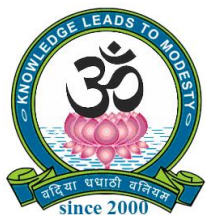


Master of



Computer Science



**SRI VIDYA MANDIR ARTS & SCIENCE COLLEGE**

**(Autonomous)**

[An Autonomous College Affiliated to Periyar University, Salem, Tamil Nadu]

[Accredited by NAAC with 'A' Grade with CGPA of 3.27]

[Recognized 2(f) & 12(B) Status under UGC Act of 1956]

Katteri – 636 902, Uthangarai (Tk), Krishnagiri (Dt)

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**DEGREE OF MASTER OF SCIENCE IN COMPUTER SCIENCE**

**CHOICE BASED CREDIT SYSTEM (CBCS)**

**REGULATIONS AND SYLLABUS FOR**

**M.Sc. COMPUTER SCIENCE PROGRAMME**

**(SEMESTER PATTERN)**

**(For Students Admitted in the College from the Academic Year 2020-2021 Onwards)**



### Programme Outcomes (POs)

<b>PO1</b>	Understand the advanced concepts of key areas in Computer Science and enable students to expose technical, analytical and creative skills.
<b>PO2</b>	Understanding and applying knowledge of mathematics, science, algorithmic and computing skills to acquire solution of complex scientific problems.
<b>PO3</b>	Build the student's effective communication, ethical attitudes, team work and logical proficiency.
<b>PO4</b>	Students are to be imparted with a broad conceptual background in the Computing sciences to design, implement and evaluate a computational system.
<b>PO5</b>	Make use of modern IT tools and techniques to develop practical skills for fulfilling the needs of industry and society.
<b>PO6</b>	Develop research oriented skills to identify, analyse and synthesize scholarly literature relating to the field of Computer Science.

### Programme Specific Outcomes (PSOs)

<b>PSO1</b>	Posses the knowledge in the field of Computer Science through theory and practicals.
<b>PSO2</b>	Students will demonstrate high-level expertise in computer Science research and in the synthesis of research.
<b>PSO3</b>	Communicate computer science concepts, designs, and solutions effectively and professionally.
<b>PSO4</b>	Use software development tools, software systems, and modern computing platforms.
<b>PSO5</b>	Design, correctly implement and document solutions to significant computational problems.



## SRI VIDYA MANDIR ARTS & SCIENCE COLLEGE

(Autonomous)

Master of Science (M.Sc.) in Computer Science

Programme Pattern and Syllabus (CBCS)

(For Students Admitted in the College from the Academic Year 2020-2021 Onwards)

Sl. No	Nature of the Course	Course Code	Name of the Course	Hours / Week	Credits	Marks		
						CIA	ESE	Total
<b>SEMESTER I</b>								
1	Core – I	20PCS1C01	Design and Analysis of Algorithms	4	4	25	75	100
2	Core – II	20PCS1C02	Advanced Web Technology	4	4	25	75	100
3	Core – III	20PCS1C03	Advanced Database Management Systems	4	4	25	75	100
4	Core – IV	20PCS1C04	Discrete Mathematics	4	4	25	75	100
5	Elective – I	----	Elective – I	4	3	25	75	100
6	Core Practical-I	20PCS1P01	Algorithm – Lab	5	2	40	60	100
7	Core Practical-II	20PCS1P02	Advanced Web Technology – Lab	5	2	40	60	100
<b>Total</b>				<b>30</b>	<b>23</b>	<b>205</b>	<b>495</b>	<b>700</b>
<b>SEMESTER II</b>								
8	Core – V	20PCS2C05	Distributed Operating System	4	4	25	75	100
9	Core – VI	20PCS2C06	Advanced Java Programming	3	4	25	75	100
10	Core – VII	20PCS2C07	Cryptography and Network Security	3	4	25	75	100
11	Core – VIII	20PCS2C08	Optimization Techniques	3	4	25	75	100
12	Elective– II	----	Elective– II	3	3	25	75	100
13	Core Practical-III	20PCS2P03	Advanced Java-Lab	4	2	40	60	100
14	Core	20PCS2P04	DOS Lab	4	2	40	60	100



	Practical-IV							
15	EDC	----	Extra Disciplinary Course (EDC) (Other than CS Major Subject)	4	4	25	75	100
16	Common Course	20P2HR01	Human Rights	2	2	25	75	100
<b>Total</b>				<b>30</b>	<b>29</b>	<b>255</b>	<b>645</b>	<b>900</b>
<b>SEMESTER III</b>								
17	Core – IX	20PCS3C09	Digital Image Processing	4	4	25	75	100
18	Core – X	20PCS3C10	Internet of Things	4	4	25	75	100
19	Core – XI	20PCS3C11	Machine Learning	4	4	25	75	100
20	Core – XII	20PCS3C12	Data Analytics	4	4	25	75	100
21	Elective–III	----	Elective–III	4	4	25	75	100
22	Core Practical-V	20PCS3P05	Data Analytics – Lab	5	2	40	60	100
23	Mini Project	20PCS3PR01	Mini Project	5	2	40	60	100
SWAYAM / MOOC / SOFT SKILL (Optional)				ADD ON COURSE				
<b>Total</b>				<b>30</b>	<b>24</b>	<b>205</b>	<b>495</b>	<b>700</b>
<b>SEMESTER IV</b>								
24	Elective-IV	----	Elective-IV	8	4	25	75	100
25	Elective-V	----	Elective-V	8	4	25	75	100
26	Project	20PCS4PR02	Dissertation and Viva-Voce (Industry/Research)	14	6	50	150	200
<b>Total</b>				<b>30</b>	<b>14</b>	<b>100</b>	<b>300</b>	<b>400</b>
<b>Cumulative Total</b>				<b>120</b>	<b>90</b>	<b>765</b>	<b>1935</b>	<b>2700</b>

**Note**

CBCS – Choice Based Credit system

CIA – Continuous Internal Assessment

ESE – End of Semester Examinations



## Major Electives

### Elective Course – I

Semester	Paper	Course Code	Name of the Course
I	I	20PCS1E01	Software Project Management
	II	20PCS1E02	Wireless Networks
	III	20PCS1E03	Object Oriented System Development

### Elective Course – II

Semester	Paper	Course Code	Name of the Course
II	I	20PCS2E04	Data Mining and Warehousing
	II	20PCS2E05	Compiler Design
	III	20PCS2E06	Embedded Systems

### Elective Course – III

Semester	Paper	Course Code	Name of the Course
III	I	20PCS3E07	Bio-informatics
	II	20PCS3E08	Theory of Computation
	III	20PCS3E09	Cloud Computing

### Elective Course – IV

Semester	Paper	Course Code	Name of the Course
IV	I	20PCS4E10	Mobile Computing
	II	20PCS4E11	Soft Computing
	III	20PCS4E12	Principles of Information Security

### Elective Course – V

Semester	Paper	Course Code	Name of the Course
IV	I	20PCS4E13	Social Network Analysis
	II	20PCS4E14	Professional Ethics
	III	20PCS4E15	Block Chain Technology

**EDC-EXTRA DISCIPLINARY COURSE**

Students are expected to opt EDC (Non major elective) offered by other departments.

Semester	Course Code	Name of the Course
II	20PCS2ED01	Principles of Information Technology
	20PCS2ED02	Fundamentals of Computers and Communications
	20PCS2ED03	E-Commerce



# PROGRAMME SYLLABUS



Program: M.Sc Computer Science				
Core – I		Course Code: 20PCS1C01		Course Title: Design and Analysis of Algorithms
Semester	Hours/Week	Total Hours	Credits	Total Marks
I	4	60	4	100

### Course Objectives

1. Understand and Apply an algorithms and design techniques to solve problems.
2. Analyze the complexities of various problems in different domains.
3. Analyze the algorithmic performance of various algorithms to determine the computational complexity of algorithms.

#### UNIT – I

**Introduction:** Notion of Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Frame Work – Asymptotic Notations and Basic Efficiency Classes – Mathematical Analysis of Non-recursive Algorithms – Non-recursive Solution to the Matrix Multiplication – Mathematical Analysis of Recursive Algorithms – Recursive Solution to the Tower of Hanoi Puzzle.

#### UNIT – II

**Divide and Conquer:** Merge sort – Quick sort – Binary Search – Binary Tree Traversals – Multiplication of Large Integers – Strassen’s Matrix Multiplication – Closest Pair and Convex Hull Problems – **Greedy Technique:** Prim’s Algorithm – Kruskal’s Algorithm – Dijkstra’s Algorithm.

#### UNIT – III

**Dynamic Programming:** Computing a Binomial Coefficient – Warshall’s and Floyd’s Algorithms – Warshall’s Algorithm – Floyd’s Algorithm for the All-Pairs Shortest-Paths Problem – Optimal Binary Search Trees – The Knapsack Problem and Memory Functions.

#### UNIT – IV

**Backtracking:** N-Queens Problem – Hamiltonian Circuit Problem – Subset Sum Problem – **Branch and Bound:** Assignment Problem – Knapsack Problem – Travelling Salesman Problem.



**UNIT - V**

P, NP and NP-Complete Problems – Approximation Algorithms for NP-Hard Problems – Approximation Algorithms for the Travelling Salesman Problem – Approximation Algorithms for the Knapsack Problem.

**Text Book**

1. Anany Levitin, “Introduction to the Design and Analysis of Algorithms”, Pearson Education, 2008.

**Reference Books**

1. S.K. Basu, “Design Methods and Analysis of Algorithms”, Prentice Hall, 2005.
2. Thomas H.Cormen, Charles E.Leiserson, Ronald L.Rivest, “Introduction to Algorithms”, Prentice Hall 1990.
3. Introduction to design and Analysis of Algorithms - S.E. Goodman, ST. Hedetniem- TMH.
4. Ellis Horowitz, Satraj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Universities Press, Second Edition, Reprint 2009.

**Web Resources**

1. <https://www.javatpoint.com/daa-tutorial>
2. <https://www.tutorialspoint.com>
3. <https://nptel.ac.in/courses/106/106/106106131>
4. <http://openclassroom.stanford.edu>
5. <https://www.geeksforgeeks.org/fundamentals-of-algorithms>



### Course Outcomes (COs)

On successful completion of the course, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand fundamental algorithmic design concepts and techniques for computational problem solving.	K1 & K2
CO2	Apply an appropriate algorithm design techniques for solving problem.	K2 & K3
CO3	Ability to analyze the performance of algorithms by comparing the efficiency of algorithms with asymptotic complexity.	K4
CO4	Ability to design algorithms using standard paradigms like: Greedy, Divide and Conquer, Dynamic Programming Backtracking and branch and bound.	K5 & K6
CO5	Ability to understand P & NP class problems for formulating solutions using standard approaches.	K6

**K1– Remember, K2– Understand, K3– Apply, K4 –Analyze, K5– Evaluate, K6 –Create**

### Mapping of COs with POs

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	M	S	S	M
CO2	S	M	S	M	S	S
CO3	S	S	M	S	M	M
CO4	S	S	M	S	S	S
CO5	S	S	S	S	S	M

**S – Strong,**

**M – Medium,**

**L – Low**



Program: M.Sc Computer Science				
Core – II		Course Code: 20PCS1C02		Course Title: Advanced Web Technology
Semester	Hours/Week	Total Hours	Credits	Total Marks
I	4	60	4	100

### Course Objectives

1. Explore the backbone of web page creation by developing .NET skill.
2. Enrich knowledge about HTML control and web control classes
3. Provide depth knowledge about ADO.NET
4. Understand the need of usability, evaluation methods for web services
5. To promote the web designing skills and data handling capabilities

### **UNIT – I**

**OVERVIEW OF ASP.NET** - The .NET Framework – Learning the .NET Languages : Data Types – Declaring Variables- Scope and Accessibility- Variable Operations- Object Based Manipulation- Conditional Structures- Loop Structures- Functions and Subroutines. Types, Objects and Namespaces : The Basics about Classes- Value Types and Reference Types- Advanced Class Programming- Understanding Name Spaces and Assemblies. Setting Up ASP.NET and IIS.

### **UNIT – II**

**Developing ASP.NET Applications** - ASP.NET Applications: ASP.NET Applications– Code Behind- The Global.aspx Applicationfile- Understanding ASP.NET Classes- ASP.NET Configuration. Web Form Fundamentals: A Simple Page Applet- Improving the Currency Converter- HTML Control Classes- The Page Class- Accessing HTML Server Controls. Web Controls: Web Control Classes – AutoPostBack and Web Control Events- Accessing Web Controls. Using Visual Studio.NET: Starting a Visual Studio.NET Project- Web Form Designer- Writing Code- Visual Studio.NET Debugging.

### **UNIT – III**



**Working with Data** - Overview of ADO.NET - ADO.NET and Data Management- Characteristics of ADO.NET-ADO.NET Object Model. ADO.NET Data Access : SQL Basics– Select , Update, Insert, Delete Statements- Accessing Data- Creating a Connection- Using a Command with a DataReader - Accessing Disconnected Data - Selecting Multiple Tables – Updating Disconnected Data. Data Binding: Single Value Data Binding- Repeated Value Data Binding- Data Binding with Databases. Data List – Data Grid.

#### UNIT – IV

**Web Services** - Web Services Architecture : Internet Programming then and now- WSDL– SOAP- Communicating with a Web Service-Web Service Discovery and UDDI. Creating Web Services : Web Service Basics- The StockQuote Web Service – Documenting the Web Service- Testing the Web Service- Web Service Data Types- ASP.NET Intrinsic Objects.

#### UNIT – V

**Advanced ASP.NET** - Component Based Programming: Creating a Simple Component – Properties and State - Database Components - Using COM Components. Custom Controls: User Controls - Deriving Custom Controls. Implementing Security: Determining Security Requirements- The ASP.NET Security Model - Forms Authentication- Windows Authentication.

#### Text Book

1. Mathew Mac Donald, “ASP.NET Complete Reference”, TMH 2005.

#### Reference Books

1. Crouch Matt J, “ASP.NET and VB.NET Web Programming”, Addison Wesley 2002.
2. J.Liberty, D.Hurwitz, “Programming ASP.NET”, Third Edition, O’REILLY, 2006

#### Web Resources

1. [https://www.tutorialspoint.com/asp.net/asp.net\\_introduction.htm](https://www.tutorialspoint.com/asp.net/asp.net_introduction.htm)
2. <https://www.geeksforgeeks.org/introduction-to-asp-net/>
3. <https://www.guru99.com/what-is-asp-dot-net.html>
4. <https://docs.microsoft.com/en-us/dotnet/framework/develop-web-apps-with-aspnet>
5. [https://www.w3schools.com/asp/ado\\_intro.asp](https://www.w3schools.com/asp/ado_intro.asp)



### Course Outcomes (COs)

On Successful completion of the course the students will have demonstrated

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Understanding basic concept of Web Technology.	K1, K2
CO2	Recognize an importance of validation control, cookies and session.	K3& K4
CO3	Applying the knowledge of ASP.NET object, ADO.NET data access and SQL to develop a client server model.	K4, K5, K6
CCC	Recognize the difference between Data list and Data grid controls in accessing data	K4
CO5	Enable to create a simple component and Database components in ASP.Net.	K5, K6

**K1- Remember, K2- Understand, K3-Analyse, K4- Implement, K5-Evaluate, K6-Create**

### Mapping of COs with POs

CO NUMBER	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	M	S	S	S
CO2	S	M	M	S	M	S
CO3	S	S	S	S	S	M
CO4	S	S	M	M	S	S
CO5	S	S	S	S	S	S

**S – Strong,**

**M – Medium,**

**L – Low**



Program: M.Sc Computer Science				
Core – III		Course Code: 20PCS1C03		Course Title: Advanced Database Management Systems
Semester	Hours/Week	Total Hours	Credits	Total Marks
I	4	60	4	100

### Course Objectives

1. To understand and apply the principles of Relational model and SQL.
2. To understand the use of E-R model and Normalization.
3. To understand the concept of parallel, distributed and object based databases.
4. To know the concept of Spatial, Temporal databases and advanced transaction processing.

### **UNIT – I**

Introduction to the Relational Model and SQL: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations. INTRODUCTION TO SQL: Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Subqueries, Modification of the Database.

### **UNIT – II**

Database Design and E-R Model: Overview of the Design Process, The Entity-Relationship Model, Constraints, Removing Redundant Attributes in Entity Sets, Entity-Relationship Diagrams. Relational Database Design: Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional Dependency Theory, Algorithms for Decomposition, Decomposition Using Multivalued Dependencies, More Normal Forms.

### **UNIT – III**

Parallel Databases: Introduction, I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Intraoperation Parallelism, Interoperation Parallelism. Distributed Databases: Homogeneous and Heterogeneous Databases, Distributed Data Storage, Distributed



Transactions, Commit Protocols, Concurrency Control in Distributed Databases, Availability, Distributed Query Processing.

#### **UNIT – IV**

Object-Based Databases: Complex Data Types, Structured Types and Inheritance in SQL, Table Inheritance, Array and Multiset Types in SQL, Object-Identity and Reference Types in SQL, Object Oriented versus Object Relational. XML: Structure of XML Data, XML Document Schema, Querying and Transformation, API to XML, Storage of XML Data, XML Applications.

#### **UNIT – V**

Spatial and Temporal Data: Time in Databases, Spatial and Geographic Data, Multimedia Databases. Advanced Transaction Processing: Transaction-Processing Monitors, Transactional Workflows, E-Commerce, Main-Memory Databases, Real-Time Transaction Systems, Long-Duration Transactions.

#### **Text Books**

1. Abraham Silberschatz, Henry F Korth , S Sudarshan, “Database System Concepts”, 6th edition , McGraw-Hill International Edition , 2013.

#### **Reference Books**

1. Ramez Elmasri, Shamkant B Navathe, “Fundamental of Database Systems”, Pearson, 7th edition 2016.
2. Thomas Connolly, Carolyn Begg., “Database Systems a practical approach to Design , implementation and Management “, Pearson Education, 2014.

#### **Web Resources**

1. <http://www.exploredatabase.com/p/blog-page.html>
2. <https://www.tutorialspoint.com/dbms/index.htm>
3. <https://www.quora.com/>
4. [https://en.wikipedia.org/wiki/XML\\_database](https://en.wikipedia.org/wiki/XML_database)



### Course Outcomes (COs)

On Successful completion of the course the students will have demonstrated

CO Number	CO Statement	Knowledge Level
CO1	Know about relational model and SQL.	K1, K2
CO2	Understand the basic concepts of E-R model, relational database and normalization.	K3& K4
CO3	Learn parallel, distributed and Object Oriented Databases	K4, K5, K6
CO4	Student will be proficient in XML database	K4
CO5	Students will understand the concept of Spatial, Temporal databases and transaction processing.	K5, K6

**K1- Remember, K2- Understand, K3-Analyse, K4- Implement, K5-Evaluate, K6- Create**

### Mapping of COs with POs

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	M	S	S	S
CO2	S	M	S	S	S	M
CO3	S	S	S	M	S	S
CO4	S	S	S	S	S	M
CO5	S	M	S	S	S	S

**S – Strong,**

**M – Medium,**

**L – Low**





Program: M.Sc Computer Science				
Core – IV		Course Code: 20PCS1C04		Course Title: Discrete Mathematics
Semester	Hours/Week	Total Hours	Credits	Total Marks
I	4	60	4	100

### Course Objectives

To extend student's Logical and Mathematical maturity and ability to deal with abstraction and to introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.

#### UNIT – I

**Mathematical Logic Connectives:** Negation – Conjunction – Disjunction – Statement Formulas and Truth Table – Conditional and Bi-conditional – Well-Formed Formulas-Tautologies-Examples Only. (Chapter 1: Sections 1.2.1 to 1.2.4, 1.2.6 to 1.2.8, Page No: 7-14 & 18-26).

#### UNIT – II

**Mathematical Logic (Continued) Normal Forms:** Disjunctive Normal Forms – Conjunctive Normal Forms – Principal Disjunctive Normal Forms – Principal Conjunctive Normal Forms-Examples Only. (Chapter 1: Sections 1.3.1 to 1.3.4, Page No: 50-58).

**The Theory of Inference for the Statement Calculus:** Validity using Truth Tables – Rules of Inference – Consistency of Premises and Indirect Method of Proof-Examples Only. (Chapter 1: Sections 1.4.1 to 1.4.3, Page No: 65-73).

#### UNIT – III

**Set Theory Relations and Ordering:** Relations–Properties of Binary Relation in a Set.

**Functions:** Definition and Introduction – Composition of Functions – Inverse Functions.

**Natural Numbers:** Peano Axioms and Mathematical Induction-Examples Only. (Chapter 2: Sections 2.3.1-2.3.2 and 2.4.1-2.4.3 and 2.5.1, Page No: 148-155, 192-203 and 220-224).



## UNIT – IV

**Lattices and Boolean Algebra Lattices as Partially Ordered Sets:** Definition and Examples – Some Properties of Lattices- Boolean Algebra-Definition and Example – Sub Algebra, Direct Product and Homomorphism – Boolean Functions – Boolean Forms and Free Boolean Algebra – Values of Boolean Expression and Boolean Functions-Examples Only. (Chapter 4: Sections 4.1.1-4.1.2, 4.2.1-4.2.2 and 4.3.2, Page No: 378-384, 397-403 and 406-416)

## UNIT – V

**Graph Theory** Introduction-Basic Definitions-Degree of a Vertex-Some Special Simple Graphs-Connectedness in Directed Graphs-Shortest Path Algorithm-Spanning Trees-Minimum Spanning Trees-Prim's Algorithm-Kruskal's Algorithm-Example 7.2, 7.3, 7.4, and 7.5 only. (Chapter 7, Page No: 366-371, 393-398, 416-417 and 422-425)

### Text Books

1. J.P. Trembly, R. Manohar, Discrete Mathematical Structure with Applications to Computer Science, Tata McGraw Hill Publishing Private Limited, New Delhi, 2001. (For Unit I, II, III, IV-All the Chapters example problems only, but exercise are not excluded.)
2. T. Veerarajan, Discrete Mathematics with Graph Theory and Combinatorics, Tata McGraw Hill Education Private Limited, New Delhi, 2010. (For Unit V).

### Reference Books

1. Prof. V. Sundaresan, K. S. Ganapathy Subramaniyan, K. Ganesan, Discrete Mathematics, Tata Mc Graw Hill, New Delhi, 2000.
2. L. Lovarz, J. Pelikan, K. Vexztergombi, Discrete Mathematics, Springer International Edition, 2002.
3. N. Chandrasekaran M. Uma parvathi, Discrete Mathematics, PHI Learning P. Ltd. 2010.
4. Dr. M. K. Sen and Dr. B. C. Charraborthy, Introduction to Discrete Mathematics, Arunabha Sen Books & Allied Pvt. Ltd., 8/1 Chintamoni Das Lane, Kolkata – 700009, Reprinted in 2016.



### Web Resources

1. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-042j-mathematics-for-computer-science-fall-2005/>
2. <https://www.geeksforgeeks.org/set-theory/>
3. <https://www.includehelp.com/basics/set-theory-and-types-of-set-in-discrete-mathematics.aspx>
4. [http://discrete.openmathbooks.org/dmoi2/ch\\_graphtheory.html](http://discrete.openmathbooks.org/dmoi2/ch_graphtheory.html)

### Course Outcomes (COs)

On Successful completion of the course the students will have demonstrated

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Solve discrete mathematics problems that involve: computing permutations and combinations of a set, fundamental enumeration principles and graph theory.	K1, K2
CO2	Demonstrate a working knowledge of set notation and elementary set theory, recognize the connection between set operations and logic, and prove elementary results involving sets.	K3& K4
CO3	Formulate and interpret statements presented in Boolean logic. Reformulate statements from common language to formal logic.	K4, K5, K6
CO4	Apply truth tables and the rules of propositional and predicate calculus	K4
CO5	Learn about Graph Theory.	K5, K6

**K1- Remember, K2- Understand, K3-Analyse, K4- Implement, K5-Evaluate, K6-Create**



### Mapping of COs with POs

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	M	M	M	S
CO2	S	M	S	S	S	S
CO3	S	S	S	S	S	M
CO4	S	S	S	S	S	M
CO5	S	S	M	S	S	S

S – Strong,

M – Medium,

L – Low



**Program: M.Sc Computer Science**

<b>Core Practical – I</b>		<b>Course Code: 20PCS1P01</b>		<b>Course Title: Algorithm Lab</b>	
<b>Semester</b> I	<b>Hours/Week</b> 5	<b>Total Hours</b> 75	<b>Credits</b> 2	<b>Total Marks</b> 100	

**Course Objectives**

1. To develop skills in implementing algorithms through C++ and to explore the features of C++ by applying to solve Data structure problems.
2. To write programs in C++ to solve problems using divide and conquer strategy.
3. To write programs in C++ to solve problems using backtracking strategy.
4. To write programs in C++ to solve problems using greedy and dynamic programming techniques.

**List of Programs**

1. Apply the divide and conquer technique to arrange a set of numbers using merge sort.
2. Apply the divide and conquer technique to implement Strassen's matrix multiplication Algorithm.
3. Compute the transitive closure of a given directed graph using Warshall's Algorithm.
4. Implement 0/1 knapsack problem using Dynamic programming.
5. Find minimum cost spanning tree of a given undirected graph using Kruskal's Algorithm.
6. Find minimum cost spanning Tree of a given undirected graph using Prim's Algorithm.
7. Implement Queen's problem using backtracking.
8. Implement Knapsack problem using backtracking.
9. Solve Dijkstra's Algorithm using greedy technique.
10. Solve subset sum problem using backtracking.



### Course Outcomes (COs)

On Successful completion of the course the students will have demonstrated

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Ability to apply the divide and conquer technique for solving problems.	K1, K2
CO2	Implementation of Dynamic Programming to solve knapsack problem	K3 & K4
CO3	Solve graph problems using algorithm design techniques such as Greedy.	K4, K5, K6
CO4	Implementation of backtracking techniques to solve various problems.	K4
CO5	Ability to write programs in C++ to solve various problems using algorithm design techniques.	K5, K6

**K1- Remember, K2- Understand, K3-Analyse, K4- Implement, K5-Evaluate, K6- Create**

### Mapping of COs with POs

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	M	S	S	S
CO2	S	M	S	S	M	S
CO3	S	S	S	M	S	M
CO4	S	S	S	S	S	S
CO5	S	S	S	S	S	S

**S – Strong,**

**M – Medium,**

**L – Low**



Program: M.Sc Computer Science				
Core Practical – II		Course Code: 20PCS1P02		Course Title: Advanced Web Technology – Lab
Semester	Hours/Week	Total Hours	Credits	Total Marks
I	5	75	2	100

### Course Objectives

1. Learn how to create websites using Asp.Net
2. Implement the advanced web concepts using Asp.Net and Ado.Net
3. Learn to use Asp.Net web controls
4. Design web applications using Asp.Net and Ado.Net

### List of Programs

#### Programs using ASP.NET Server controls

1. Create a website for a bank and include types of navigation.
2. Write a program to perform Asp.Net State.
3. Design Image Mapping using Asp.Net
4. Create the following using web controls
  - a) Money conversion
  - b) Temperature conversion
5. Write a program to create an advertisement using Ad rotator.
6. Create a user control that contains a list of colors. Add a button to the Web Form which when clicked changes the color of the Form to the color selected from the list.
7. Create a user control that displays the current date and time. Include it in a Web Form and refresh it each time a button is clicked.
8. Create a user control that receives the user name and password from the user and validates them. If the user name is “Radiant” and the password is “asp.net” then the user is authorized, otherwise not.

#### Programs using ADO.NET and ASP.NET

1. Create a web application to insert 3 records inside the SQL database table having following fields(DeptId, DeptName, EmpName, Salary). Update the salary for any one employee and increment it to 15% of the present salary. Perform delete operation on 1



row of the database table.

2. Create a Web App to display all the Empname and Deptid of the employee from the database using SQL source control and bind it to GridView. Database fields are(DeptId, DeptName, EmpName, Salary).

### Course Outcomes (COs)

On Successful completion of the course the students will have demonstrated

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Apply .NET concepts to design and develop web applications	K1, K2
CO2	Create a basic website using ASP.Net concepts	K3 & K4
CO3	Design web page and connect to the backend databases	K4, K5, K6
CO4	Applying different functionalities in ASP.Net and ADO.Net	K4
CO5	Ability to create database oriented web applications with ADO.Net.	K5, K6

**K1- Remember, K2- Understand, K3-Analyse, K4- Implement, K5-Evaluate, K6-Create**

### Mapping of COs with POs

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	M	S	S	S
CO2	S	M	S	M	S	S
CO3	S	S	S	S	S	M
CO4	S	S	S	S	S	S
CO5	S	S	M	S	S	S

**S – Strong,**

**M – Medium,**

**L – Low**





Program: M.Sc Computer Science				
Core – V		Course Code: 20PCS2C05		Course Title: Distributed Operating System
Semester	Hours/Week	Total Hours	Credits	Total Marks
II	4	60	4	100

### Course Objectives

1. To study Distributed operating system concepts
2. To understand hardware, software and communication in distributed OS
3. To learn the distributed resource management components.
4. Practices to learn concepts of OS and Program the principles of Operating Systems

### **UNIT – I**

Introduction – Operating System Definition – Functions of Operating System – Types of Advanced Operating System – Design Approaches – Synchronization Mechanisms – concepts of a Process – Critical Section Problem – Process Deadlock – Models of Deadlock – Conditions for Dead – lock – System with single-unit requests, Consumable Resources, Reusable Resources.

### **UNIT – II**

Distributed Operating Systems: Introduction- Issues – Communication Primitives – Inherent Limitations –Lamport’s Logical Clock , Vector Clock, Global State , Cuts – Termination Detection – Distributed Mutual Exclusion – Non Token Based Algorithms – Lamport’s Algorithm - Token Based Algorithms –Distributed Deadlock Detection – Distributed Deadlock Detection Algorithms – Agreement Protocols

### **UNIT – III**

Distributed Resource Management – Distributed File Systems – Architecture – Mechanisms – Design Issues – Distributed shared Memory – Architecture – Algorithm – Protocols – Design Issues – Distributed Scheduling – Issues – Components – Algorithms.

**UNIT – IV**

Failure Recovery and Fault Tolerance – Concepts – Failure Classifications – Approaches to Recovery in Concurrent Systems – Synchronous and Asynchronous Check Pointing and Recovery – Check pointing in Distributed Database Systems – Fault Tolerance Issues – Two-Phase and Nonblocking Commit Protocols – Voting Protocols – Dynamic Voting Protocols.

**UNIT – V**

Multiprocessor and Database Operating Systems – Structures – Design Issues – Threads – Process Synchronization – Processor Scheduling – Memory Management – Reliability/Fault Tolerance – Database Operating Systems – Concepts – Features of Android OS, Ubuntu, Google Chrome OS and Linux Operating Systems.

**Text Books**

1. MukeshSinghalN.G.Shivaratri, “Advanced Concepts in Operating Systems”, McGraw Hill 2000.
2. Distributed Operating System – Andrew S. Tanenbaum, PHI.

**Reference Books**

1. Abraham Silberschatz, Peter B.Galvin, G.Gagne, “Operating Concepts”, 6<sup>th</sup> Edition Addison Wesley publications 2003.
2. Andrew S.Tanenbaum, “Modern Operating Systems”, 2<sup>nd</sup> Edition Addison Wesley 2001.

**Web Resources**

1. <https://www.tutorialspoint.com/distributed-operating-system>
2. <https://www.geeksforgeeks.org/types-of-operating-systems/>
3. <https://examupdates.in/operating-system-pdf/>
4. <http://stst.elia.pub.ro/news/SO/Modern%20Operating%20System%20-20Tanenbaum.pdf>



### Course Outcomes (COs)

On Successful completion of the course the students will have demonstrated

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Clear understanding on several resource management techniques like distributed shared memory and other resources.	K1, K2
CO2	Knowledge on mutual exclusion and Deadlock detection of Distributed operating system.	K3 & K4
CO3	Able to design and implement algorithms of distributed shared memory and commit protocols.	K4, K5, K6
CO4	Able to design and implement fault tolerant distributed systems	K4
CO5	Learn the structure and design issues of Multiprocessor and Database Operating Systems.	K5, K6

**K1- Remember, K2- Understand, K3-Analyse, K4- Implement, K5-Evaluate, K6-Create**

### Mapping of COs with Pos

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	M	S	S	M
CO2	S	M	S	S	S	S
CO3	S	S	S	S	S	M
CO4	S	S	S	M	S	S
CO5	S	S	S	S	S	S

S – Strong,

M – Medium,

L – Low



Program: M.Sc Computer Science				
Core – VI		Course Code: 20PCS2C06		Course Title: Advanced Java Programming
Semester	Hours/Week	Total Hours	Credits	Total Marks
II	3	45	4	100

### Course Objectives

1. To deepen student's programming skills by analyzing the real world problem in a programmer's point of view and implement the concepts in real time projects in Java.
2. To learn basics of Java programming concepts like Packages, Applets, Database Connectivity Enable the students to learn network programs in Java
3. Acquire Knowledge about JDBC and Servlet.

### **UNIT – I**

An Overview of Java: Object Oriented Programming-Lexical Issues- Class Libraries. Data Types, Variables, and Arrays: Primitive Types-Literals Variables-Type Conversion and Casting- Arrays. Operators: Arithmetic Bitwise – Relational - Boolean Logical Assignment – Conditional - Operator Precedence. Control Statements: Selection statements-Iteration Statements-Jump Statements.

### **UNIT – II**

Classes and Methods: Fundamentals- Declaring objects- Methods - Constructors-Garbage Collection- Overloading Methods. Recursion – Access Control- Nested and Inner Classes - Command Line Arguments - Inheritance: Basics- Super Class- Method overriding- Abstract Class. Packages and Interfaces: Packages-Access Protection-Importing Packages- Interfaces.

### **UNIT – III**

Exception Handling: Fundamentals- types- Uncaught Exceptions- Try and Catch- Throw-throws-finally-built-in exceptions. Input /Output: The I/O Classes and Interfaces – File - I/O Exceptions - Byte Streams - Character Steams – Serialization. The Applet Class: Basics-Architecture - Applet Skeleton - Display methods – Status Window - Passing Parameters. Event Handling: Event Model – Classes - KeyEventClassEvent Listener Interfaces.



## UNIT – IV

AWT: Window Fundamentals - Working with Frame Windows – Graphics –Working with Color - Working with Fonts - Controls – Labels- Buttons - Check Box – Choice Controls – Lists - Scroll Bars - Text Field - Text Area - Layout Menu Bars and Menus. JavaBeans: Advantages - Introspection – Properties - Java Beans API. Servlets: Life Cycle-Simple Servlet - Cookies-session tracking.

## UNIT – V

Using Relational Databases: Introduction- JDBC Drivers for RDBM Systems – Using Java.sql API - Using Javax.sql API - Connection Pooling. Network Programming: Introduction- Working with URLs-Working with Sockets- Remote Method Invocation.

### Text Books

1. Herbert Schildt, “The Complete Reference Java J2SE”, 9th ed., TMH Publishing Company Ltd, New Delhi, 2014.Chapter: 2-11, 16, 22, 23,24,25,26,37,38
2. Joe Wiggles worth and Paula McMillan, “Java Programming Advanced Topics”, 3rd ed., TMH, 2009.Chapter: 9, 11

### Reference Books

1. John Dean, Raymond Dean, “ Introduction to Programming with JAVA – A Problem Solving Aproach”, Tata McGrawHil, 2012
2. Ralph Bravaco, Shai Simonson, “Java Programming : From the Ground Up”, Tata McGraw Hil Edit on, 2012
3. Herbert Schildt, Dale Skrien, “Java Fundamentals – A Comprehensive Introduction”, Tata McGrawHil, 2013

### Web Resources

1. <https://www.udemy.com/course/advanced-java-programming/>
2. <https://www.w3schools.in/java-tutorial/>
3. <https://beginnersbook.com/java-tutorial-for-beginners-with-examples/>
4. <https://www.tutorialspoint.com/java/index.htm>



### Course Outcomes (COs)

On Successful completion of the course the students will have demonstrated

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Able to understand basics of Java programming	K1, K2
CO2	Create ability to handle exceptions in Java.	K3 & K4
CO3	Able to develop a Graphical User Interface (GUI) with Applet and Swing.	K4, K5, K6
CO4	Create interactive applications using AWT components.	K4
CO5	Understand JDBC and Network programming concepts in Java.	K5, K6

**K1- Remember, K2- Understand, K3-Analyse, K4- Implement, K5-Evaluate, K6- Create**

### Mapping of COs with POs

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	M	S	S	S
CO2	S	S	S	M	S	S
CO3	S	S	S	S	S	M
CO4	S	S	S	S	S	S
CO5	S	S	S	S	S	M

**S – Strong,**

**M – Medium,**

**L – Low**



Program: M.Sc Computer Science				
Core – VII		Course Code: 20PCS2C07		Course Title: Cryptography and Network Security
Semester	Hours/Week	Total Hours	Credits	Total Marks
II	3	45	4	100

### Course Objectives

1. To understand the cryptography theories and algorithms.
2. To understand necessary approaches and techniques to build protection mechanisms in order to secure computer networks.
3. To know about the malicious software & firewalls.

### UNIT – I

**Introduction** - Security Trends – Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies – Model of Network Security – Security Attacks, Services and Mechanisms – OSI Security Architecture – Classical Encryption Techniques: Substitution Techniques, Transposition Techniques, Steganography- Foundations of Modern Cryptography: Perfect Security – Information Theory – Product Cryptosystem – Cryptanalysis.

### UNIT – II

**Symmetric Encryption and Message Confidentiality** - Symmetric Encryption Principles, Symmetric Block Encryption Algorithms, Stream Ciphers and RC4 , Cipher Block Modes of Operation, Location of Encryption Devices, Key Distribution. Public-key Cryptography and Message Authentication: Approaches to Message Authentication, Secure Hash Functions and HMAC, Public-Key Cryptography Principles, Public-Key Cryptography Algorithms, Digital Signatures, Key Management.

### UNIT – III

**Authentication Applications** - Kerberos, x.509 Authentication Service, Public-Key Infrastructure. Electronic Mail Security: Pretty Good Privacy (PGP), S/MIME.



## UNIT – IV

**IP Security** - IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations. **Web Security:** Web Security Considerations, Secure Socket Layer(SSL) and Transport Layer Security(TLS), Secure Electronic Transaction(SET). **Network Management Security:** Basic Concepts of SNMP, SNMPv1 Community Facility, SNMPv3.

## UNIT – V

**Intruders –** Intruders, Intrusion Detection, Password Management. **Malicious Software:** Virus and Related Threats, Virus Countermeasures, Distributed Denial of Service Attacks. **Firewalls:** Firewall Design Principles, Trusted System, Common Criteria for Information Technology Security Evaluation.

### Text Books

1. Behrouz A. Ferouzan, “Cryptography & Network Security”, Tata Mc Graw Hill, 2007, Reprint 2015.
2. Stallings William, “Cryptography and Network Security - Principles and Practice 2017.
3. William Stallings, “Network Security Essentials Applications and Standards ”Third Edition, Pearson Education, 2008.

### Reference Books

1. Man Young Rhee, “Internet Security: Cryptographic Principles”, “Algorithms And Protocols”, Wiley Publications, 2003.
2. Charles Pfleeger, “Security In Computing”, 4th Edition, Prentice Hall Of India, 2006.
3. Ulysess Black, “Internet Security Protocols”, Pearson Education Asia, 2000.
4. Charlie Kaufman And Radia Perlman, Mike Speciner, “Network Security, Second Edition, Private Communication In Public World”, PHI 2002.
5. Bruce Schneier And Neils Ferguson, “Practical Cryptography”, First Edition, Wiley Dreamtech India Pvt Ltd, 2003.
6. Douglas R Simson “Cryptography – Theory And Practice”, First Edition, CRC Press, 1995.

### Web Resources

1. <https://www.geeksforgeeks.org/cryptography-introduction/>





2. [http://www.cse.iitm.ac.in/~chester/courses/16e\\_cns/slides/01\\_Introduction.pdf](http://www.cse.iitm.ac.in/~chester/courses/16e_cns/slides/01_Introduction.pdf)

3. [http://www.vssut.ac.in/lecture\\_notes/lecture1428550736.pdf](http://www.vssut.ac.in/lecture_notes/lecture1428550736.pdf)

### Course Outcomes (COs)

On Successful completion of the course the students will have demonstrated

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Understand the fundamentals of networks security, security architecture, threats and vulnerabilities.	K1, K2
CO2	Apply the different cryptographic operations using symmetric cryptographic algorithms.	K3 & K4
CO3	Apply the different cryptographic operations using public key cryptography.	K4, K5, K6
CO4	Apply the various Authentication schemes to simulate different applications.	K4
CO5	Understand various Security practices and System security standards	K5, K6

**K1- Remember, K2- Understand, K3-Analyse, K4- Implement, K5-Evaluate, K6- Create**

### Mapping of COs with POs

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	M	S	S	S
CO2	S	S	M	S	S	S
CO3	S	S	S	M	S	S
CO4	S	S	S	S	S	M
CO5	S	S	S	S	S	M

S – Strong,

M – Medium,

L – Low



Program: M.Sc Computer Science				
Core – VIII		Course Code: 20PCS2C08		Course Title: Optimization Techniques
Semester	Hours/Week	Total Hours	Credits	Total Marks
II	3	45	4	100

### Course Objectives

1. To understand the concept of optimization
2. To develop mathematical model of real life cases
3. To study Optimization algorithms
4. understand various mathematical applications in industries

#### **UNIT – I**

Linear Programming Problem (LPP): Formulations and Graphical Solution of (2 variables) Canonical and Standard Terms of Linear Programming Problem, Simplex Method, Two Phase Simplex Method.

#### **UNIT – II**

Duality in LPP- Dual Problem to Primal- Primal to Dual Problem-Duality Simplex Method- Revised Simplex Method-Revised Simplex Algorithm-Revised Simplex Method Versus Simplex Method.

#### **UNIT – III**

Transportation Model: North West Corner Method, Least Cost Method, and Vogel's Approximation Method. Determining Net Evaluation-Degeneracy in TP- Assignment Model : Hungarian Assignment Model – Travelling Salesman Problem.

#### **UNIT – IV**

Replacement Problem: Replacement Policy for Equipment that Deteriorate Gradually, Replacement of Item that Fail Suddenly-Individual and Group Replacement, Problems in Mortality and Staffing.

**UNIT – V**

Project Scheduling PERT/CPM Networks – Fulkerson’s Rule – Measure of Activity – PERT Computation – CPM Computation – Resource Scheduling.

**Text Book**

1. Kanti Swarup, P.K. Gupta & Manmohan – Operation Research 1996.
2. S.Kalavathy: Operations Research – Second Edition – Vikas Publishing House Pvt.Ltd.,
3. S.Godfrey Winster, S. Aruna Devi, R.Sujatha, “Compiler Design”, Yesdee Publishing.

**Reference Books**

1. D.Shanthi, N.Uma Maheswari, S.Jeyanthi, “Theory of Computation”, Yesdee Publishing.
2. John W.Chinneck, “Feasibility and Infeasibility in Optimization-Algorithms and Computational Methods”, Springer, 2015.

**Web Resources**

1. [https://nptel.ac.in/content/storage2/courses/105108127/pdf/Module\\_1/M1L4slides.pdf](https://nptel.ac.in/content/storage2/courses/105108127/pdf/Module_1/M1L4slides.pdf)
2. <https://mech.iitm.ac.in/nspch52.pdf>
3. <https://www.sciencedirect.com/topics/engineering/optimization-method>
4. <https://www.hindawi.com/journals/mpe/2014/319418/>

**Course Outcomes (COs)**

On Successful completion of the course the students will have demonstrated

<b>CO NUMBER</b>	<b>CO STATEMENT</b>	<b>KNOWLEDGE LEVEL</b>
<b>CO1</b>	Learn about Linear Programming Problem	<b>K1 &amp; K2</b>
<b>CO2</b>	Learn about Elements of Queueing System	<b>K1 &amp; K2</b>
<b>CO3</b>	Apply game theory to analyze different situations of each player	<b>K2</b>
<b>CO4</b>	Apply Mathematical Techniques to find solution in the real life situations	<b>K2</b>
<b>CO5</b>	Solve the problems related to Network Analysis, Transportation and Assignment	<b>K3</b>

**K1- Remember, K2- Understand, K3-Analyse, K4- Implement, K5-Evaluate, K6-Create**

**Mapping of COs with Pos**

<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>
<b>CO1</b>	S	M	M	S	S	M
<b>CO2</b>	S	M	S	S	S	M
<b>CO3</b>	S	S	S	M	S	S
<b>CO4</b>	S	S	S	S	S	M
<b>CO5</b>	S	S	S	S	S	S

**S – Strong,****M – Medium,****L – Low**



Program: M.Sc Computer Science				
<b>Core Practical – III</b>		<b>Course Code: 20PCS2P03</b>		<b>Course Title: Advanced Java Lab</b>
<b>Semester</b> II	<b>Hours/Week</b> 4	<b>Total Hours</b> 60	<b>Credits</b> 2	<b>Total Marks</b> 100

### Course Objectives

1. To enable the students to implement different java packages.
2. To develop the students with the skills to implement different java tools.
3. Learn to use Asp.Net web controls
4. Design web applications using Asp.Net and Ado.Net

### **List of Programs**

#### **Use JAVA Programming Language to implement the following:**

1. To create applets incorporating the following Features:
  - a. Create a color palette with matrix of buttons
  - b. Set background and foreground of the control text area by selecting a color from color palette.
  - c. In order to select Foreground or background use check box control as radio buttons
  - d. To set background images
2. Use GridLayout to design a calculator and simulate the functions of simple calculator.
3. To create Input output and Random files
4. To develop chat application with datagram sockets and datagram packets.
5. To invoke servlet from HTML forms.
6. To invoke servlet from Applets.
7. To invoke servlet from JSP.
8. Simple client/server application.
9. JDBC to interact with database.
10. To create multiple chat applications using TCP packets.



### Course Outcomes (COs)

On Successful completion of the course the students will have demonstrated

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Learn the Internet Programming, using Java Applets.	K1, K2
CO2	Apply event handling on AWT and Swing components.	K3 & K4
CO3	Create a full set of UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (AWT) & Swings.	K4, K5, K6
CO4	Learn to access database through Java programs, using Java Data Base Connectivity (JDBC).	K4
CO5	Create dynamic web pages, using Servlets and JSP.	K5, K6

**K1- Remember, K2- Understand, K3-Analyse, K4- Implement, K5-Evaluate, K6-Create**

### Mapping of COs with POs

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	M	S	S	S
CO2	S	M	S	S	S	S
CO3	S	S	S	M	S	S
CO4	S	S	S	S	S	S
CO5	S	S	S	S	S	M

**S – Strong,**

**M – Medium,**

**L – Low**



**Program: M.Sc Computer Science**

<b>Core Practical – IV</b>		<b>Course Code: 20PCS2P04</b>		<b>Course Title: DOS Lab</b>	
<b>Semester</b> II	<b>Hours/Week</b> 4	<b>Total Hours</b> 60	<b>Credits</b> 2	<b>Total Marks</b> 100	

**Course Objectives**

1. Understand the design aspects of operating system.
2. Exposure on usage of various operating systems.
3. Design modern distributed system components

**List of Experiments**

1. Simulate the following CPU scheduling algorithms
  - a) Round Robin b) SJF c) FCFS d) Priority
2. Simulate all file allocation strategies
  - a) Sequential b) Indexed c) Linked
3. Implement process strategies: creation of child, zombie, orphan process
4. Implement file organization strategies
  - a) single level b) Two level c) Hierarchical
5. Simulate Bankers Algorithm for Dead Lock Avoidance
6. Simulate Bankers Algorithm for Dead Lock Prevention
7. Simulate all page replacement algorithms
  - a) FIFO b) LRU c) LFU
8. Implement shared memory and semaphore concepts for inter process communication



### Course Outcomes (COs)

On Successful completion of the course the students will have demonstrated

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Understand the simulation of CPU scheduling algorithms and file allocation strategies.	K1, K2
CO2	Develop distributed application using file allocation strategies.	K3 & K4
CO3	Construct the program to demonstrate concept of centralized and distributed deadlock.	K4, K5, K6
CO4	Build distributed application to illustrate the concept of Page replacement algorithms.	K4
CO5	Build the program to demonstrate concept of distributed mutual exclusion and process synchronization.	K5, K6

**K1- Remember, K2- Understand, K3-Analyse, K4- Implement, K5-Evaluate, K6- Create**

### Mapping of COs with POs

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	M	S	S	S
CO2	S	M	S	S	S	S
CO3	S	S	S	S	S	M
CO4	S	S	S	M	S	S
CO5	S	S	S	S	S	S

**S – Strong,**

**M – Medium,**

**L – Low**





Program: M.Sc Computer Science				
Elective – I		Course Code: 20PCS1E01		Course Title: Software Project Management
Semester	Hours/Week	Total Hours	Credits	Total Marks
I	4	60	3	100

### Course Objectives

1. Understand the framework of project management
2. Learn to monitor and control the project
3. Know the sound knowledge in Agile method
4. Know the team, cost, quality and resource management
5. Identify and control the risk in the projects

### **UNIT – I**

**Project Management Framework:** Introduction: Project - Project management - Relationship among Project, Program and Portfolio management - Project and Operations Management- Role of Project Manager - Project Management Body of Knowledge - Enterprise Environmental Factors. Project Life Cycle and Organization: Overview of Project life Cycle - Projects vs Operational Work - Stakeholders - Organizational Influences on Project Management. **The Standard for Project Management of a Project:** Project Management Processes for a Project: Common Project Management Process Interactions - Projects Management Process Groups - Initiating Process Group - Planning Process Group - Executing Process Group - Monitoring and Controlling Process Group - Closing Process Group.

### **UNIT – II**

Choosing Methodologies and Technologies – Software Processes and Process Models – Choice of Process Models – The Waterfall Model– Prototyping – Other Ways of Categorizing Prototype - **Agile Methods** – Extreme Programming Selecting the Most Appropriate Process Model- Need of Agile - Iterative vs Incremental-Agile Manifesto and Mindset – Lean, Scrum and Kanban Methods-Uncertainty, Risk, and Lifecycle Selection-Scrum Elements Overview-5 Levels of Planning-Scrum Process Overview-Agile Team-Roles and Responsibilities- Epic-Feature-User Stories-PBI-The Sprint.



### UNIT – III

**The Project Management Knowledge Areas:** Project Integration Management: Develop Project Charter - Develop Project Management Plan - Direct and Manage Project Execution - Monitor and Control Project Work - Perform Integrated Change Control - Close Project or Phase. Project Scope Management: Collect Requirements - Define Scope - Create WBS - Verify Scope - Control Scope. Project Team Management: Define Activities - Sequence Activities - Estimate Activity Resources - Estimate Activity Durations - Develop Schedule - Control Schedule.

### UNIT – IV

Project Cost Management: Estimate Costs - Determine Budget - Control Costs. Project Quality Management: Plan Quality - Perform Quality Assurance - Perform Quality Control. Project Human Resource Management: Develop Human Resource Plan - Acquire Project Team - Develop Project Team - Manage Project Team. Project Communications Management: Identify Stakeholders - Plan Communications - Distribute Information - Manage Stakeholder Expectations - Report Performance.

### UNIT – V

Project Risk Management: Plan Risk Management - Identify Risks - Perform Qualitative Risk Analysis - Perform Quantitative Risk Analysis - Plan Risk Responses - Monitor and Control Risks. Project Procurement Management: Plan - Conduct - Administer - Close procurements.

### Text Books

1. A guide to the Project management Body of Knowledge (PMBOK Guide)" Fourth Edition, Project Management Institute, Pennsylvania, 2008
2. BOB Huges, Mike Cotterell, Rajib Mall "Software Project Management", McGraw Hill, Fifth Edition, 2011.
3. Emerson, "Agile Handbook," Philosophie

### Reference Books

1. Futrell, "Quality Software Project Management", Pearson Education India.
2. Royce, "Software Project Management", Pearson Education India.
3. C.Ravindranath Pandian, "Applied Software Risk Management-A Guide for Software Project Managers", Auerbach Publications, 2015.



4. Benjamin A. Lieberman, “The Art of Software Modeling”, Auerbach Publications, 2010.

### Web Resources

1. <http://www.cs.bilkent.edu.tr/~cagatay/cs413/PMBOK.pdf>
2. <http://www.orange.ngo/wp-content/uploads/2016/09/PMBOK-Guide-5th-Edition-PMI.pdf>
3. <https://books.google.co.in/>

### Course Outcomes (COs)

On Successful completion of the course the students will have demonstrated

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Analyze the scope, cost, timing, and quality of the project, at all times focused on project success as defined by project stakeholders.	K1
CO2	Align the project to the organization's strategic plans and business justification throughout its lifecycle	K1 & K2
CO3	Identify project goals, constraints, deliverables, performance criteria, control needs, and resource requirements in consultation with stakeholders.	K3
CO4	Implement project management knowledge, processes, lifecycle and the embodied concepts, tools and techniques in order to achieve project success.	K3
CO5	Adapt projects in response to issues that arise internally and externally.	K3

**K1- Remember, K2- Understand, K3-Analyse, K4- Implement, K5-Evaluate, K6-Create**

### Mapping of COs with POs

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	M	S	S	S
CO2	S	S	S	S	M	S
CO3	S	S	S	S	S	S
CO4	S	S	M	S	S	S
CO5	S	S	S	S	S	M

S – Strong,

M – Medium,

L – Low



Program: M.Sc Computer Science				
Elective – I		Course Code: 20PCS1E02		Course Title: Wireless Networks
Semester	Hours/Week	Total Hours	Credits	Total Marks
I	4	60	3	100

### Course Objectives

1. To impart adequate knowledge of wireless communication
2. To Study about Wireless Networks, Protocol Stack and Standards.
3. To Study about Fundamentals of 3G Services, Its Protocols and Applications.
4. To Study about Evolution of 4G Networks, its Architecture and Applications.

#### **UNIT – I**

**WIRELESS LAN** - Introduction-WLAN Technologies: Infrared, UHF Narrowband, Spread Spectrum -IEEE802.11: System Architecture, Protocol Architecture, Physical Layer, MAC Layer, 802.11b, 802.11a – Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, Radio Layer, Baseband Layer, Link Manager Protocol, Security – IEEE802.16- WIMAX: Physical Layer, MAC, Spectrum Allocation For WIMAX

#### **UNIT – II**

**MOBILE NETWORK LAYER** - Introduction – Mobile IP: IP Packet Delivery, Agent Discovery, Tunneling And Encapsulation, IPV6-Network Layer In The Internet- Mobile IP Session Initiation Protocol – Mobile Ad-Hoc Network: Routing, Destination Sequence Distance Vector, Dynamic Source Routing.

#### **UNIT – III**

**MOBILE TRANSPORT LAYER** - TCP Enhancements For Wireless Protocols – Traditional TCP: Congestion Control, Fast Retransmit/Fast Recovery, Implications of Mobility – Classical TCP Improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time Out Freezing, Selective Retransmission, Transaction Oriented TCP – TCP Over 3G Wireless Networks.



## UNIT – IV

**WIRELESS WIDE AREA NETWORK** - Overview Of UTMS Terrestrial Radio Access Network-UMTS Core Network Architecture: 3G-MSC, 3G-SGSN, 3G-GGSN, SMS-GMSC/SMS-IW MSC, Firewall, DNS/DHCP-High Speed Downlink Packet Access (HSDPA)- LTE Network Architecture And Protocol.

## UNIT – V

4G NETWORKS - Introduction – 4G Vision – 4G Features And Challenges – Applications Of 4G – 4G Technologies: Multicarrier Modulation, Smart Antenna Techniques, OFDM-MIMO Systems, Adaptive Modulation And Coding with Time Slot Scheduler, Cognitive Radio.

### Text Books

1. Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education 2012.(Unit I,II,III)
2. Vijay Garg , "Wireless Communications And Networking", First Edition, Elsevier 2014.(Unit IV,V)

### Reference Books

1. Erik Dahlman, Stefan Parkvall, Johan Skold And Per Beming, "3G Evolution HSPA And LTE For Mobile Broadband", Second Edition, Academic Press, 2008.
2. Anurag Kumar, D.Manjunath, Joy Kuri, "Wireless Networking", First Edition, Elsevier 2011.
3. Simon Haykin , Michael Moher, David Koilpillai, "Modern Wireless Communications", First Edition, Pearson Education 2013.
4. David G. Messerschmitt, "Understanding Networked Applications", Elsevier, 2010

### Web Resources

1. [https://sgar91.files.wordpress.com/2011/10/mobile\\_communications\\_schiller\\_2e.pdf](https://sgar91.files.wordpress.com/2011/10/mobile_communications_schiller_2e.pdf)
2. <https://www.ibr.cs.tu-bs.de/courses/ss11/mk/material/mk-ss11-slides-ch01.pdf>
3. <https://www.tutorialspoint.com/Wireless-Networks>
4. <https://commotionwireless.net/docs/cck/networking/types-of-wireless-networks/>



### Course Outcomes (COs)

On Successful completion of the course the students will have demonstrated

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Students will get the knowledge of wireless communication	K1
CO2	Knows the structures and standards of wireless communication	K1 & K2
CO3	Conversant With The Latest 3G/4G And WiMAX Networks And Its Architecture.	K3
CO4	Design and Implement Wireless Network Environment For Any Application Using Latest Wireless Protocols And Standards.	K4
CO5	Implement Different Type Of Applications For Smart Phones And Mobile Devices With Latest Network Strategies	K4

**K1- Remember, K2- Understand, K3-Analyse, K4- Implement, K5-Evaluate, K6-Create**

### Mapping of COs with POs

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	M	S	S	M
CO2	S	M	S	S	S	S
CO3	S	S	S	S	M	S
CO4	S	S	S	S	S	S
CO5	S	S	S	S	S	S

**S – Strong,**

**M – Medium,**

**L – Low**



Program: M.Sc Computer Science				
Elective – I		Course Code: 20PCS1E03		Course Title: Object Oriented System Development
Semester	Hours/Week	Total Hours	Credits	Total Marks
I	4	60	3	100

### Course Objectives

1. Introduce the concept of Object-oriented design and understand the fundamentals of OOSD life cycle.
2. Familiar with evolution of object-oriented model, classes and its notations
3. Practice UML in order to express the design software projects.
4. Specify, analyze and design the use case for a particular system.
5. Enrich knowledge about DBMS, designing classes and object oriented testing.

### **UNIT – I**

**Fundamentals of OOSD** - Overview of Object Oriented Systems Development : Two Orthogonal View of the Software - OOSD Methodology - Why an Object Object Orientation. Object Basics: Object Oriented Philosophy- Objects – Attributes – Object Respond to Messages – Encapsulation and Information Hiding – Class Hierarchy – Polymorphism – Object Relationship and Associations. OOSD Life Cycle : Software Development Process – OOSD Use Case Driven Approach – Reusability.

### **UNIT – II**

**Methodology, Modeling and UML** - Object Oriented Methodologies: Rumbaugh et al.'s Object Modeling Technique – The Booch Methodology – The Jacobson et al. Methodology – Patterns – Frameworks - The Unified Approach. Unified Modeling Language : Static and Dynamic Models – Why Modeling - UML Diagrams – UML Class Diagram – Use Case Diagram - UML Dynamic Modeling – Packages and Model Organization.

### **UNIT – III**

**Object Oriented Analysis** - Object Oriented Analysis Process : Business Object Analysis - Use Case Driven Object Oriented Analysis – Business Process Modeling – Use-Case model – Developing Effective Documentation . Classification : Classifications Theory – Approaches



for Identifying Classes – Noun Phrase Approach – Common Class Patterns Approach – Use-Case Driven Approach – Classes, Responsibilities, and Collaborators - Naming Classes. Identifying Object Relationships, Attributes, and Methods : Association – Super-Sub Class Relationship – Aggregation – Class Responsibility – Object Responsibility.

#### UNIT – IV

**Object Oriented Design** - Object Oriented Design Process and Design Axioms - OOD Process- OOD Axioms – Corollaries – Design Patterns. Designing Classes : Designing Classes – Class Visibility – Refining Attributes – Designing Methods and Protocols – Packages and Managing Classes. Access Layer: Object Store and Persistence – DBMS – Logical and Physical Database Organization and Access Control – Distributed Databases and Client Server Computing — Multidatabase Systems – Designing Access Layer Classes. View Layer : Designing View Layer Classes – Macro Level Process – Micro Level Process – The Purpose of View Layer Interface – Prototyping the User Interface.

#### UNIT – V

**Software Quality** - Software Quality Assurance : Quality Assurance Tests – Testing Strategies – Impact of Object Orientation on Testing - Test Cases- Test Plan – Continuous Testing. System Usability and Measuring User Satisfaction: Usability Testing – User Satisfaction test – A tool for Analyzing User Satisfaction. System Usability and Measuring User Satisfaction : Introduction – Usability Testing.

#### Text Book

1. Ali Bahrami, “Object Oriented Systems Development using UML”, McGraw-Hill, 2008

#### Reference Books

1. Booch Grady, Rumbaugh James, Jacobson Ivar, “The Unified modeling Language – User Guide, Pearson Education, 2006
2. Brahma Dathan, Sarnath Ramnath, “Object Oriented Analysis, Design and Implementation”, Universities Press, 2010.
3. Mahesh P.Matha, “Object-Oriented Analysis and Design Using UML”, PHI Learning Private Limited, 2012.
4. Rachita Misra, Chhabi Rani Panigrahi, Bijayalaxmi Panda, “Principles of Software Engineering and System Design”, Yesdee Publishing 2019.

#### Web Resources

1. <https://www.tutorialspoint.com/>





2. <https://javajee.com/introduction-to-object-oriented-systems-development>
3. <https://www.uml-diagrams.org/uml-object-oriented-concepts.html>

### Course Outcomes (COs)

On Successful completion of the course the students will have demonstrated

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Show how the object-oriented approach differs from the traditional approach to systems analysis and design.	K1
CO2	Analyze, design, document the requirements through use case driven approach	K1 & K2
CO3	Explain the importance of modeling and how the Unified Modeling Language (UML) represents an object-oriented system using a number of modeling views.	K3
CO4	Recognize the difference between various object relationships: inheritance, association and aggregation.	K4
CO5	Show the role and function of test cases, testing strategies and test plans in developing object-oriented software.	K4

**K1- Remember, K2- Understand, K3-Analyse, K4- Implement, K5-Evaluate, K6-Create**

### Mapping of COs with POs

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	M	S	S	S
CO2	M	M	S	S	S	M
CO3	S	S	S	S	S	S
CO4	S	S	S	S	S	S
CO5	S	S	S	M	S	S

S – Strong,

M – Medium,

L – Low



Program: M.Sc Computer Science				
Elective – II		Course Code: 20PCS2E04		Course Title: Data Mining And Warehousing
Semester II	Hours/Week	Total Hours	Credits	Total Marks
	3	45	3	100

### Course Objectives

1. Learn the basics of Data Mining and Data Warehousing.
2. To recognize the various data mining and warehousing tools
3. To develop the proficiency for planning & applying the DM techniques.

#### UNIT – I

**Data Mining And Data Preprocessing:** Data Mining – Motivation – Definition – Data Mining on Kind of Data –Functionalities – Classification – Data Mining Task Primitives – Major Issues in Data Mining – Data Preprocessing – Definition – Data Clearing – Integration and Transformation – Data Reduction.

#### UNIT – II

**Data Warehousing:** Multidimensional Data Model –Data Warehouse Architecture – Data Warehouse Implementation –From data Warehousing to Data Mining – Online Analytical Processing - Online Analytical Mining.

#### UNIT – III

**Frequent Patterns, Associations And Classification:** The Apriori Algorithm – Definition of Classification and Prediction – Classification by Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Lazy Learners – K-Nearest Neighbor – Other Classification Methods.

#### UNIT – IV

**Cluster Analysis:** Definition – Types of data in Cluster Analysis – Categorization of major Clustering Techniques – Partitioning Methods – Hierarchical Clustering – BIRCH - ROCK – Grid Based Methods – Model Based Clustering Methods – Outlier Analysis.



## UNIT – V

**Spatial, Multimedia, Text And Web Data:** Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web – Data Mining Applications – Trends in Data Mining.

### Text Books

1. Jiawei Han and Micheline Kamber, “Data Mining: Concepts and Techniques, 3rd Edition, July 6, 2011.
2. Ian H. Witten, Eibe Frank, Mark A. Hall, “Data Mining: Practical Machine Learning Tools and Techniques”, Elsevier; Third edition, 2014.

### Reference Books

1. Margret H. Dunham, “Data Mining: Introductory and Advanced Topics”, Pearson Education, 2003.
2. M. Awad, Latifur Khan, Bhavani Thuraisingham, Lei Wang, “Design and Implementation of Data Mining Tools”, CRC Press-Taylor & Francis Group, 2015.
3. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, “Introduction to Data Mining- Instructor’s Solution Manual”, Pearson Education, First Edition, 2016.
4. Mohammed J.Zaki, Wagner Meira JR, “Data Mining and Analysis: Fundamental Concepts and Algorithms”, Cambridge India, 2016.

### Web Resources

1. <http://myweb.sabanciuniv.edu/rdehkharghani/files/2016/02/The-Morgan-Kaufmann-Series-in-Data-Management-Systems-Jiawei-Han-Micheline-Kamber-Jian-Pei-Data-Mining.-Concepts-and-Techniques-3rd-Edition-Morgan-Kaufmann-2011.pdf>
2. [http://ccs1.hnue.edu.vn/hungtd/DM2012/DataMining\\_BOOK.pdf](http://ccs1.hnue.edu.vn/hungtd/DM2012/DataMining_BOOK.pdf)



### Course Outcomes (CO)

On Successful completion of the course the students will have demonstrated

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Understand the basics of DataMining & DataWarehousing.	K1
CO2	Identify the appropriate Data Mining techniques for problem solving	K2
CO3	Demonstration of various data mining techniques and ware housing tool	K3
CO4	Implement the classification and clustering techniques	K4
CO5	Aware about Spatial, Multimedia and Text Mining	K4

K1- Remember, K2- Understand, K3-Analyse, K4- Implement, K5-Evaluate, K6-Create

### Mapping of COs with POs

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	M	S	S	S
CO2	S	S	S	S	S	S
CO3	S	S	S	S	M	S
CO4	S	M	S	S	S	S
CO5	S	S	S	S	S	S

S – Strong,

M – Medium,

L – Low



**Program: M.Sc Computer Science**

<b>Elective – II</b>		<b>Course Code: 20PCS2E05</b>		<b>Course Title: Compiler Design</b>	
<b>Semester</b> II	<b>Hours/Week</b> 3	<b>Total Hours</b> 45	<b>Credits</b> 3	<b>Total Marks</b> 100	

**Course Objectives**

1. Discover principles, algorithms and techniques that can be used to construct various phases of compiler.
2. Acquire knowledge about finite automata and regular expressions.
3. Learn the concept of context free grammars, compiler parsing techniques.
4. Explore knowledge about Syntax Directed definitions and translation scheme.
5. Understand intermediate machine representations and actual code generation

**UNIT – I**

**Lexical analysis** - Language Processors, The Structure of a Compiler, Parameter Passing Mechanism – Symbol Table - The Role of the Lexical Analyzer - Input Buffering - Specification of Tokens - Recognition of Tokens – Finite Automata - Regular Expression to Automata.

**UNIT – II**

**Syntax Analysis** - The Role of the Parser - Context-Free Grammars - Writing a Grammar - Top Down Parsing - Bottom-Up Parsing - LR Parsers- LALR Parsers.

**UNIT – III**

**Semantic Analysis** - Inherited and Synthesized Attributes – Dependency Graphs – Ordering the Evaluation of Attributes – S-attributed Definitions – L-attributed Definitions – Applications of Syntax Directed Translation – Syntax Directed Translations Schemes - Storage Organization – Stack Allocation of Space.

**UNIT – IV**

**Intermediate Code Generation** - Variants of Syntax Trees – Three Address Code – Types and Declarations - Translation of Expressions – Type Checking - Control Flow - Back Patching - Switch Statements - Procedure Calls.



## UNIT – V

**Code Generation and Code Optimization** - Issues in the Design of a Code Generator - The Target Language – Address in the Target Code – Basic Block and Flow Graphs – Optimization of Basic Blocks - A Simple Code Generator – Peephole Optimization.

### Text Book

1. Alfred V. Aho, Monica S.Lam, Ravi Sethi and Jeffrey D. Ullman, “Compilers- Principles, Techniques and Tools”, Second Edition, Pearson Education Asia, 2009.

### Reference Books

1. A.V. Aho, Ravi Sethi, J.D. Ullman, Compilers - Principles, Techniques and Tools, Addison- Wesley, 2003.
2. Fischer Leblanc, Crafting Compiler, Benjamin Cummings, Menlo Park, 1988.
3. Kenneth C.Louden, Compiler Construction Principles and Practice, Vikas publishing House, 2004.
4. Allen I. Holub, Compiler Design in C, Prentice Hall of India, 2001.
5. S.Godfrey Winstler, S.Aruna Devi, R.Sujatha, “Compiler Design”, yesdee Publishers, Third Reprint 2019.

### Web Resources

1. <http://index-of.es/Varios-2/Compilers.pdf>
2. <http://turbo51.com/download/Compilers-Principles-Techniques-and-Tools-Book-Preview.pdf>
3. [http://www.crectirupati.com/sites/default/files/lecture\\_notes/COMPILER%20DESIGN%20NOTES.pdf](http://www.crectirupati.com/sites/default/files/lecture_notes/COMPILER%20DESIGN%20NOTES.pdf)



### Course Outcomes (COs)

On Successful completion of the course the students will have demonstrated

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Posses knowledge about finite automata and regular expressions.	K1
CO2	Understand Lexical, syntax and Semantic analysis	K2
CO3	Learn the concept of context free grammars, compiler parsing techniques.	K2
CO4	Learn Code Generation and Code Optimization	K2
CO5	Use the knowledge of patterns, tokens & regular expressions for solving a problem in the field of data mining.	K4

**K1- Remember, K2- Understand, K3-Analyse, K4- Implement, K5-Evaluate, K6-Create**

### Mapping of COs with POs

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	S	S	S	S
CO2	S	M	S	S	S	S
CO3	S	S	S	S	M	S
CO4	S	S	S	S	S	S
CO5	S	S	S	S	S	S

**S – Strong,**

**M – Medium,**

**L – Low**



Program: M.Sc Computer Science				
Elective – II		Course Code: 20PCS2E06		Course Title: Embedded Systems
Semester	Hours/Week	Total Hours	Credits	Total Marks
II	3	45	3	100

### Course Objectives

1. To teach all aspects of design and development of an embedded System.
2. To understand hardware and software of development system.
3. Describe the hardware software co-design and firmware design approaches.
4. Know the RTOS internals, multitasking, task scheduling, task communication and synchronization.
5. Learn the development life cycle of embedded system.

### **UNIT – I**

Introduction to Embedded System - Embedded System vs General Computing Systems - History - Classification - Major Application Areas - Purpose of Embedded systems - Smart Running Shoes: The Innovative Bonding of Lifestyle with Embedded Technology. Characteristics and Quality Attributes of Embedded Systems.

### **UNIT – II**

Elements of an Embedded System - Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, COTS - Memory - Sensors and Actuators - Communication Interface: Onboard and External Communication Interfaces - Embedded Firmware - Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real-Time Clock, and Watchdog Timer - PCB and Passive Components.

### **UNIT – III**

Embedded Systems - Washing Machine: Application-Specific - Automotive: Domain Specific. Hardware Software Co-Design - Computational Models - Embedded Firmware Design Approaches - Embedded Firmware Development Languages - Integration and Testing of Embedded Hardware and Firmware.





## UNIT – IV

RTOS based Embedded System Design: Operating System Basics - Types of Operating Systems - Tasks, Process and Threads - Multiprocessing and Multitasking - Task Scheduling- Task Communication - Task Synchronisation - Device Drivers - Choosing an RTOS.

## UNIT – V

Components in Embedded System Development Environment, Files Generated During Compilation, Simulators, Emulators and Debugging - Objectives of Embedded Product Development Life Cycle - Different Phases of EDLC - EDLC Approaches - Trends in Embedded Industry - Case Study: Digital Clock.

### Text Book

1. K. V. Shibu, "Introduction to embedded systems", TMH education Pvt. Ltd. 2009.

### Reference Books

1. Raj Kamal, "Embedded Systems: Architecture, Programming and Design", TMH. Second Edition 2009
2. Frank Vahid, Tony Givargis, "Embedded System Design", John Wiley. Third Edition 2006
3. Cliff Young, Faraboschi Paolo, and Joseph A. Fisher, "Embedded Computing: A VLIW Approach to Architecture, Compilers and Tools", Morgan Kaufmann Publishers, An imprint of Elsevier, 2005.
4. David E. Simon, "An Embedded Software Primer" Pearson Education, 1999.

### Web Resources

1. [https://www.tutorialspoint.com/embedded\\_systems/embedded\\_systems\\_tutorial.pdf](https://www.tutorialspoint.com/embedded_systems/embedded_systems_tutorial.pdf)
2. <https://www.bharathuniv.ac.in/>
3. <https://www.iitg.ac.in/>
4. <https://sushmatoravi.files.wordpress.com/2017/08/233633895-intro-to-embedded-systems-by-shibu-kv.pdf>



### Course Outcomes (COs)

On Successful completion of the course the students will have demonstrated

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Acquire knowledge about microcontrollers embedded processors and their applications.	K1
CO2	Understand the internal architecture and interfacing of different peripheral devices with Microcontrollers.	K2
CO3	Apply key concepts of embedded systems like interrupts interaction, drivers, and ports with peripheral devices.	K3
CO4	Analyze the design concept of embedded systems	K4
CO5	Design real time embedded systems using the concepts of RTOS	K6

**K1- Remember, K2- Understand, K3-Analyse, K4- Implement, K5-Evaluate, K6-Create**

### Mapping of COs with POs

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	M	M	M	S	S	S
CO2	M	M	S	S	S	S
CO3	S	S	S	S	S	S
CO4	S	S	S	S	S	S
CO5	S	S	S	S	S	S

S – Strong,

M – Medium,

L – Low



## EDC-EXTRA DISCIPLINARY COURSE

Program: M.Sc Computer Science				
EDC		Course Code: 20PCS2EDC01		Course Title: Principles of Information Technology
Semester	Hours/Week	Total Hours	Credits	Total Marks
II	4	60	4	100

### Course Objectives

To acquire skills relating to IT basics, computer applications, programming, interactive medias, Internet basics etc.

#### **UNIT – I**

Business Environment: Business and Information Technology – Business in the Information Age – about Information Technology – what is an Information System – Information Technology in the Modern Organization.

#### **UNIT – II**

Computer Hardware – Significance of Hardware – Central Processing Unit – Computer Memory – Computer Hierarchy – Input Technologies – Output Technologies – Strategic Hardware Issues. Computer Software: Software History and Significance – System Software – Application Software – Software Issues – Programming Languages – Enterprise Software.

#### **Unit – III**

Managing Organizational Data and Information: Basics of Data Arrangement and Access – Traditional File Environment – Modern Approach: Database Management Systems – Logical Datamodels – Data Warehouses – Telecommunications and Networks: The Telecommunication System – Networks – Telecommunications Applications – Internet Evolution of the Internet – Operation of the Internet – WWW- Intranets and Extranets.

#### **UNIT – IV**

Functional, Enterprises, and Inter-organizational Systems: Information System to Support Business Functions – Transaction Processing Information Systems – Accounting and Finance



System – Marketing and Sales System – Production and Operations Management System – Integrated Information System and Enterprises Resource Planning – Inter-organizational / Global Information System. - Electronic Commerce.

### UNIT – V

Information Systems Development: Information System Planning – Traditional Systems Development Life Cycle – Alternative Methods for System Development – System Development Outside the IS Department – Building Internet and Intranet Applications – Implementing: Ethics, Impacts and Security.

### Text Book

1. Turban, Rainer, Potter "Introduction to Information Technology," 2nd edition, Wiley India, 2007

### Reference Book

1. V. Rajaraman – Introduction to Information Technology, Prentice Hall of India, 2007.

### Course Outcomes (COs)

On successful completion of the course, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand fundamental concepts and techniques of Information technology.	K1 & K2
CO2	Have a basic understanding of personal computers and their operations.	K2 & K3
CO3	Learn about computer Hardware	K4
CO4	Implementing Ethics, Impacts and Security of IT	K5 & K6
CO5	Be able to identify issues related to information security	K6

**K1– Remember, K2– Understand, K3– Apply, K4 –Analyze, K5– Evaluate, K6 –Create**



**Mapping of COs with POs**

<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>
<b>CO1</b>	M	M	M	S	S	S
<b>CO2</b>	M	M	S	S	S	S
<b>CO3</b>	S	S	M	S	S	M
<b>CO4</b>	S	S	S	S	S	S
<b>CO5</b>	S	S	S	M	S	S

**S – Strong,**

**M – Medium,**

**L – Low**



Program: M.Sc Computer Science				
EDC		Course Code: 20PCS2EDC02		Course Title: Fundamentals of Computers and Communications
Semester	Hours/Week	Total Hours	Credits	Total Marks
II	4	60	4	100

### Course Objectives

1. Understanding of basic concepts of computer.
2. Learn the fundamentals of hardware, software and programming.
3. Introducing to system and application software.
4. Understanding of communication and computer security.

#### UNIT – I

**Computer:** Introduction – Components of Computers – Advantages and Disadvantages of using Computers – Computer Software – Categories of Computers -Elements of an Information Systems. The Components of the Systems Unit: Processor – Data Representation – Memory – Expansion Slot and Adapter Cards – Ports and Connectors - Buses – Bays – Power Supply – Mobile Computers and Devices.

#### UNIT – II

**Input and Output Device:** What is Input - What are Input devices – Keyboard – Pointing Device – Mouse – Other Pointing Devices – Controllers for Gaming and Media Players – Voice Input – Input for PDAs, Smart Phones and Tablet PCs- Digital Cameras – Video Input – Scanners and Reading Devices Terminals – Biometric Input - Input Devices for Physically challenged Users- Output: What is Output – Display Devices – Flat Panel Displays – CRT Monitors – Printers – Speakers, Headphones and Ear phones – Other Output Devices – Output Device for Physically Challenged Users – Storage Devices.

#### UNIT – III

**Operating Systems and Utility Programs:** System Software – Operating System – Operating System Functions – Operating System Utility Programs – Types of Operating Systems – Stand alone Operating Systems – Network Operating Systems – Embedded Operating System – Standalone Utility Programs. Application Software: Application



Software – Business Software – Graphics and Multimedia Software – Application Software for Communication.

#### UNIT – IV

**Internet and World Wide Web:** Internet – History of the Internet – How the Internet Works – WWW – E-commerce – Other Internet Services – Netiquette. Communications and Networks: Communications – Uses of Computer Communications – Networks – Network communication Standards – Communication Software – Communication Over the Telephone Network – Communication Devices – Home Networks – Communications Channel – Physical Transmission Media and Wireless Transmission Media.

#### UNIT – V

**Database Management:** Databases, Data and Information, The Hierarchy of Data – Maintaining Data – File Processing Versus Databases – Database Management Systems – Relational, Object Oriented and Multidimensional Databases – Web Databases – Database Administration. Computer Security: Computer Security Risks – Internet and Network Attacks – Unauthorized Access and Use.

#### Text Book

1. Gary B. Shelly, Thomas j. Cashman, Misty E.Vermaat, "Introduction to Computers," Cengage Learning, 2008

#### Reference Books

1. Reema Thareja, "Fundamentals of Computers," Oxford Univ. Press, 2015
2. Deborah Morley, Charles S. Parker, "Understanding Computers- Today and Tomorrow", 14th Edition, Thomson Course Technology, 2012
3. Alexis Leon, Mathew's Leon, "Fundamentals of Computer Science and Communication Engineering", Vikas Publishing House, New Delhi, 1998.



### Course Outcomes (COs)

On successful completion of the course, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand fundamental components and functionality of Computer.	K1 & K2
CO2	Learn about input and output devices	K2 & K3
CO3	Build knowledge of operating system concepts	K4
CO4	Understanding the concept of communication network	K5 & K6
CO5	Aware about database concepts and computer security	K6

**K1– Remember, K2– Understand, K3– Apply, K4 –Analyze, K5– Evaluate, K6 –Create**

### Mapping of COs with POs

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	M	M	M	S	S	S
CO2	M	S	S	S	S	S
CO3	S	S	S	M	S	M
CO4	S	S	S	S	S	S
CO5	S	S	M	S	S	S

**S – Strong,**

**M – Medium,**

**L – Low**





**Program: M.Sc Computer Science**

<b>EDC</b>		<b>Course Code:20PCS2EDC03</b>		<b>Course Title: E-Commerce</b>
<b>Semester</b> II	<b>Hours/Week</b> 4	<b>Total Hours</b> 60	<b>Credits</b> 4	<b>Total Marks</b> 100

**Course Objectives**

1. Understanding Framework and Anatomy of E-Commerce Applications.
2. Learn the concept of Electronic payment system
3. Study about Standardization and EDI and EDI Software Implementation.

**UNIT – I**

Electronic Commerce- Electronic Commerce Framework-The Anatomy of Electronic Commerce Applications- Electronic Commerce Consumer Applications- Electronic Commerce Organization Applications- Components of I-Way – Network Access Equipment.

**UNIT – II**

Architecture Framework for Electronic Commerce- World Wide Web as the Architecture – Consumer Oriented Applications – Mercantile Process Models – Mercantile Models from the Consumers Perspective and Merchant’s Perspective.

**UNIT – III**

**Electronic Payment Systems:** Types of Electronic Payment Systems – Digital Token Based Electronic Payment Systems – Smart Card and Credit Card Based Electronic Payment Systems – Risk and Electronic Payment Systems – Designing Electronic Payment Systems.

**UNIT – IV**

Electronic Data Interchange – EDI Applications in Business – EDI: Legal, Security and Privacy Issues EDI and Electronic Commerce – Standardization and EDI – EDI Software Implementation.

**UNIT – V**

**Internet and World Wide Web:** Origin of the Internet – New Uses for the Internet – Commercial Use of the Internet – Growth of the Internet- Advertising on the Internet.



### Text Books

1. Kalakota and Whinston, "Frontiers of Electronic Commerce," Pearson Education, 2004.
2. Gray P. Scheider, "Fourth Annual Edition Electronic Commerce," Thomson Course Technology, 2003.

### Reference Books

1. Kamalesh K. Baja, Debjani Nag, "E-Commerce – The Cutting Edge of Business," TMH Publications, 2005.
2. Agarwala, K.N, Deeksha Agarwala, "Business on the Net: What's and How's of ECommerce;" Macmillan, New Delhi.
3. Parag Diwan, Sunil Sharma, "Electronic Commerce: A Manager's Guide to E-Business," Excel books, 2005.

### Course Outcomes (COs)

On successful completion of the course, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn the concept of e-commerce	K1 & K2
CO2	Examine some typical distributed applications	K2 & K3
CO3	Describe briefly some of the technologies that are used to support distributed applications	K4
CO4	Identifying the functionality of Electronic payment system	K5 & K6
CO5	Understand the Commercial use of Internet	K6

**K1– Remember, K2– Understand, K3– Apply, K4 –Analyze, K5– Evaluate, K6 –Create**

### Mapping of COs with POs

CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	M	S	S	S
CO2	S	S	M	S	S	S
CO3	S	S	S	S	S	M
CO4	S	S	S	S	S	M
CO5	S	S	M	S	S	S

**S – Strong,**

**M – Medium,**

**L – Low**