be undertaken as per the discretion of the faculty or HOD.

**Components of Continuous Internal Assessment**

| Components | | Marks | Total |
|---|---|---|---|
| **Theory** | | | |
| CIA I | 75 | (75+75 = 150/10) 15 | 25 |
| CIA II | 75 | | |
| Assignment/Seminar | | 5 | |
| Attendance | | 5 | |
| **Practical** | | | |
| CIA Practical | | 25 | 40 |
| Observation Notebook | | 10 | |
| Attendance | | 5 | |
| **Project** | | | |
| Review | | 15 | 20 |
| Regularity | | 5 | |

## BLOOM'S TAXONOMY BASED ASSESSMENT PATTERN

**K1**-Remembering; **K2**-Understanding; **K3**-Applying; **K4**-Analyzing; **K5**-Evaluating

### 1. Theory Examination:

**CIA I & II and ESE: 75 Marks**

| Knowledge Level | Section | Marks | Description | Total |
|---|---|---|---|---|
| K1<br>Q1 to 10 | A (Answer all) | 10 x 1 = 10 | MCQ | 75 |
| K1 – K5<br>Q11 to 15 | B (Either or pattern) | 5 x 5 = 25 | Short Answers | |
| K2 – K5<br>Q16 to 20 | C (Either or pattern) | 5 x 8 = 40 | Descriptive / Detailed | |

### 2. Practical Examination:

| Knowledge Level | Section | Marks | Total |
|---|---|---|---|
| K3 | Experiments | 50 | 60 |
| K4 | Record Work | 10 | |
| K5 | | | |

### 3. Project Viva Voce:

| Knowledge Level | Section | Marks | Total |
|---|---|---|---|
| K3 | Project Report | 60 | 80 |
| K4 | Viva voce | 20 | |
| K5 | | | |

**First Year**

**(Semester – I)**

**Sub.Code:25PCS101**

| ProgrammeCode:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **Core Paper 1 - Data Structures using Python** | | | |
| Batch **2025-2026** | Hours/Week **6** | Total Hours **90** | Credits **4** | Employability/ Skill Development |

**Course Objectives**

1. To inculcate the Knowledge of various data structures and definitions.
2. To provide the use of data structure background for programming with Python.
3. To develop the proficiency for planning & organizing the data structures.

**Course Outcomes (CO)**

| | | |
|---|---|---|
| K1 to K5 | CO1 | Students will get the knowledge of data structures and its usage |
| | CO2 | Distinguish the Various data structures |
| | CO3 | Skills to describe the data structures appropriately for programming |
| | CO4 | Apply appropriate algorithms and data structures for various applications |
| | CO5 | Implement Data Structures with Python coding |

**Syllabus**

**UNIT I** **(18 Hours)**

Introduction to Python: Python – Features of Python – Data types in python – Built-in data types – sequences in python – sets – literals – operators in python - input and output – control statements: if, while, for, Arrays: creating an array – importing the array module – indexing and slicing on arrays – processing the arrays – viewing and copying arrays – dimensions of array.

**UNIT II** **(18 Hours)**

Strings and characters: creating, indexing, removing spaces from a string. – String testing methods – formatting the string – sorting – searching. Function: defining a function – calling a function – returning results from a function – returning multiple values from a string – Lists and Tuples: creating lists using range () function – updating the elements of list – methods to process lists- sorting the list elements- operations in dictionaries: dictionaries-dictionaries methods.

**UNIT III** **(18 Hours)**

Introduction & overview: Data Structures, Data Structure operations- Algorithm: Complexity, Time space, Trade off. Array, Records & Pointers: Introduction – Linear Array- Representation of Linear Array-Inserting and Deleting. Linked Lists: Introduction - Representation of Linked list in memory – Traversing a linked list – Insertion into a linked list – Deletion from linked list.

| **UNIT IV** | **(18 Hours)** |
|---|---|
| Stacks & Queues, Recursion: Introduction – Stack – Array representation of stack – linked representation of stack – Recursion – Queues – linked representation – Dequeue – * Applications of Stack & Queue. | |
| **UNIT V** | **(18Hours)** |
| Trees: Binary Tree – Traversing Binary tree – Binary Search Tree. Sorting & Searching: Insertion – Selection sort – Bubble sort – Quick sort – Merge sort – Radix sort – Shell sort. Hashing. | |
| *Self-study and questions for examinations may be taken from the self-study portions also. | |
| **Teaching Methods:** | |
| Chalk and Talk/Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class/peer Learning/Experiential Learning/Blended Learning. | |
| **Text Book:** | |
| 1. Dr. R. Nageswara Rao, Core Python Programming, 2nd (Kindle Edition), 2017 (unit I &II)<br>2. Seymour Lipchitz, Adopted by G.A.V. PAI, Data Structures, Schaum's Outline, McGraw Hill Publications. 2013 & 2006 (Unit III, IV & V). | |
| **Reference Books:** | |
| 1. Wiley, Data Structures and Algorithms Using Python, Wiley Student edition.2016.<br>2. Problem Solving in Data Structures & Algorithms Using Python, First edition, 2016. | |

**Mapping**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | S | H | S | S | L |
| **CO2** | S | M | S | H | H |
| **CO3** | S | M | S | H | H |
| **CO4** | S | S | S | S | S |
| **CO5** | S | H | S | S | H |

**S**–Strong **H**–High **M**–Medium **L** –Low

**Sub.Code:25PCS102**

| ProgrammeCode:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **Core Paper 2 - Advanced Relational Database Management Systems** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>**6** | Total Hours<br>**90** | Credits<br>**4** | Employability/<br>Skill Development |

**Course Objectives**

1. To understand and apply the principles of data modelling using Entity Relationship and develop a good database design.
2. To understand the use of SQL and its syntax and apply Normalization.
3. To understand the concept of information retrieval.

| **Course Outcomes (CO)** | | |
|---|---|---|
| K1 to K5 | CO1 | Student will master the basic concepts of Databases |
| | CO2 | Student will have high level understanding of relational model and SQL. |
| | CO3 | Student will be proficient in data Normalization |
| | CO4 | Students will understand security concept and informational retrieval. |
| | CO5 | Students will understand an analyze the technology in Cloud Database |

**Syllabus**

**UNIT I** **(18 Hours)**

Overview of Database Systems: Managing data -File System versus DBMS- Advantages of DBMS-Describing and storing data in a DBMS -Database design: Database design and ER diagrams-Entities, Attributes and Entity sets -Relationship and relationship sets- Additional features of the E-R model -Conceptual design with E-R model -Logical database design-Introduction to Views-Destroying altering tables and views.

**UNIT II** **(18 Hours)**

Queries, Constraints and Triggers: Overview-the form of a basic SQL query-Union, Intersect and Except-Join types and conditions: Natural Join - Inner Join – Outer Join-Nested queries-Aggregate operators -Null values -Complex integrity constraints in SQL-Triggers and active databases.

**UNIT III** **(18 Hours)**

Transaction Management: The ACID properties-Transaction and schedule-Concurrent execution of transactions-Lock based concurrency control - Performance of locking* - Transaction support in SQL-Concurrency control: 2PL, Serializability and Recoverability-Introduction to lock management-Lock conversion -Dealing with deadlocks.

**UNIT IV** **(18 Hours)**

Schema refinement and normal forms: Introduction-Functional dependencies - Normal forms - Properties of decomposition-Normalization-Schema refinement in database design- Other kind of dependencies Security and Authorization: Introduction-Access control -Discretionary access control -Mandatory access control.

| UNIT V | (18 Hours) |
|---|---|

Introduction to Cloud Databases: Database Options in the Cloud – The Changing Role of DBA in the Cloud – Moving the Databases to the Cloud.

Information Retrieval: Introduction to IR - DBMS versus Information Retrieval - Indexing for text search – Web search engines – Managing text in DBMS.

*Self-study and questions for examinations may be taken from the self-study portions also.

**Teaching Methods:**

Chalk and Talk/Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class/peer Learning/Experiential Learning/Blended Learning.

**Text Book:**

1. Ragu Ramakrishnan, Johannes Gehrke, **"Database Management Systems"**, 3rd Edition, Tata McGraw Hill Publication, 2003.
2. Wendy Neu, Viad Viasceanu, Andy Oram, Sam Alapati, **"An Introduction to Cloud Databases"** O'Reilly,2019.

**Reference Books:**

1. Elmarsri Navathe, Ranez Shankand, "Fundamentals of Database Systems", 5th Edition, Pearson Publication, 2008.
2. Silberschatz, Henry Korth, "Database System Concepts", 6th Edition, Tata McGraw Hill Publication, 2011.

**Mapping**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | S | M | S | H | H |
| **CO2** | M | H | H | S | H |
| **CO3** | H | S | S | M | S |
| **CO4** | H | M | H | S | H |
| **CO5** | S | H | M | H | S |

**S**–Strong **H**–High **M**–Medium **L** –Low

**Sub.Code:25PCS1CL**

| Programme Code:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **Core Practical 1 – Data Structures using Python Lab** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>**6** | Total Hours<br>**90** | Credits<br>**4** | Employability/ Skill Development |

**Course Objectives**

1. To Inculcate the Knowledge of various data structures and definitions.
2. To provide the use of data structure background for programming.
3. To make a decision of appropriate data structure for programming.

| **Course Outcomes (CO)** | | |
|---|---|---|
| K1 to K5 | CO1 | Distinguish the Various data structures |
| | CO2 | Skills to describe the data structures appropriately for programming |
| | CO3 | Apply appropriate algorithms and data structures for various applications |
| | CO4 | Evaluate the Various Data Structures with various applications |
| | CO5 | Evaluate various Data Structures with different applications using Python |

**LIST OF PRACTICAL PROBLEMS**

1. Array Creation and Operations.
2. Stack and Queue Operations.
3. Recursion, Infix to Postfix Conversion.
4. Implementation of Linked List.
5. Tree Traversals.
6. Searching-Linear, binary, Fibonacci.
7. Sorting-Radix, shell.
8. Sorting-Quick, Merge.

**Teaching Methods:**

Program Demonstration and Hands on training using LCD Projector.

**sGuide lines to the distribution of marks for Practical Examinations:**

**CIA:** Total marks– 40 [Practical – 25, Observation-10, Attendance – 5]

**ESE:** Two Questions will be given for each student. (3Hours/60marks)

Record- 10 Marks, Algorithm, Coding and Execution – 50 Marks

| Particulars | Program1 (Marks) | Program2 (Marks) |
|---|---|---|
| **Algorithm** | 5 | 5 |
| **Program Coding** | 15 | 15 |
| **Execution & viva voce** | 5 | 5 |

**Mapping**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | S | H | S | S | L |
| **CO2** | S | M | S | H | H |
| **CO3** | S | M | S | H | H |
| **CO4** | S | S | S | S | S |
| **CO5** | S | S | H | S | S |

**S**– Strong **H** –High **M**–Medium **L**–Low

**Sub.Code:25PCS1CM**

| Programme Code:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **Core Practical 2 – Advanced RDBMS Lab** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>**6** | Total Hours<br>**90** | Credits<br>**4** | Employability/<br>Skill Development |

**Course Objectives**

1. To define schema and creation of Databases.
2. To write SQL Queries to retrieve information from Databases.
3. To use host language interface with Embedded SQL.

| **Course Outcomes (CO)** | | |
|---|---|---|
| K1 to K5 | CO1 | Creation of Databases |
| | CO2 | Retrieval of Information of Databases |
| | CO3 | Use of Forms and Report writer packages |
| | CO4 | Use of host language interface with Embedded SQL |
| | CO5 | Use the role of Cloud architecture in the storage design |

**LIST OF PRACTICAL PROBLEMS**

1. Queries to perform SET operations, Views, Aggregate Operators and Triggers.
2. Online Reservation System.
3. Personal Information.
4. Student Mark Processing.
5. Stock Maintenance.
6. College Admission
7. Cloud Database

**Teaching Methods:**

Program Demonstration and Hands on training using LCD Projector.

**Guidelines to the distribution of marks for Practical Examinations:**

**CIA:** Total marks– 40 [Practical – 25, Observation-10, Attendance – 5].

**ESE:** Two Questions will be given for each student. (3Hours/ 60 marks)

Record - 10 Marks Algorithm, Coding and Execution – 50 Marks

| Particulars | Program1 (Marks) | Program2 (Marks) |
|---|---|---|
| **Algorithm** | 5 | 5 |
| **Program Coding** | 15 | 15 |
| **Execution &Viva voce** | 5 | 5 |

**Mapping**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | S | H | S | S | L |
| **CO2** | S | M | S | H | H |
| **CO3** | S | M | S | H | H |
| **CO4** | S | S | S | S | S |
| **CO5** | S | M | H | M | S |

**S**– Strong **H** –High **M**–Medium **L**–Low

**First Year**

**(Semester – II)**

**Sub.Code:25PCS203**

| Programme Code:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **Core Paper 3 - Advanced Java Programming** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>**5** | Total Hours<br>**75** | Credits<br>**4** | Employability/<br>Skill Development |

**Course Objectives**

1. To understand the basic concepts of Object-oriented programming.
2. To inculcate the concepts of networking and graphics offering a GUI environment.
3. To educate the concepts of database management and essentials of Servlets.

| **Course Outcomes (CO)** | | |
|---|---|---|
| K1 to K5 | CO1 | Ability to understand the applications in OOPS paradigm. |
| | CO2 | Students can establish Client-Server network and enable Multithreaded applications |
| | CO3 | Will Effectively use Applets, Event and Construction of Bean API, providing a GUI environment, |
| | CO4 | Capable of better Backend Management, can compose complex applications with Swings and Servlet. |
| | CO5 | Develop applets for web applications and design GUI based applications |

**Syllabus**

**UNIT I** **(15 Hours)**

Introduction: Inheritance: basics-Using super keyword- Multilevel inheritance – Overriding – Dynamic method dispatch – Abstract – Using final with inheritance.

Packages and Interfaces: Packages- Access protection -Importing Packages. Interface – Defining interface- Variables in interface-Implementing an interface.

**UNIT II** **(15 Hours)**

Exception handling: Fundamentals – Using try and catch – Nested try statements - Throw – Throws – Finally – Using built in exceptions – Creating own exceptions.

Multithreading: Thread model – Creating a thread- Using is Alive () and join () Thread priorities – Synchronization – Deadlock- Suspending, resuming and stopping threads. File Input Stream-File Output Stream. Networking: Inet address TCP/IP client/ server sockets- Datagrams. Applet Class: Applet basics -Applet Skeleton-A simple Applet-HTML Applet tag.

| UNIT III | (15 Hours) |
|---|---|
| Event handling: Event model - Event classes - Event Listener interface- Adapter classes. Graphics: Window Fundamentals - Working with graphics, color and font. AWT Controls Fundamentals – Labels-Buttons- Checkboxes-Lists – Text field – Layout managers - Menu bars and menus. | |

| UNIT IV | (15 Hours) |
|---|---|
| JDBC: Connecting java with Oracle-Java Beans: Advantages – using BDK – JAR files – Introspection- Developing simple bean using the BDK *. | |

| UNIT V | (15 Hours) |
|---|---|
| Swing – Japplet – Icons and JLabel, JTextField, JPasswordField, JButton, JCheckBox, JRadioButton, JComboBox, JScroll panes - JTabbed panes – Trees – Tables. Servlets – Simple Servlet – life cycle – Servlet API – Servlet Package. | |

*Self-study and questions for examinations may be taken from the self-study portions also.

**Teaching Methods:**

Chalk and Talk/Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class/peer Learning/Experiential Learning/Blended Learning.

**Text Book:**

1. Herbert Schildt, "Java, The Complete Reference ", Eighth edition, Tata McGraw HillPublication, 2011.
2. E. Ramraj, P. Geetha, S.Muthukumaran Advanced Java Programming", Yes Dee Publishing, 2020

**Reference Books:**

1. Cay S. Horstmann, Gary Cornell, (2013), "Core Java®, Volume II—Advanced Features, Ninth Edition" Prentice Hall.
2. Hariom Choudhary, (2015),"Introduction to Java Programming, Comprehensive Version 2014-2015".

**Mapping**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | S | H | M | S | L |
| **CO2** | S | S | H | H | M |
| **CO3** | H | M | H | S | L |
| **CO4** | M | H | S | H | H |
| **CO5** | S | H | M | H | S |

**S**–Strong **H** –High **M**–Medium **L**–Low

**Sub.Code:25PCS204**

| Programme Code:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **Core Paper 4 - Block Chain Technology** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>**5** | Total Hours<br>**75** | Credits<br>**4** | Employability / Skill Development |

**Course Objectives**

1. To understand the concepts and types of Block chain Technologies.
2. To understand the concepts of Private and Public Block chain.
3. To familiarize with Security concepts in Block chain Technology.

| **Course Outcomes (CO)** | | |
|---|---|---|
| K1 to K5 | CO1 | Understanding the fundamentals of Block chain Technologies |
| | CO2 | Knowing about Types of Block chain Technologies |
| | CO3 | Familiarizing the concepts of public Block chain Technologies |
| | CO4 | Analyze concepts of private Block chain Technologies |
| | CO5 | Implementing the security concepts of Block chain Technology |

**Syllabus**

| **UNIT I** | **(15 Hours)** |
|---|---|
| Fundamentals of Block Chain: Introduction - Origin of Block chain - Blockchain Solution - Components of Blockchain - Block in Blockchain - The Technology and the Future. | |
| **UNIT II** | **(15 Hours)** |
| Blockchain Types And Consensus Mechanism: Introduction - Decentralization and Distribution - Types of Blockchain -Consensus Protocol - Cryptocurrency - Bitcoin, Altcoin And Token: Introduction - Bitcoin and Cryptocurrency Basics - Types of Cryptocurrency -Cryptocurrency Usage. | |
| **UNIT III** | **(15 Hours)** |
| Public Blockchain System: Introduction - Public Blockchain - Popular Public Blockchains - The Bitcoin Clock chain – Ethereum Blockchain. | |
| **UNIT IV** | **(15 Hours)** |
| Private Blockchain System: Introduction - Key Characteristics of Private Blockchain - Why We Need Private Blockchain - Private Blockchain Examples - Private Blockchain and Open Source - E-Commerce Site Examples - ***** Various Commands in E-Commerce Blockchain -Smart Contract in Private Environment - State Machine - Different Algorithms of Permissioned Blockchain - Byzantine Fault – Multichain. | |

| UNIT V | (15 Hours) |
|---|---|
| **Security in Blockchain**: Introduction - Security Aspects in Bitcoin - Security and Privacy Challenges of Blockchain in General - Performance and Scalability - Identity Management and Authentication - Regularity Compliance and Assurance – Safeguarding Blockchain Smart Contract - Security Aspects in Hyper-ledger Fabric -Applications of Blockchain: Blockchain in Banking and Finance -Blockchain in Healthcare | |
| *Self-study and questions for examinations may be taken from the self-study portions also. | |
| **Teaching Methods:** | |
| Chalk and Talk/Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class/peer Learning/Experiential Learning/Blended Learning. | |
| **Text Book:** | |
| 1. Chandramouli Subramanian, Asha A George Abhilash K A and Meena Karthikeyan, " Block Chain Technology", Univversities Press (INDIA) Pvt Ltd, 2020. | |
| **Reference Books:** | |
| 1. Martin Quest, "Block chain Dynamics:A Quick Beginners Guide on understanding the foundations of Bitcoin and other Crypto currencies",create space Independent Publishing Platform,2018.<br>2. Imran Bashir, "Mastering Blockchain: Distributed Ledger Technology, Decentralization ans Smart contracts explained", second edition, Packt publishing,2018. | |

**Mapping**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | S | H | S | S | S |
| **CO2** | S | M | S | H | S |
| **CO3** | S | H | S | H | S |
| **CO4** | S | H | S | H | S |
| **CO4** | H | H | H | S | S |

**S**–Strong **H**–High **M**–Medium **L**–Low

**Sub. Code: 25PCS205**

| Programme Code:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **Core Paper5 - .Net Framework** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>**5** | Total Hours<br>**75** | Credits<br>**4** | Employability |

**Course Objectives**

1. To understand .Net framework features like portability and language interoperability concepts.
2. To understand the VB.Net and ASP.Net controls.
3. To understand how to work with database with the help of ADO.Net.

| **Course Outcomes (CO)** | | |
|---|---|---|
| K1 to K5 | CO1 | Student will be able to understand .Net framework concepts. |
| | CO2 | Student will be able to remember VB.Net controls windows application. |
| | CO3 | Student will be able to analyze how to use an ASP.Net controls and web application. |
| | CO4 | Student will be able to create or apply database driven Windows application and ASP.Net web applications. |
| | CO5 | Evaluate various Window and Web applications using VB.Net and ASP.Net |

| **Syllabus** | |
|---|---|
| **UNIT I** | **(15 Hours)** |
| Understanding .Net-The .Net strategy-The origins of .Net technology-The.Net framework-The CLR-Framework base classes-Visual studio .net-.Net languages-Benefits of .Net approach-VB.NET-new in vb.net-operators-conditionals & loops-Procedures, scope & exception handling. | |
| **UNIT II** | **(15 Hours)** |
| Windows forms and controls-General controls: Label, textbox, button, rich textbox, Linklabels, check boxes, radio button, combo box, listbox, timer, progress bar.Container controls: Group box, panel, tab control-tooltip-splitters- menus-menu items- context menus-built in dialog box. | |
| **UNIT III** | **(15 Hours)** |
| ASP.NET:Webforms:Buttons,textboxes,labels,Literals,placeholders,checkboxes,radio buttons, tables, panels- images-image lists-tree and list view-toolbars-status bar and progress bars. | |
| **UNIT IV** | **(15 Hours)** |
| Image button, list boxes, drop downlist, hyperlink & link button-Validation controls: required field, regular expression, compare, range validators*-calendars-adrotators-html controls. | |
| **UNIT V** | **(15 Hours)** |
| Data access with ADO.Net - Binding controls to database*-database access with web applications-creating window services, web services-deploying applications. | |
| *Self-study and questions for examinations may be taken from the self-study portions also. | |

| **Teaching Methods:** |
|---|
| Chalk and Talk/Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class/peer Learning/Experiential Learning/Blended Learning. |
| **Text Book:** |
| 1. E.Balagurusamy, "Programming in C# A Premier", TMH Publisher co Ltd, 2008. (UNIT I)<br>2. Steven Holzner, "Visual Basic.Net Programming Black Book", Dream Tech, 2016. (UNIT -I, II, III, IV,V). |
| **Reference Books:** |
| 1. Evangelos Petroustes, "Mastering Visual Basic.Net", BPB Publications, First Edition, 2010.<br>2. KoGENT Solutions Inc., ASP.NET 3.5 (Covers C# and VB 2008 codes) Black Book, Platinum Edition, Dreamtech press, 2010. |

**Mapping**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | H | H | H | S | H |
| **CO2** | M | H | H | S | H |
| **CO3** | H | S | H | S | H |
| **CO4** | H | H | H | S | H |
| **CO4** | L | M | S | S | S |

**S**–Strong **H**–High **M**–Medium **L**–Low

**Sub.Code:25PCS2CN**

| Programme Code:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **Core Practical 3 – Advanced Java Programming Lab** | | | |
| Batch **2025-2026** | Hours/Week **5** | Total Hours **75** | Credits **4** | Employability/ Skill Development |

**Course Objectives**

1. The course inculcates the fundamentals and dynamics of OOPs paradigm.
2. To demonstrate the GUI and advanced functionalities enriching the development skill.
3. To simulate the industrial demands and expertise in the specified domain.

| **Course Outcomes (CO)** | | |
|---|---|---|
| K1 to K5 | CO1 | Students will be capable to understand and apply the better usage of OOPs concept. |
| | CO2 | Proficient in developing GUI environment and event handling |
| | CO3 | Establishing networks with socket programming and Sessions |
| | CO4 | Simulates applications with Swings and Servlets. |
| | CO5 | Solve problems using Java collection framework and I/O classes |

**LIST OF PRACTICAL PROBLEMS**

1. Develop applications using package, polymorphism, inheritance and inner class.
2. Applications with applets and sockets.
3. Application with Swing and JDBC concepts.
4. Create applications with multithreading and file concepts.

**Teaching Methods:**

Program Demonstration, simulation, assignment, Discussion and Hands on training using LCD Projector.

**Guide lines to the distribution of marks for Practical Examinations:**

**CIA:** Total marks– 40 [Practical– 25, Observation-10, Attendance– 5]

**ESE:** Two Questions will be given for each student (3Hours / 60 Marks)

Record Work -10 Marks Algorithm, Coding and Execution - 50Marks

| **Particulars** | **Program1 (Marks)** | **Program2 (Marks)** |
|---|---|---|
| **Algorithm** | 5 | 5 |
| **Program Coding** | 15 | 15 |
| **Execution & viva voce** | 5 | 5 |

**Mapping**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | S | H | M | H | M |
| **CO2** | H | M | S | S | H |
| **CO3** | H | S | S | H | M |
| **CO4** | H | S | S | H | S |
| **CO5** | S | M | H | H | S |

**S**–Strong **H** –High **M**–Medium **L**–Low

**Sub.Code:25PCS2CO**

| Programme Code:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **Core Practical 4 – .NET Framework Lab** | | | |
| Batch<br>**2025-2026** | Hours/ Week<br>**5** | Total Hours<br>**75** | Credits<br>**4** | Employability/<br>Skill Development |

**Course Objectives**

1. To educate the usage of .Net framework Environment.
2. To understand the usage of controls in .Net.
3. To create database application with ADO.Net.

| **Course Outcomes (CO)** | | |
|---|---|---|
| K1 toK5 | CO1 | Effective use of .Net framework concepts. |
| | CO2 | Develop a working knowledge of VB.Net controls |
| | CO3 | Student will be able to build well-formed web controls with validation |
| | CO4 | Student will be able to create or apply database driven windows application and ASP.Net web applications. |
| | CO5 | Implementation of various Window and Web applications using VB.Net and ASP.Net |

**LIST OF PRACTICAL PROBLEMS**

1. Develop applications with windows controls.
2. Develop ADO.Net application to insert, delete and update records in database.
3. Develop a web site using Web controls.
4. Develop a web site with database connection.

**Teaching Methods:**

Program Demonstration, simulation, assignment, Discussion and Hands on training using LCD Projector.

**Guide lines to the distribution of marks for Practical Examinations: (Total Marks: 100)**

**CIA:** Total marks– 40 [Practical– 25, Observation-10, Attendance– 5]

**ESE:** Two Questions will be given for each student (3Hours / 60 Marks)

Record Work -10 Marks Algorithm, Coding and Execution – 50 Marks

| **Particulars** | **Program1 (Marks)** | **Program2 (Marks)** |
|---|---|---|
| **Algorithm** | 5 | 5 |
| **Program Coding** | 15 | 15 |
| **Execution & viva voce** | 5 | 5 |

**Mapping**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | H | H | H | S | H |
| **CO2** | M | S | H | S | S |
| **CO3** | H | S | H | H | H |
| **CO4** | H | S | H | **S** | H |
| **CO5** | L | H | S | **S** | S |

**S**–Strong **H** –High **M**–Medium **L**–Low

**Second Year**

**(Semester – III)**

**Sub.Code:25PCS306**

| Programme Code:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **Core Paper 6 - Web Technologies** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>**6** | Total Hours<br>**90** | Credits<br>**4** | Employability/<br>Skill Development |

**Course Objectives**

1. To educate the benefits of proprietary and non-proprietary software.
2. To inculcate the significance of freeware Web Technologies.
3. To promote the web designing skills and data handling with Server-side scripts.

**Course Outcomes (CO)**

| | | |
|---|---|---|
| K1 to K5 | CO1 | Will enhance their presentation skills in designing, recollecting Html tags. |
| | CO2 | Students can escalate their web design and perfection with stylesheets. |
| | CO3 | Can enhance data manipulation at client end will have sound knowledge in data validation and handling dynamic data with Php Fundamentals. |
| | CO4 | Handling challenges at backend, performing validation at Server end with PHP-MySQL suite. |
| | CO5 | Evaluate the working of PHP and MySQL with different Web Servers. |

**Syllabus**

**UNIT I** **(18 Hours)**

Introduction to HTML: what is html, how does it work – Working with Lists: creating different types of lists – Working with Images: inserting an image, the alt attribute, adding borders, alignment, using links with images, image maps – HTML Forms: designing a form, form controls: buttons, textboxes, checkboxes, radio buttons, select, legend tags – Frames: creating frames, horizontal and vertical frames, hyperlink targets to a frame.

**UNIT II** **(18 Hours)**

Introduction to CSS: what is CSS, how does it work – Including Styles: inline, internal, and external styles – Properties and Values in CSS – The CSS box model – Classes and IDs – Applying styles to blocks of information (div blocks)- containers.

**UNIT III** **(18 Hours)**

Introduction to PHP: creating and running a PHP script – Variables and Constants – Data types – Operators – Strings, echo command– Conditional Statements: exploring different conditional statements, defining nested if statements – Looping Statements: exploring different looping statements – Break, Continue, and Exit statements.

| **UNIT IV** | **(18 Hours)** |
|---|---|
| Functions in PHP: syntax, naming conventions, built in functions: string functions, math functions, date and time functions, understanding variable scopes, calling a function, recursion. Arrays in PHP: Introduction to PHP – numeric arrays – associative arrays – multidimensional arrays – iterating through an array.<br>Working with Forms in PHP: using and manipulating different form elements, submitting form data, retrieving form data, get and post methods, displaying errors, include, require. | |
| **UNIT V** | **(18 Hours)** |
| Connecting a form to a Database: checking configuration, connecting to a database, selecting a database, creating a table, inserting records, altering, updating, and deleting a table. Regular Expressions in PHP – preg_match(), preg_match_all() – File Handling – reading from a file, writing to a file – Exception Handling in PHP – Cookies and Session in PHP. | |
| *Self-study and questions for examinations may be taken from the self-study portions also. | |
| **Teaching Methods:** | |
| Chalk and Talk/ Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class/peer Learning/Experiential Learning/Blended Learning. | |
| **Text Book:** | |
| 1. Deitel and Deitel "Internet and World wide web" Pearson International,4th Edition, 2011 | |
| **Reference Books:** | |
| 1. Adam Rizvi, Click Start Internet Basics: The Internet Basics, Written for Beginners, Click start publishing, UK, 2011.<br>2. Jon Duckett, "Beginning Web Programming with HTML, XHTML, and CSS", Wiley publishers, 2008.<br>3. Ivan Bayross and Sharanam Shah, "MySQL 5 for Professionals", Shroff Publishers and Distributors, Third Edition, 2005. | |

**Mapping**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | S | M | M | S | L |
| **CO2** | H | S | S | H | M |
| **CO3** | M | S | S | S | H |
| **CO4** | M | H | H | S | S |
| **CO4** | M | M | H | H | M |

**S**–Strong **H**–High **M**–Medium **L**–Low

**Sub.Code:25PCS307**

| ProgrammeCode:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper | **Core Paper7 - Big Data Analytics** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>**6** | Total Hours<br>**90** | Credits<br>**4** | Employability |

**Course Objectives**

1. To introduce the basic concepts of big data.
2. To face the challenges of big data.
3. To teach students in applying skills and tools to manage and analyze big data.

| **Course Outcomes (CO)** | | |
|---|---|---|
| K1 to K5 | CO1 | Understand the concept and challenges of big data. |
| | CO2 | Collect, manage, store, store, query and analyze various forms of big data. |
| | CO3 | Gain hands-on experience on large-scale analytics tools to solve some open big data problems. |
| | CO4 | Understand the big data tools like Hadoop, Hbase, NoSQL and Neo4J |
| | CO5 | Exposure to modeling a Graph Database. |

**Syllabus**

**UNIT I** **(18 Hours)**

What is big data – why big data – convergence of key trends – unstructured data – industry examples of big data – web analytics – big data and marketing – fraud and big data – risk and big data – credit risk management – big data and algorithmic trading – big data and healthcare – big data in medicine – advertising and big data – big data technologies - open source technologies – cloud and big data – mobile business intelligence – Crowd sourcing analytics – inter and trans firewall analytics.

**UNIT II** **(18 Hours)**

History of Hadoop- The Hadoop Distributed File System – Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort– Task execution - Map Reduce Types and Formats- Map Reduce Features.

**UNIT III** **(18 Hours)**

Hbase – data model and implementations – Hbase clients – Hbase examples – praxis. Cassandra – cassandra data model – cassandra examples – cassandra clients – Hadoop integration. Pig – Grunt – pig data model – Pig Latin – developing and testing Pig Latin scripts. Hive – data types and file formats – HiveQL data definition – HiveQL data manipulation – HiveQL queries.

**UNIT IV** **(18 Hours)**

Introduction to NoSQL – aggregate data models – aggregates – key-value and document data models – relationships– schemaless databases – materialized views – distribution models - peer- peer replication –consistency – relaxing consistency – version stamps – partitioning and combining – composing map-reduce calculations -Document based Database *– MongoDB-Introduction- Data Model- Working with data- Replication & Sharding- Development.

| **UNIT V** | **(18 Hours)** |
|---|---|
| Graph databases Neo4J- Key concept and characteristics-Modelling data for neo4j- Importing data into neo4j-Visualizations neo4j-Cypher Query Language-Data visualization- Creating Visual analytics with Tableau-Connecting your data-Creating Calculation-Using maps- Dashboard-Stories. | |
| *Self-study and questions for examinations may be taken from the self-study portions also. | |
| **Teaching Methods:** | |
| Chalk and Talk/ Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class/peer Learning/Experiential Learning/Blended Learning. | |
| **Text Book:** | |
| 1. Tom White, "Hadoop: The Definitive Guide", Third Edition ,O'Reilly Media Inc., 2012. | |
| **Reference Books:** | |
| 1. Rik Van Bruggen, "Learning Neo4j" Packt Publishing, 2014.<br>2. Daniel G. Murray, "Tableau Your Data!: Fast and Easy Visual Analysis with Tableau Software" 2nd Edition,Wiley Publications, 2016.<br>3. EelcoPlugge, David Hows, Peter Membrey, Tim Hawkins "The Defininetive Guide to Mongodb",Apress, 2015.<br>4. Pramod J. Sadalage, Martin Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence" Pearsons Education, 2014. | |

**Mapping**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | M | H | S | H | S |
| **CO2** | M | H | S | M | S |
| **CO3** | M | S | S | M | S |
| **CO4** | M | M | S | M | S |
| **CO4** | H | H | M | S | H |

**S**–Strong **H**–High **M**–Medium **L**–Low

**Sub.Code:25PCS3CP**

| ProgrammeCode:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **Core Practical 5 – Web Technologies Lab** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>**6** | Total Hours<br>**90** | Credits<br>**4** | Employability/<br>Skill Development |

**Course Objectives**

1. The course educates the advanced concepts in web designing with Open Source tools.
2. To demonstrate the development of web application and its validation.
3. To inculcate the significance of Server Scripts and simulating applications with backends.

| **Course Outcomes (CO)** | | |
|---|---|---|
| K1 to K5 | CO1 | Possess better presentation and manipulating skills for developing a dynamic webpage. |
| | CO2 | Validating the essentials in an application using JavaScript. |
| | CO3 | Capable to develop Web application with Server script. |
| | CO4 | Performs better Data manipulation for web application using PHP- Mysql suite. |
| | CO5 | Develop Web applications to solve day today problems using PHP and My SQL. |

**LIST OF PRACTICAL PROBLEMS**

1. Designing Websites with HTML and CSS.
2. Developing applications with JavaScript.
3. Validations with PHP.
4. File Handling in PHP.
5. Develop applications with PHP and MySQL

**Teaching Methods:**

Program Demonstration, assignment, Discussion and Hands on training using LCD Projector.

**Guide lines to the distribution of marks for Practical Examinations:**

**CIA:** Total marks– 40 [Practical – 25, Observation-10, Attendance – 5]

**ESE:** Two Questions will be given for each student. (3Hours/60marks)
Record - 10 Marks, Algorithm, Coding and Execution - 50 Marks

| Particulars | Program1 (Marks) | Program2 (Marks) |
|---|---|---|
| **Algorithm** | 5 | 5 |
| **Program Coding** | 15 | 15 |
| **Execution & viva voce** | 5 | 5 |

**Mapping**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | S | H | M | H | M |
| **CO2** | H | M | S | S | H |
| **CO3** | H | S | S | H | M |
| **CO4** | H | S | S | H | S |
| **CO5** | H | H | M | H | S |

**S**–Strong **H** –High **M**–Medium **L**–Low

**Sub.Code:25PCS3CQ**

| | | | | |
|---|---|---|---|---|
| | **M.Sc. Computer Science** | | | |
| Title of the Paper: | **Core Practical 6 – Big Data Analytics Lab** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>**6** | Total Hours<br>**90** | Credits<br>**4** | Employability/<br>Skill Development |

**Course Objectives**

1. To setup and install Hadoop, Pig Latin and Hive in different operating modes.
2. To develop map reduce to solve problems.
3. To implement Pig Latin and Hive for Problem Solving.

| **Course Outcomes (CO)** | | |
|---|---|---|
| K1 to K5 | CO1 | Exposure to setup and install Hadoop, Pig Latin and Hive |
| | CO2 | Apply Map Reduce to Solve different problems |
| | CO3 | Exposure to Solve Problems using Pig Latin |
| | CO4 | Execution of simple programs using Hive |
| | CO5 | Develop queries using HiveQL |

**LIST OF PRACTICAL PROBLEMS**

1. Setting and installing Hadoop, Pig Latin and Hive in different operating modes.
2. Developing Map Reduce to solve problems
3. Solving problems using Pig Latin.
4. Problem Solving using Hive.

**Teaching Methods:**

Program Demonstration, assignment, Discussion and Hands on training using LCD Projector.

**Guide lines to the distribution of marks for Practical Examinations:**

**CIA:** Total marks– 40 [Practical – 25, Observation-10, Attendance – 5].

**ESE:** Two Questions will be given for each student. (3Hours/60 marks)
Record - 10 Marks Algorithm, Coding and Execution - 50 Marks

| **Particulars** | **Program1 (Marks)** | **Program2 (Marks)** |
|---|---|---|
| **Algorithm** | 5 | 5 |
| **Program Coding** | 15 | 15 |
| **Execution & viva voce** | 5 | 5 |

**Mapping**

| | **PSO1** | **PSO 2** | **PSO 3** | **PSO 4** | **PSO 5** |
|---|---|---|---|---|---|
| **CO1** | S | H | S | H | M |
| **CO2** | S | H | S | H | H |
| **CO3** | S | H | S | H | H |
| **CO4** | S | S | S | H | S |
| **CO5** | S | H | M | H | S |

**S**–Strong **H** –High **M**–Medium **L**–Low

**Sub.Code:25PCS408**

| Programme Code:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **Core Paper8 - Internet of Things** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>**4** | Total Hours<br>**60** | Credits<br>**4** | Employability/ Skill Development |

**Course Objectives**

1. To understand Smart Objects and IoT Architectures
2. To learn about various IOT - related protocols
3. To develop IoT infrastructure for popular applications

| **Course Outcomes (CO)** | | |
|---|---|---|
| K1 to K5 | CO1 | Inculcate Students basic knowledge of IoT |
| | CO2 | Understand the IoT Protocols & IoT Access Technologies |
| | CO3 | Describe Design & Development of IoT |
| | CO4 | Distinguish IoT supporting services |
| | CO5 | Develop IoT prototypes for solving real time issues. |

**Syllabus**

**UNIT I** **(12 Hours)**

IoT with ancient IKS-Introduction to Internet of Things: Characteristics of IoT-Genesis of IoT-IoT Enabling Technologies– Needed Capabilities and Technology behind IoT.
Various Architectural Views-Architectural Layer: View in IETF Model, View in ITU-T Reference Model-IoTWF Standardized Architecture–Logical Design of IoT: IoT Functional Blocks, IoT Communication Models.

**UNIT II** **(12 Hours)**

Functional blocks of an IoT ecosystem: Sensors, Actuators. Role of Cloud in IoT-Security aspects in IoT-Hierarchy of Fog, Edge and Cloud.
Basics of Networking: Wireless Communication: NFC, RFID, Bluetooth, Zigbee, Wi-Fi, RF Transceivers, Sigfox, LoRaWAN. Web Connectivity Principles: CoAP, MQTT Protocol & REST. Everything as a Service: Cloud Service-Role of Cloud in IoT.

**UNIT III** **(12 Hours)**

IoT Design Methodology: Purpose & Requirement Specification, Process Specification, Domain Model Specification, IoT Level Specification, Functional View Specification & Application Development.
Packet Tracer: Getting started with Packet Tracer: Protocols supported by Packet Tracer-Interface. Overview-Creating Simple Topology. Network Devices: Cisco Devices and other Packet Tracer Devices.

**UNIT IV** **(12 Hours)**

Data Analytics for IoT: Introduction, Structures Versus Unstructured Data, Data in Motion Versus Data at Rest, Overview of data analytics. Big Data Analytics Tools and Technology: NoSQL Database, Hadoop, YARN. The Hadoop Ecosystem: Apache Kafka, Apache Spark, Apache Storm, Apache Flink. Lambda Architecture.

| UNIT V | (12 Hours) |
|---|---|
| Case Studies illustrating IoT Design: Home Automation, Smart Parking, Temperature Monitoring System, Air Pollution Monitoring, Forest Fire Detection, Smart Irrigation, Smart Traffic Control and Weather Reporting Bot. | |

*Self-study and questions for examinations may be taken from the self-study portions also.

**Teaching Methods:**

Chalk and Talk/ Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class/peer Learning/Experiential Learning/Blended Learning.

**Text Book:**


1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things", Cisco Press, 2023.
2. Arshdeep Bahga, Vijay Madisetti, "Internet of Things-A Hands on Approach", Universities Press (India) Pvt Ltd, 2023.
3. Raj Kamal, "Internet of Things-Architecture and Design Principles", McGraw Hill Education (India) Pvt Ltd, 2024.
4. Jesin A, "Packet Tracer Network Simulator", PacktPublishingLtd,2017.


**Reference Books:**


1. ArshdeepBahga, Vijay Madisetti, ―Internet of Things–A hands-on approach, Universities Press, 2015.
2. Olivier Hersent, David Boswarthick, Omar Elloumi, ―The Internet of Things–Key Applications and Protocols, Wiley, 2012.


| | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | S | S | H | M | H |
| **CO2** | S | S | M | H | M |
| **CO3** | S | S | H | H | M |
| **CO4** | S | S | H | H | H |
| **CO4** | S | M | H | M | H |

**S**–Strong **H**–High **M**–Medium **L**–Low

**Sub.Code:25PCS409**

| ProgrammeCode:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **Core Paper 9 - Advanced Computing** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>**5** | Total Hours<br>**75** | Credits<br>**4** | Employability/<br>Skill Development |

**Course Objectives**

1. To Inculcate the basics of Grid Computing Architecture and Framework
2. To provide exposure to Cluster Computing Middle wares
3. To understand the concepts of Cloud Computing and its Applications

| **Course Outcomes (CO)** | | |
|---|---|---|
| K1 to K5 | CO1 | Obtain a foundation for Grid Computing Concepts and Architecture |
| | CO2 | Exposure to various toolkits used in Grid |
| | CO3 | Proficient in single system image |
| | CO4 | Understand Cloud in various Real-time Applications |
| | CO5 | Apply Cloud concepts in various Real-time Applications |

**Syllabus**

**UNIT I** **(15 Hours)**

Grid Computing: Grid Computing -The data Centre, the Grid and the distributed/High performance computing –Cluster computing and Grid computing – Meta computing– Scientific, business and E-Governance Grids, web services and Grid computing. Technologies and architecture for Grid computing. World wide Grid Computing Activities, Organizations and projects. Web services and the Service oriented Architecture (SOA).

**UNIT II** **(15 Hours)**

Grid Computing Architecture: OGSA for Resource distribution – Stateful web services in OGSA –Web services Resource Framework (WSRF) – Resource approach to stateful services- WSRF specification – Globus Toolkit. Grid Resource Management system - Grid Security Requirements – *Data management challenges.

**UNIT III** **(15 Hours)**

Cluster Computing: Approaches to parallel computing –How to achieve low cost parallel computing through clusters – Definition and architecture of a cluster – Cluster Middleware: An Introduction –Levels and layers of single system Image (SSI) –Cluster middleware design objectives –Resource Management and scheduling –Cluster programming environment and tools. Process Scheduling - Load sharing and Load balancing.

**UNIT IV** **(15 Hours)**

Understanding Cloud Computing: Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services.

| **UNIT V** | **(15 Hours)** |
|---|---|
| Developing Cloud Services: Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service –Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds. Cloud Computing for the family - Cloud Computing for the Community - Cloud Computing for the Corporation. | |
| *Self-study and questions for examinations may be taken from the self-study portions also. | |
| **Teaching Methods:** | |
| Chalk and Talk/ Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class/peer Learning/Experiential Learning/Blended Learning. | |
| **Text Book:** | |
| 1. C.S.R Prabhu, Grid and Cluster computing, Prentice Hall of India, 2011. (Units I, II &III)<br>2. Michael Miller, "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", Que, 2008. (Units IV & V) | |
| **Reference Books:** | |
| 1. Ian Foster, Carl Kesselman, The Grid 2: Blueprint for a New Computing Infrastructure, Elsevier Series, 2004.<br>2. Dr.Kumar Saurabh, " Cloud Computing: Architecting Next-Gen Transformation Paradigms", 4th Edition, Wiley Publications, 2017. | |

**Mapping**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | S | H | S | H | S |
| **CO2** | S | H | S | H | S |
| **CO3** | S | S | S | H | S |
| **CO4** | S | S | S | S | S |
| **CO4** | S | H | S | S | S |

**S**–Strong **H** –High **M**–Medium **L**–Low

**Sub.Code:25PCS4CR**

| ProgrammeCode:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **Core Practical 7 – Internet of Things Lab** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>**5** | Total Hours<br>**75** | Credits<br>**4** | Employability/<br>Skill Development |

**Course Objectives**

1. To understand Smart Objects and IoT Architectures
2. To learn about various IOT-related protocols
3. To develop IoT infrastructure for popular applications

| **Course Outcomes (CO)** | | |
|---|---|---|
| K1 to K5 | CO1 | Understand and Effective use of IoT concepts. |
| | CO2 | Ability to understand IDE for IoT implementation. |
| | CO3 | Analyze the basic ideas to implement IoT Applications. |
| | CO4 | Developing skill to embed IoT Applications. |
| | CO5 | Develop and implement IoT applications |

**LIST OF PRACTICAL PROBLEMS**

1. Automated electrical product
2. A Smart house hold monitoring system
3. A smart agriculture monitoring system
4. Sensors (Temperature& Humidity etc.)

**Teaching Methods:**

Demonstration, simulation, assignment and Discussion.

**Guide lines to the distribution of marks for Practical Examinations:**

**CIA:** Total marks– 40 [Practical – 25, Observation-10, Attendance – 5].

**ESE:** Two Questions will be given for each student. (3Hours/60marks)
Record - 10 Marks Algorithm, Coding and Execution - 50 Marks

| **Particulars** | **Program1 (Marks)** | **Program2 (Marks)** |
|---|---|---|
| **Algorithm** | 5 | 5 |
| **Program Coding** | 15 | 15 |
| **Execution & viva voce** | 5 | 5 |

**Mapping**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | H | H | H | H | M |
| **CO2** | H | M | H | H | M |
| **CO3** | M | M | M | H | H |
| **CO4** | H | M | H | H | M |
| **CO5** | H | H | M | M | M |

**S**–Strong **H** –High **M**–Medium **L**–Low

**Sub.Code:25PCS4Z1**

| ProgrammeCode:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **Project and Viva-Voce** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>**12** | Total Hours<br>**180** | Credits<br>**6** | Employability/<br>Skill Development |

**Course Objectives**

1. To develop real time applications.
2. To implement the concepts of Software Project Management.
3. To teach students in applying skills and tools to manage and develop a solution.

| **Course Outcomes (CO)** | | |
|---|---|---|
| K1 to K5 | CO1 | Understand the concept and challenges of market. |
| | CO2 | Collect, manage, plan and develop a real time application. |
| | CO3 | Gain hands-on experience on different project models. |
| | CO4 | Helps to understand the complexity and maintaining quality. |
| | CO5 | Helps to understand the complexity and maintaining quality. |

**MARK DISTRIBUTION**

**CIA:** Total marks - 20 [Review - 15, Regularity - 5]

**ESE:** Total marks - 80 [Project Report - 60, Viva-Voce - 20]

***Both Internal and External Examiner shall evaluate Project and Viva-Voce together.**

**Mapping**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | S | H | M | H | M |
| **CO2** | H | M | S | S | H |
| **CO3** | H | S | S | H | M |
| **CO4** | H | S | S | H | S |
| **CO5** | H | S | S | S | H |

**S**–Strong **H**–High **M**–Medium **L**–Low

## MAJOR ELECTIVE PAPERS

| | | | | |
|---|---|---|---|---|
| | | **M.Sc. Computer Science** | | |
| Title of the Paper: | **Major Elective Papers: Network Security and Cryptography** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>**-** | Total Hours<br>**-** | Credits<br>**5** | Employability / Skill Development |

**Course Objectives**

1. To familiarize basic concepts of cryptography and algorithms.
2. To know about various security issues.
3. To understand the process of implementing the cryptographic algorithms.

| **Course Outcomes (CO)** | | |
|---|---|---|
| K1 to K5 | CO1 | Understanding fundamental concepts of network security. |
| | CO2 | Knowing how the encryption and decryption are done. |
| | CO3 | Familiarize various kinds of viruses and related threats. |
| | CO4 | Implementing various cryptography algorithms. |
| | CO5 | Exposure to various Encryption standards |

**Syllabus**

**UNIT I**

Introduction: The OSI Security Architecture-Security Attacks-Security Services- Security Mechanisms-A model for network security. Classical Encryption Techniques: Symmetric Cipher Model-Substitution technique -Transposition Technique-Rotor Machines- Steganography.

**UNIT II**

Block Ciphers and the data Encryption Standard: Block Cipher Principles-The Data Encryption Standard-Block Cipher Design Principles. Advanced Encryption Standard: Evaluation Criteria for AES-The AES Cipher. Public Key Encryption and Hash Functions: Introduction to Number theory - Public Key Cryptography and RSA-Key Management.

**UNIT III**

Message Authentication and Hash Functions: Authentication Requirements-Authentication Functions-Authentication Codes-Hash Functions-Security of Hash Functions and MACs. Hash and MAC Algorithms: Secure Hash algorithm-Whirlpool-HMAC-CMAC. Digital Signatures-Authentication protocols - Digital Signature Standard.

**UNIT IV**

Network Security Applications: Authentication Applications-Electronic Mail Security*- IP Security-Web Security.

**UNIT V**

Intruders-Intrusion Detection-Password Management-Viruses and Related Threats-Virus Counter measures - Firewall Design Principles-Trusted Systems.

* Self-study and questions for examinations may be taken from the self-study portions also.

| **Teaching Methods:** |
|---|
| Chalk and Talk/ Smart Class Room/Powerpoint presentation/Seminar/Quiz/Discussion/Flipped Class/peer Learning/Experiential Learning/Blended Learning |
| **Text Book:** |
| 1. S.William Stallings "Cryptography and Network Security Principles and Practices", Fourth Edition, PHI Publications, 2011. |
| **Reference Books:** |
| 1. Atul Kahate, "Cryptography and Network Security", Third Edition, TMH, 2005.<br>2. Hari bhaskar, "Cryptographyand Network Security", Sam Publishers, First Edition, 2008. |

**MAPPING**

| | **PSO1** | **PSO 2** | **PSO 3** | **PSO 4** | **PSO 5** |
|---|---|---|---|---|---|
| **CO1** | S | S | H | H | S |
| **CO2** | H | S | H | H | H |
| **CO3** | H | S | H | H | H |
| **CO4** | H | S | H | M | H |
| **CO4** | S | S | M | M | H |

**S**–Strong **H**–High **M**–Medium **L**–Low

| ProgrammeCode:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **Major Elective Papers- Quantum Computing** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>**-** | Total Hours<br>**-** | Credits<br>**5** | Employability |

**Course Objectives**

1. To understand the building blocks of a Quantum Computer
2. To understand the principles, Quantum information and Limitation of quantum operations.
3. To understand the Quantum error and its correction.

| | | |
|---|---|---|
| K1 to K5 | CO1 | Understand the fundamental concepts of Quantum Computing and Computations. |
| | CO2 | Understand the concepts Quantum Computers. |
| | CO3 | Understand the concepts of Informations of Quantum Computing |
| | CO4 | Understand the concepts of Quantum Noise and Operations |
| | CO5 | Exposure to error correction and fault tolerant Quantum computation |

**Syllabus**

**UNIT I**

Fundamental Concepts: Global Perspectives, Quantum Bits, Quantum Computation, Quantum Algorithms, Quantum Information, Postulates of Quantum Mechanisms.

**UNIT II**

Quantum Computation: Quantum Circuits – Quantum algorithms, Single Orbit operations, Control Operations, Measurement, Universal Quantum Gates*, Simulation of Quantum Systems, Quantum Fourier transform, Phase estimation, Applications, Quantum search algorithms – Quantum counting – Speeding up the solution of NP – complete problems- Quantum Search for an unstructured database.

**UNIT III**

Quantum Computers: Guiding Principles, Conditions for Quantum Computation, Harmonic Oscillator Quantum Computer, Optical Photon Quantum Computer– Optical cavity Quantum electrodynamics, Ion traps, Nuclear Magnetic resonance.

**UNIT IV**

Quantum Information: Quantum noise and Quantum Operations – Classical Noise and Markov Processes, Quantum Operations, Examples of Quantum noise and Quantum Operations – Applications of Quantum operations, Limitations of the Quantum operations formalism, Distance Measures for Quantum information.

**UNIT V**

Quantum Error Correction: Introduction, Shor code, Theory of Quantum Error –Correction, Constructing Quantum Codes, Stabilizer codes, Fault – Tolerant Quantum Computation, Entropy and information – Shannon Entropy, Basic properties of Entropy, Von Neumann, Strong Sub Additivity, Data Compression, Entanglement as a physical resource.

| |
|---|
| *Self-study and questions for examinations may be taken from the self-study portions also. |
| **Teaching Methods:** |
| Chalk and Talk/ Smart ClassRoom/Powerpoint presentation/Seminar/Quiz/Discussion/Flipped Class/peerLearning/Experiential Learning/Blended Learning. |
| **Text Book:** |
| 1. Micheal A. Nielsen and Issac L. Chiang, ―Quantum Computation and Quantum Information, Cambridge University Press, Fint South Asian Edition, 2002<br>2. Vinod Chandra. Bennett C.H., Bernstein E., Brassard G., Vazirani U., The Strengths and Weaknesses of Quantum Computation. SIAM Journal on Computing, 1997 |
| **Reference Books:** |
| 1. Nayak, Chetan; Simon, Steven; Stern, Ady; Das Sarma, Sankar, ―NonabelianAnyons and Quantum Computation, 2008.<br>2. Clarke, John, Wilhelm, Frank, ―Superconducting quantum bits, 2008<br>3. William M Kaminsky, ―Scalable Superconducting Architecture for Adiabatic Quantum Computation, 2004. |

**Mapping**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | H | M | H | S | S |
| **CO2** | M | H | H | S | H |
| **CO3** | H | S | S | M | S |
| **CO4** | H | M | H | S | H |
| **CO4** | H | M | H | H | H |

**S**–Strong **H**–High **M**–Medium **L**–Low

| ProgrammeCode:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: **Major Elective Papers: Advanced Artificial Intelligence and Machine Learning** | | | | |
| Batch **2025-2026** | Hours/Week **-** | Total Hours **-** | Credits **5** | Employability / Skill Development |

**Course Objectives**

1. To familiarize AI problems and AI techniques.
2. To learn various search techniques and knowledge representations.
3. To inculcate expert system concepts and applying them to solve the problems.

**Course Outcomes (CO)**

| | | |
|---|---|---|
| K1 to K5 | CO1 | Understanding basic concepts Artificial Intelligence, AI problems and its techniques. |
| | CO2 | Analyze state space search, problem characteristics and knowledge representations. |
| | CO3 | Students can able to differentiate between different types of learning. |
| | CO4 | Students can solve the problem by acquiring knowledge of supervised and unsupervised learning. |
| | CO5 | Analyze and understand difference between various types of Machine Learning algorithms |

**Syllabus**

**UNIT I**

AI with ancient IKS - Introduction: AI Problems - Al techniques - Criteria for success. Problems, Problem Spaces, Search: State space search - Production Systems - Problem Characteristics - Issues in design of Search.

**UNIT II**

Heuristic Search techniques: Generate and Test - Hill Climbing- Best-First, Problem Reduction, Constraint Satisfaction, Means-end analysis. Knowledge representation issues: Representations and mappings -Approaches to Knowledge representations -Issues in Knowledge representations* - Frame Problem.

**UNIT III**

Using Predicate logic: Representing simple facts in logic - Representing Instance and Is a relationship - Computable functions and predicates - Resolution - Natural deduction. Representing knowledge using rules: Procedural Vs Declarative knowledge - Logic programming - Forward Vs Backward reasoning - Matching - Control knowledge

**UNIT IV**

ML with ancient IKS Learning: Types of learning - Machine learning - Intelligent agents.
Clustering: k- means clustering - fuzzy clustering - hierarchical clustering - cluster similarity - case studies.
Supervised learning: support vector machines- nearest neighborhood- case studies. Unsupervised learning: self-organizing maps - adaptive resonance theory - case studies.

| **UNIT V** | |
|---|---|
| Generative AI: The era of multimodal interactions- Industry-specific generative AI apps- The rise of small language models (SLMs)- Integrating generative AI with intelligent edge devices- More important emerging trends and 2024–2025 predictions- From quantum computing to AGI. | |
| *Self-study and questions for examinations maybe taken from the self-study portions also. | |

**Teaching Methods:**

Chalk and Talk/ Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class/Peer Learning/Experiential Learning/Blended Learning.

**Text Book:**

1. Elaine Rich and Kevin Knight," Artificial Intelligence", Tata McGraw Hill Publishers company Pvt Ltd, Second Edition, 2017.
2. Vinod Chandra. S.S. and Anand Hareendran. S, "Artificial Intelligence and Machine Learning", PHI Learning Private Limited, 2014.
3. Paul Singh and Anurag Karuparti, “Generative AI for cloud Solutions”, Packt publishing Ltd, First Edition, 2024.

**Reference Books:**

1. Purva Raut, Sandeep Kamble, Ashwini R.Mane, “Artificial Intelligence”, Tech Knowledge Publications, 2023.
2. Richard E Neapolitan and Xia Jiang , ”Artificial Intelligence with an Introduction to Machine Learning”, 2nd Edition ,CRC Press, 2018.

**MAPPING**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | S | M | H | H | S |
| **CO2** | H | M | S | M | S |
| **CO3** | H | M | M | M | H |
| **CO4** | M | M | M | M | H |
| **CO4** | S | M | M | M | S |

**S**–Strong **H** –High **M**–Medium **L**–Low

| ProgrammeCode:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **Major Elective Papers: Information Retrieval** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>**-** | Total Hours<br>**-** | Credits<br>**5** | Employability / Skill Development |

**Course Objectives**

1. To learn Information Retrieval Models.
2. To be exposed to Link analysis.
3. To inculcate concepts in Text Mining Techniques.

**Course Outcomes (CO)**

| | | |
|---|---|---|
| K1 to K5 | CO1 | Understanding basic concepts of Information Retrieval. |
| | CO2 | Exposure to various Information Retrieval Models. |
| | CO3 | Familiarize the concepts behind Web Search Engine. |
| | CO4 | Inculcate concepts about Link analysis. |
| | CO5 | Analyze Document Text Mining. |

**Syllabus**

**UNIT I**

Introduction : History of IR- Components of IR - Issues –Open source Search engine Frameworks - The impact of the web on IR - The role of artificial intelligence (AI) in IR – IR Versus Web Search - Components of a Search engine- Characterizing the web.

**UNIT II**

Information Retrieval : Boolean and vector-space retrieval models- Term weighting - TF-IDF weighting- cosine similarity – Preprocessing - Inverted indices - efficient processing with sparse vectors – Language Model based IR - Probabilistic IR –Latent Semantic Indexing - Relevance feedback and query expansion

**UNIT III**

Web Search Engine – Introduction and Crawling: Web search overview, web structure, the user, paid placement, search engine optimization/ spam. Web size measurement - search engine optimization/spam – Web Search Architectures - crawling - meta-crawlers- Focused Crawling - web indexes –- Near-duplicate detection - Index Compression - XML retrieval.

**UNIT IV**

Web Search – Link Analysis and Specialized Search: Link Analysis –hubs and authorities – Page Rank and HITS algorithms -Searching and Ranking – Relevance Scoring and ranking for Web – Similarity - Hadoop & Map Reduce - Evaluation - Personalized search - Collaborative filtering and content-based recommendation of documents and products – handling “invisible” Web - Snippet generation, Summarization, Question Answering, Cross-Lingual Retrieval.

| **UNIT V** | |
|---|---|
| Document Text Mining: Information filtering; organization and relevance feedback – Text Mining -Text classification and clustering - Categorization algorithms: naive Bayes; decision trees; and nearest neighbor - Clustering algorithms: agglomerative clustering; k-means; expectation maximization (EM). | |
| *Self-study and questions for examinations maybe taken from the self-study portions also. | |

| **Teaching Methods:** |
|---|
| Chalk and Talk/ Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class/Peer Learning/Experiential Learning/Blended Learning. |
| **Text Book:** |
| 1. C. Manning, P. Raghavan, and H. Schütze, Introduction to Information Retrieval , Cambridge University Press, 2008.<br>2. Ricardo Baeza -Yates and Berthier Ribeiro - Neto, Modern Information Retrieval: The Concepts and Technology behind Search 2nd Edition, ACM Press Books 2011. |
| **Reference Books:** |
| 1. Bruce Croft, Donald Metzler and Trevor Strohman, Search Engines: Information Retrieval in Practice, 1st Edition Addison Wesley, 2009.<br>2. Mark Levene, An Introduction to Search Engines and Web Navigation, 2nd Edition Wiley, 2010. |

**MAPPING**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | S | M | H | H | S |
| **CO2** | H | M | S | M | S |
| **CO3** | H | M | M | M | H |
| **CO4** | M | M | M | M | H |
| **CO4** | S | M | M | M | S |

**S**–Strong **H**–High **M**–Medium **L**–Low

| ProgrammeCode:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **Major Elective Papers- Data Mining and Soft Computing** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>**-** | Total Hours<br>**-** | Credits<br>**5** | Employability / Skill Development |

**Course Objectives**

1. To Design and implement systems for data mining.
2. To acquire the fundamental theory and concepts of neural networks.
3. To describes the principles underlying evolutionary computation in general and Genetic Algorithms.

**Course Outcomes (CO)**

| | | |
|---|---|---|
| K1 to K5 | CO1 | Categorize, differentiate between situations for applying different data-mining techniques and Evaluate the performance of different data- mining algorithms. |
| | CO2 | Comprehend the fuzzy logic and concept of fuzziness involved in various systems and fuzzy set theory. |
| | CO3 | Identify different neural network architectures, algorithms, applications, and their limitations. |
| | CO4 | Understand and analyze appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications |
| | CO5 | Apply evolutionary computation methods to find solutions to complex problems. |

**Syllabus**

**UNIT I**

Knowledge discovery in Databases, Data Mining Processes, Tasks of data mining, KDD process, Data Mining Software WEKA, KEEL, Introduction to Association Rule Mining, Apriori Algorithms, Introduction to Classification, classification algorithms- Decision Trees, Bayesian classifier, K-nearest neighbor classifier, Neural network-based classifier. Introduction to Clustering, Types of Clustering, Clustering Algorithms

**UNIT II**

Supervised Neural Networks: Basic concepts of Artificial Neural Networks, Learning Schemes, Multi-layer feed-forward neural networks, Back Propagation Algorithm, Effect of tuning parameters of the back propagation neural network. Selection of various parameters in BPN, Variations of standard back propagation algorithm. Recurrent Neural Networks, Functional Link Neural Nets, Radial Basis Function Neural Nets, Hopfield Nets. Unsupervised Neural Networks: Adaptive Resonance Theory: Introduction, ART1, ART2, Kohonen Neural Network: Self-Organizing Feature Map, Learning Vector Quantization.

| **UNIT III** | |
|---|---|
| Recurrent Neural Networks, Functional Link Neural Nets, Radial Basis Function Neural Nets, Hopfield Nets. Unsupervised Neural Networks: Adaptive Resonance Theory: Introduction, ART1, ART2, Kohonen Neural Network: Self-Organizing Feature Map, Learning Vector Quantization. | |
| **UNIT IV** | |
| Fuzzy Theory: Fuzzy Set Theory - Fuzzy Vs Crisp - Crisp & Fuzzy Sets, Crisp & Fuzzy Relations, Fuzzy Systems-Crisp Logic, Predicate Logic, Fuzzy Logic, Fuzzy Rule Based System, Defuzzification Methods, Application: Air conditioning system. | |
| **UNIT V** | |
| Genetic Algorithms: Basic Concepts, Creation of Offspring"s, Working Principle, Encoding, Fitness Function, Reproduction. Genetic Modeling, Inheritance Operators, Cross Over, Inversion & Deletion, Mutation Operator. Bit-wise operators in GA, Generational Cycle, Convergence of GA, Applications, Introduction to Particle swarm optimization. | |
| *Self-study and questions for examinations may be taken from the self-study portions also. | |

| **Teaching Methods:** |
|---|
| Chalk and Talk/ Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class/peer Learning/Experiential Learning/Blended Learning. |
| **Text Book:** |
| 1. J. Han, M. Kamber, and J. Pei, Data Mining: Concepts and Techniques, 3rd Edition, Morgan Kaufmann Series, 2012.<br>2. S. Rajasekaran, and G. A. VijayalakshmiPai, Neural Networks, Fuzzy Logic, & Genetic Algorithms Synthesis & Applications, PHI,1997<br>3. J.-S. R. Jang, C.-T. Sun, E. Mizutani, Neuro-Fuzzy and Soft Computing: A Computational Approach to Learning and Machine Intelligence, PHI, 2004.<br>4. Simon Haykin, Neural Networks A Comprehensive Foundation , Pearson Education, 2011. |
| **Reference Books:** |
| 1. H.J.Zimmermann, Fuzzy Set Theory and its Applications, Allide publishers Ltd.,1996 |

**Mapping**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | S | H | S | S | L |
| **CO2** | S | M | S | H | H |
| **CO3** | S | M | S | H | H |
| **CO4** | S | S | S | S | S |
| **CO4** | S | S | H | S | S |

**S**–Strong **H** –High **M**–Medium **L**–Low

| ProgrammeCode:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **Major Elective Papers: Computer Graphics** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>- | Total Hours<br>- | Credits<br>**5** | Employability / Skill Development |

| **Course Objectives** |
|---|
| 4. To familiarize AI problems and AI techniques.<br>5. To learn various search techniques and knowledge representations.<br>6. To inculcate expert system concepts and applying them to solve the problems. |

**Course Outcomes (CO)**

| | | |
|---|---|---|
| K1 to K5 | CO1 | Understanding basic concepts Artificial Intelligence, AI problems and its techniques. |
| | CO2 | Analyze state space search, problem characteristics and knowledge representations. |
| | CO3 | Students can able to differentiate between different types of learning. |
| | CO4 | Students can solve the problem by acquiring knowledge of supervised and unsupervised learning. |
| | CO5 | Analyze and understand difference between various types of Machine Learning algorithms |

**Syllabus**

**UNIT I**

Application areas of Computer Graphics, overview of graphics systems, Video -display devices, Raster - scan systems, random scan systems, graphics monitors and work stations and input devices Output primitives: Points and lines, line drawing algorithms, mid - point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary - fill and flood - fill algorithms.

**UNIT II**

Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms transformations between coordinate systems.

2-D Viewing: The viewing pipeline, viewing coordinate reference frame, window to view - port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

**UNIT III**

Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B spline curves, Bezier and B-spline surfaces, Basic Illumination models, polygon rendering methods.

| **UNIT IV** | |
|---|---|
| 3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.<br>3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping. | |
| **UNIT V** | |
| Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications | |
| *Self-study and questions for examinations maybe taken from the self-study portions also. | |

| **Teaching Methods:** |
|---|
| Chalk and Talk/ Smart Class Room/Power point presentation/Seminar/Quiz/Discussion/Flipped Class/Peer Learning/Experiential Learning/Blended Learning. |
| **Text Book:** |
| 1."Foley, Van Dam, Feiner and Hughes, "Computer Graphics Principles and Practice", second edition in C, Pearson Education, 2021<br>2. Zhigand xiang, Roy Plastock, Schaum's outlines, "Computer Graphics Second edition", Tata Mc Graw hill edition, 2002<br>3. Donald Hearn and M. Pauline Baker, "Computer Graphics C version", Pearson education, 2002. |
| **Reference Books:** |
| 1. David F Rogers, "Procedural elements for Computer Graphics", Tata Mc Graw hill, 2nd edition, 2001. |

**MAPPING**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | S | M | H | H | S |
| **CO2** | H | M | S | M | S |
| **CO3** | H | M | M | M | H |
| **CO4** | M | M | M | M | H |
| **CO4** | S | M | M | M | S |

**S**–Strong **H**–High **M**–Medium **L**–Low

## NON-MAJOR ELECTIVE PAPERS

| ProgrammeCode:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **Non-Major Elective Paper - Information Security** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>**4** | Total Hours<br>**60** | Credits<br>**4** | Employability / Skill Development |

**Course Objectives**

1. Students will identify the core concepts of Information security.
2. To examine the concepts of Information Security.
3. To design and implement the security features for IT and Industrial sectors.

**Course Outcomes (CO)**

| | | |
|---|---|---|
| K1 to K5 | CO1 | To Learn the principles and fundamentals of information security. |
| | CO2 | To Demonstrate the knowledge of Information security concepts. |
| | CO3 | To Understand about Information Security Architecture. |
| | CO4 | To Analyze the various streams of security in IT and Industrial sector. |
| | CO5 | To know about Cyber Laws and Regulations. |

**Syllabus**

| **UNIT I** | **(12 Hours)** |
|---|---|
| Information Security basics: Definition of Information Security - History of Information Security - Characteristics of Information Security - Components of Information Security - Security System Development Life Cycle (SDLC). Information Security for technical administrators: Server Security – Network security- Social Media Security. | |
| **UNIT II** | **(12 Hours)** |
| Cryptography: Basic concepts - plain text - Cipher text - Encryption Principles - CRYPT Analysis - Cryptographic Algorithms - Cryptographic Tools – Authentication -Biometrics* - passwords - Access Control Devices - Physical Security - Security and Personnel. Language-based Security: Analysis of code for security errors, Safe language and sandboxing techniques. | |
| **UNIT III** | **(12 Hours)** |
| Firewalls, Viruses & Worms & Digital Rights Management: Viruses and Worms- Worms - Digital Rights Management – Firewalls - Application and Circuit Proxies - Stateful Inspection - Design Principles of Firewalls. Logical Design: Access Control Devices- Physical Security- Security and Personnel - NIST Models-VISA International Security Model- Design of Security Architecture-Planning for Continuity. | |
| **UNIT IV** | **(12 Hours)** |
| Hacking: Introduction – Hacker Hierarchy – Password cracking – Phishing - Network Hacking - Wireless Hacking - Windows Hacking - Web Hacking*- Ethical Hacking. Security Investigation: Need for Security- Business Needs-Threats- Attacks- IP Addressing and Routing - Social Media. | |

| UNIT V | (12 Hours) |
|---|---|

Cyber Laws: What is Cyber Law? - Need for Cyber laws - Common Cyber Crimes and Applicable Legal Provisions: A Snapshot - Cyber Law (IT Law) in India – The Information Technology Act of India 2000 - Cyber Law and Punishments in India -Cyber Crime Prevention guide to users – Regulatory Authorities.

*Self-study and questions for examinations may be taken from the self-study portions also.

**Teaching Methods:**

Chalk and Talk, Power point presentation, Seminar, Brainstorming, Assignment, Google Classroom.

**Text Book:**

1. Information Security –Text book prepared by Kongunadu Arts and Science College, Coimbatore -29, 2022.

**Reference Books:**


1. Charles P Pfleeger and Shai Lawrence Pfleeger, **"Security in Computing",** Fourth Edition, Prentice Hall, 2007 & 2011.
2. Ross J. Anderson and Ross Anderson, "Security Engineering: A guide to build Dependable Distributed System", Wiley,2009.
3. Thomas R. Peltier, Justin Peltier and John Bleckley, "Information Security Fundamentals",2nd Edition, Prentice Hall 1996.
4. Gettier, Urs E. Information Security: Strategies for Understanding and Reducing Risks John Wiley & Sons, 2011.
5. "Principles of information security". Michael Whiteman and Herbert J. Mattord,2012.
6. Information security -Marie wright and John kakalik,2007.
7. Information security Fundamentals- Thomas R. Peltier, Justin Peltier and John Blackle 2005.
8. Information Security theory and practical PHI publication, Dhiren R. Patel-2008.
9. Debby Russell and Sr.G.T. Gangemi," computer Security Basics,2nd edition, O'Reilly Media,2006.

| ProgrammeCode:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **Non-Major Elective Paper- Management Information Systems** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>**4** | Total Hours<br>**60** | Credits<br>**4** | Skill Development |

**Course Objectives**

1. Students will identify the core concepts of Management Information Systems
2. To examine the concepts of business and information.
3. To design and implement the manufacturing sector.

| **Course Outcomes (CO)** | | |
|---|---|---|
| K1 to K5 | CO1 | Student will learn the principles and fundamentals of business management |
| | CO2 | Demonstrate knowledge of the Information concepts |
| | CO3 | Student will able to configure and develop a Management Information Systems |
| | CO4 | Analyses the various streams of manufacturing sector |
| | CO5 | Students would have the knowledge about, Development and implementation of the MIS technology |

| **Syllabus** | |
|---|---|
| **UNIT I** | **(12 Hours)** |
| Management's information systems: role and importance of management-process of management -organization and theory -strategic management of business. | |
| **UNIT II** | **(12 Hours)** |
| Concepts –methods-tools and the name of the procedures -behavioral concepts in decision making: information–Information concepts-information: a quality product- classification of the information-methods of data and information collection -Value of the information -general model of a human as an information preprocessor -organization and information. | |
| **UNIT III** | **(12 Hours)** |
| Development of MIS-Development of long-range plans of MIS -ascertaining the class of information-determining the information requirement-Development and implementation of the MIS -management of quality in the MIS -organization for Development of the MIS -choice of information technology –nature of its decision-strategic decision-configuration design–evaluation. | |
| **UNIT IV** | **(12 Hours)** |
| Applications in manufacturing sector -personnel management –financial management –production management - *****Materials management – marketing management-decision support systems-concept and philosophy, DSS: deterministic systems -knowledge based expert systems (KBES). | |
| **UNIT V** | **(12 Hours)** |
| InfoTech infrastructure-technology of information systems-database and client server architecture-data in data warehouse-architecture of data ware houses -* Data in Data warehouse. | |
| *Self-study and questions for examinations may be taken from the self-study portions also. | |

| **Teaching Methods:** |
|---|
| Chalk and Talk/ Smart ClassRoom/Powerpoint presentation/Seminar/Quiz/Discussion/Flipped Class/peerLearning/Experiential Learning/Blended Learning |
| **Text Book:** |
| 1. W.S Jawadekar, "Management Information Systems", Tata McGraw Hill Publishers, 2002. |
| **Reference Books:** |
| 1. Amitabh Jain ,Naveena Bajaj, "Management Information System", 1st edition, 2002<br>2. Aman Jindal, "Management information system", 1st edition, 2003. |

**Mapping**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | H | M | H | S | S |
| **CO2** | M | H | H | S | H |
| **CO3** | H | S | S | M | S |
| **CO4** | H | M | H | S | H |
| **CO4** | L | M | H | H | H |

**S**–Strong **H** –High **M**–Medium **L**–Low

| ProgrammeCode:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **Non-Major Elective Paper - Business Intelligence** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>**4** | Total Hours<br>**60** | Credits<br>**4** | Skill Development/ Employment |

**Course Objectives**

1. To be exposed with the basic rudiments of business intelligence system
2. To understand the modeling aspects behind Business Intelligence
3. To understand business intelligence life cycle and the techniques used
4. To be exposed with different data analysis tools and technique.

| **Course Outcomes (CO)** | | |
|---|---|---|
| K1 to K5 | CO1 | Understanding fundamental concepts within Business Intelligence, |
| | CO2 | Knowing how decision analysis and decision processes are carried Out in businesses |
| | CO3 | Familiarize concepts, theories and methods within data warehousing |
| | CO4 | Implementing the relationship of data warehouses to production and Operational systems, |
| | CO5 | Incorporate Data analysis framework for optimal performance |

| **Syllabus** | |
|---|---|
| **UNIT I** | **(12 Hours)** |
| INTRODUCTION: Business Intelligence: definition, concept and need for Business Intelligence, Case studies BI Basics: Data, information and knowledge, Role of Mathematical models. | |
| **UNIT II** | **(12 Hours)** |
| ANALYTICS STRATEGY: Business Analytics at the strategic level: Strategy and BA, Link between strategy and Business Analytics, BA supporting strategy at functional level, dialogue between strategy and BA functions, information as strategic resource. | |
| **UNIT III** | **(12 Hours)** |
| Business Analytics at Analytical level: Statistical data mining, descriptive Statistical methods, lists, reports, automated reports, hypothesis driven methods, data mining with target variables, cluster analysis, Discriminate analysis, logistic regression, principal component analysis. | |
| **UNIT IV** | **(12 Hours)** |
| XML: Introduction XML: An Eagle's Eye view of XML – XML Definition-List of an XML DATA WAREHOUSING: Business Analytics at Data Warehouse Level, Designing physical database, Deploying and supporting DW/BI system. | |
| **UNIT V** | **(12 Hours)** |
| BUSINESS INTELLIGENCE: Business Intelligence Architectures: Cycle of Business Intelligence Analysis, Development of Business Intelligence System, spread sheets, concept of dashboard, CLAP, SQA, decision engineering. BI Tools: Concept of dashboard. BI Applications in different domains- CRM, HR, Production.<br>. | |

| |
|---|
| *Self-study and questions for examinations may be taken from the self-study portions also. |
| **Teaching Methods:** |
| ChalkandTalk/ Smart ClassRoom/Powerpoint presentation/Seminar/Quiz/Discussion/Flipped Class/peerLearning/Experiential Learning/Blended Learning |
| **Text Book:** |
| 1. Turban, Sharda, Decision Support and Business Intelligence Systems, Delen, Pearson, 9th Edition, 2014. |
| **Reference Books:** |
| 1. Olivia Parr Rud, "Business Intelligence Success Factors Tools for aligning your business in the global economy", John Wiley and Sons, 2009<br>2. Steve Williams and Nancy Williams, "The Profit impact of Business Intelligence, Morgan Kauffman Publishers! " Elsevier, 2007<br>3. Gert H.N. Laursen, Jesper Thorlund, "Business Analytics for Managers: Taking Business Intelligence beyond reporting", Wiley and SAS Business Series. 2010. |

**Mapping**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | S | S | H | H | S |
| **CO2** | H | S | H | H | H |
| **CO3** | H | S | H | H | H |
| **CO4** | H | S | H | M | H |
| **CO4** | S | M | H | H | S |

**S**–Strong **H** –High **M**–Medium **L**–Low

| ProgrammeCode:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **Non-Major Elective Paper- Social Network Analysis** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>**4** | Total Hours<br>**60** | Credits<br>**4** | Skill Development |

**Course Objectives**

1. To Introduce the Concepts of Social Network Analysis.
2. To be familiar with the concepts of Graph Theory In SNA.
3. To understand the Two mode networks for SNA.

| **Course Outcomes (CO)** | | |
|---|---|---|
| K1 to K5 | CO1 | Understanding the fundamentals of Social Network Analysis |
| | CO2 | Knowing the usage of Graph Theory |
| | CO3 | Analyzing the Network Structure |
| | CO4 | Inculcating the approaches to Network Positions and Social Roles |
| | CO5 | Understanding the Mode Networks for SNA |

**Syllabus**

**UNIT I** **(12 Hours)**

Introduction to social network analysis (SNA)-Introduction to networks and relations- analyzing relationships to understand people and groups, binary and valued relationships, symmetric and asymmetric relationships, multimode relationships.

**UNIT II** **(12 Hours)**

Using graph theory for social networks analysis- adjacency matrices, edge-lists, adjacency lists, graph traversals and distances, depth-first traversal, breadth-first traversal paths and walks Dijkstra's algorithm, graph distance and graph diameter, social networks vs. link analysis, ego-centric and socio-centric density.

**UNIT III** **(12 Hours)**

Understanding networks- density, reachability, connectivity, reciprocity, group-external and group-internal ties in networks, ego networks, extracting and visualizing ego networks, structural holes, Centrality- degree of centrality, closeness and between centrality, local and global centrality, centralization and graph centers, notion of importance within network, Analyzing network structure-bottom-up approaches using cliques, N-cliques, N-clans, K-plexes, K-cores, F-groups and top-down approaches using components, blocks and cut-points, lambda sets and bridges, and factions.

**UNIT IV** **(12 Hours)**

Measures of similarity and structural equivalence in SNA-Approaches to network positions and social roles- defining equivalence or similarity, structural equivalence, automorphic equivalence, finding equivalence sets, brute force and Tabu search, regular equivalence, equivalence of distances: Maxsim, regular equivalence, Measuring similarity/dissimilarity- valued relations, Pearson correlations covariance and cross-products.

**UNIT V** **(12 Hours)**

Two-mode networks for SNA: Understanding mode networks- Bi-partite data structures, visualizing two-mode data, quantitative analysis using two-mode Singular value decomposition (SVD) analysis, two-mode factor analysis, two-mode correspondence analysis, qualitative analysis using two-mode core-periphery analysis, two-mode fractions analysis, affiliation and attribute networks.

*Self-study and questions for examinations may be taken from the self-study portions also.

**Teaching Methods:**

Chalk and Talk/ Smart ClassRoom/Powerpoint presentation/Seminar/Quiz/Discussion/Flipped Class/peerLearning/Experiential Learning/Blended Learning

**Text Book:**

1. Social Network Analysis- 3rd edition, John Scott, SAGE Publications, 2012.
2. Social Network Analysis for Startups- Finding connections on the social web:Maksim Tsvetovat, Alexander Kouznetsov, O'Reilly Media, 2011.
3. Introduction to Social Network Methods: Robert A. Hanneman, Mark Riddle, University of California, 2005 [Published in digital form and available at http://faculty.ucr.edu/~hanneman/nettext/index.html]

**Reference Books:**

1. Exploratory Social Network Analysis with Pajek, Second edition: Wouter de Nooy, Andrej Mrvar, Vladimir Batagelj, Cambridge University Press, 2011.
2. Analyzing Social Networks, Stephen P Borgatti, Martin G. Everett, Jeffrey C. Johnson, SAGE Publications, 2013.
3. Statistical Analysis of Network Data with R: Eric D. Kolaczyk, Gábor Csárdi, Springer, 2014.

**Mapping**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | S | S | H | H | S |
| **CO2** | H | S | H | H | H |
| **CO3** | H | S | H | H | M |
| **CO4** | M | S | H | M | H |
| **CO4** | S | M | H | H | S |

**S**–Strong **H** –High **M**–Medium **L**–Low

**Extra Departmental Course**

| ProgrammeCode:**09** | **M.Sc. Computer Science** | | | |
|---|---|---|---|---|
| Title of the Paper: | **EDC Paper - Internet and Web Designing Lab** | | | |
| Batch<br>**2025-2026** | Hours/Week<br>**2** | Total Hours<br>**30** | Credits<br>**2** | Skill Development/ Employability |

**Course Objectives**

1. To educate the benefits of the Internet.
2. To promote web designing skills using html tags.
3. Students can understand usage of CSS in web designing.

| **Course Outcomes (CO)** | | |
|---|---|---|
| K1 to K5 | CO1 | Understand the concepts of Internet and Internet Addresses and DNS. |
| | CO2 | To enhance the usage of E-Mail. |
| | CO3 | Understand how to create a website with HTML tags like table tag, frame tag and can apply their knowledge to create dynamic website using html and CSS. |
| | CO4 | Can apply their knowledge to create dynamic website using html and CSS. |

**LIST OF PRACTICAL PROBLEMS**

1. Design a web page for a company using HTML formatting tags.
2. Design a web page for your department using Images.
3. Design a personal web page with hyperlink.
4. Design a web page for advertising a product using animation effect
5. Design a web page using ordered and unordered list.
6. Design a web page using tables.
7. Design a web page using forms.
8. Design a web page using frameset tag.
9. Design a web page using position and background concept in CSS
10. Design a web page, which shows your bio-data using CSS.

**Teaching Methods:**

Program Demonstration, assignment, Discussion and Hands on training using LCD Projector.

**Mapping**

| PSO / CO | PSO1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|
| **CO1** | M | M | H | H | M |
| **CO2** | H | M | M | M | M |
| **CO3** | M | H | M | M | H |
| **CO4** | M | M | H | M | M |
| **CO5** | H | S | H | H | S |

**S**–Strong **H** –High **M**–Medium **L**–Low

**CIA EXAMINATION MARK BREAKUP**

**( For Practical Only)**

| S. NO | DISTRIBUTION COMPONENT | MARKS |
|---|---|---|
| 1. | CIA Practical I – 60 Marks Converted to 30 | **30** |
| 2. | CIA Practical II – 60 Marks Converted to 30 | **30** |
| 3. | Continuous Assessment of Practical (Observation to be Submitted*) (15 Experiments/Programs × 2 = 30Marks) | **30** |
| 4. | Record | **05** |
| 5. | Attendance | **05** |
| | **Total** | **100** |

* In case a student is absent for an Experiment/Program conducted on a particular day, the Student will not be allowed to compensate that Experiment/Program and will be awarded zero for that particular Experiment/Program and shall be marked absent. In case any students have an attendance lack; the concerned faculty handling the course in consultation with HoD may permit the student who has an attendance lack to compensate one or two Experiments/Programs as the case may be to enable them to become eligible with mandate of 75% attendance to appear for the Continuous Internal Practical Examinations. However, the compensated Experiments/Programs will not be awarded any marks whatsoever.

**ADVANCED LEARNERS COURSE (ALC)**

**Sub. Code: 25PCS0D1**

## ALC1: HUMAN COMPUTER INTERACTION

### Course Objectives

1. To Learn the foundations of Human Computer Interaction.
2. To familiarize with the design technologies for individuals and persons with disabilities.
3. To understand concepts of mobile HCI and guidelines for user interface.

| Syllabus | |
|---|---|
| **UNIT I** | |
| Foundations of HCI : The Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms. | |
| **UNIT II** | |
| Design and Software Process : Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design. | |
| **UNIT III** | |
| Models and Theories : Cognitive models –Socio-Organizational issues and stake holder requirements –Communication and collaboration models-Hypertext, Multimedia and WWW. | |
| **UNIT IV** | |
| Mobile HCI : Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools. | |
| **UNIT V** | |
| Web Interface Design : Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies. | |
| **Text Books:** | |
| 1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human Computer Interaction", 3rd Edition, Pearson Education, 2004 (UNIT I , II & III).<br>2. Brian Fling, "Mobile Design and Development", First Edition, O"Reilly Media Inc., 2009 (UNIT –IV).<br>3. Bill Scott and Theresa Neil, "Designing Web Interfaces", First Edition, O"Reilly, 2009. (UNIT-V). | |

**Sub.Code:25PCS0D2**

## ALC 2: KNOWLEDGE MANAGEMENT

### Course Objectives

1. To learn the Evolution of Knowledge management.
2. To be familiar with tools and exposed to Applications.
3. To analyze the concepts behind case studies.

| Syllabus | |
|---|---|
| **UNIT I** | |
| Introduction: Knowledge Management - The foundations of knowledge management- including cultural issues- technology applications organizational concepts and processes- management aspects- and decision support systems. The Evolution of Knowledge management**:** From Information Management to Knowledge Management - Key Challenges Facing the Evolution of Knowledge Management - Ethics for Knowledge Management. | |
| **UNIT II** | |
| Creating the Culture of Learning and Knowledge Sharing: Organization and Knowledge Management - Building the Learning Organization. Knowledge Markets: Cooperation among Distributed Technical Specialists – Tacit Knowledge and Quality Assurance. | |
| **UNIT III** | |
| Knowledge Management-The Tools : Telecommunications and Networks in Knowledge Management - Internet Search Engines and Knowledge Management - Information Technology in Support of Knowledge Management - Knowledge Management and Vocabulary Control - Information Mapping in Information Retrieval - Information Coding in the Internet Environment - Repackaging Information. | |
| **UNIT IV** | |
| Knowledge management-Applications: Components of a Knowledge Strategy - Case Studies (From Library to Knowledge Center, Knowledge Management in the Health Sciences, Knowledge Management in Developing Countries). | |
| **UNIT V** | |
| Future Trends and Case Studies: Advanced topics and case studies in knowledge management - Development of a knowledge management map/plan that is integrated with an organization's strategic and business plan - A case study on Corporate Memories for supporting various aspects in the process life -cycles of an organization. | |
| **Text Book:** | |
| 1. Srikantaiah.T. K., Koenig, M., "Knowledge Management for the Information Professional" Information Today, Inc., 2000.<br>2. Nonaka, I., Takeuchi, H., "The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation", Oxford University Press, 2023. | |