

E.M.G. YADAVA WOMEN'S COLLEGE , MADURAI – 625 014.

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)

Re-accredited (**3rd Cycle**) with Grade **A+ & CGPA 3.51** by NAAC

DEPARTMENT OF COMPUTER SCIENCE



CBCS With OBE

BACHELOR OF SCIENCE

PROGRAMME CODE - S

COURSE STRUCTURE

(w.e.f. 2022 – 2023 Batch onwards)

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI -14.

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)

(Re –accredited (3rd cycle) with Grade A⁺ and CGPA 3.51 by NAAC)**DEPARTMENT OF COMPUTER SCIENCE - UG****CBCS with OBE****COURSE STRUCTURE**

(w.e.f. 2022 – 2023 Batch onwards)

Semester	Part	Course Code	Title of the Course	Teaching hrs (per week))	Duration of Exam (hrs.)	Marks Allotted			Credits
						CIA	SE	Total	
III	I	22OU1TA3	Tamil	6	3	25	75	100	3
	II	22OU2EN3	English	6	3	25	75	100	3
	III	22OUCS31	Core : Digital Principles and Computer Organization	4	3	25	75	100	3
	III	22OUCS32	Core : RDBMS	4	3	25	75	100	4
	III	22OUCS3P	Core : SQL and PL/SQL Lab	3	3	40	60	100	3
	III	22OUCSGEMA3	GEC : Mathematics – 3 Numerical Methods	5	3	25	75	100	5
	IV	22OUCSSE3P	SEC : VB.Net and ASP.Net Programming Lab	2	3	40	60	100	2
IV	I	22OU1TA4	Tamil	6	3	25	75	100	3
	II	22OU2EN4	English	6	3	25	75	100	3
	III	22OUCS41	Core : Data Structures	4	3	25	75	100	3
	III	22OUCS42	Core : Programming in JAVA	4	3	25	75	100	4
	III	22OUCS4P	Core : Programming in JAVA Lab	3	3	40	60	100	3
	III	22OUCSGEMA4	GEC : Mathematics – 4 Resource Management Techniques	5	3	25	75	100	5
	IV	22OUCSSE4P	SEC : Data Structures Lab	2	3	40	60	100	2

GEC- Generic Elective Course**SEC**- Skill Enhancement Course**DSEC**- Discipline Specific Elective Course**AECC**- Ability Enhancement Compulsory Course**IDC**- Inter Disciplinary Course

Department of Computer Science				Class: II B.Sc.,				
Sem	Category	Course Code	Course Title	Credits	Hours/Week	CIA	External Exam	Total
III	Core	22OUCS31	Digital Principles and Computer Organization	3	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓		

Course Objectives:

1. Make the students to understand gates and circuit level.
2. The main emphasis of the subject is to convert conversion in number system.
3. Explore the basic computer organization and design.
4. To impart adequate knowledge of instruction techniques and data format.
5. Make the Students to analyze different types input and output memory organization.

Course Content:

Unit – I

Digital Logic: The Basic Gates - NOT, OR, AND – Universal Gates-NOR, NAND. **Combinational logic Circuits:** Boolean Laws and Theorem – Sum-of-Product Method – Truth Table to Karnaugh Map – Pairs, Quads and Octets – Karnaugh Simplifications – Don't care Conditions. **Data Processing Circuits:** Multiplexers – Demultiplexer – 1-of-16 Decoder – Encoders.

Unit – II

Number Systems and Codes: Binary Number System – Binary-to-decimal Conversion – Decimal-to-binary Conversion – Octal Numbers – Hexadecimal Numbers- The ASCII Code – The Excess-3 Code – The Gray Code. **Arithmetic Circuits:** Binary Addition – Binary Subtraction – 2's Complement Representation – 2's Complement Arithmetic. **Flip-Flops:** RS FLIP-FLOPs – Edge-triggered D FLIP-FLOPs – Edge-triggered JK FLIP-FLOPs – JK Master Slave FLIP-FLOPs. **Counters:** Asynchronous Counters – Synchronous Counters.

Unit – III

Basic Computer Organization and Design: Instruction Codes – Computer Registers – Computer Instructions – Instruction Cycle – Input-Output Interrupt. **Programming the Basic Computer:** Assembly Language – The Assembler – Subroutines.

Unit – IV

Central Processing Unit: Introduction – General Register Organization – Stack Organization – Instruction Formats – Addressing Modes – Data Transfer and Manipulation – Reduced Instruction Set Computer(RISC). **Pipeline and Vector Processing:** Parallel Processing – Pipelining – Instruction Pipelining.

Unit – V

Input-Output Organization: Peripheral Device – Input-Output Interface – Direct Memory Access (DMA) – **Memory Organization:** Memory Hierarchy - Main Memory – Auxiliary Memory – Associative Memory – Cache Memory – Virtual Memory.

Books for Study:

1. Donald P Leach, Albert Paul Malvino, Goutam Saha, “*Digital Principles and Applications*”, Mc Graw Hill Publications, 8th Edition, 2015.

Chapters:

- Unit – I** : 2.1, 2.2, 3.1 to 3.6, 4.1 to 4.3, and 4.6
- Unit – II** : 5.1, 5.3, 5.5 to 5.10, 6.1, 6.2, 6.5, 6.6, 8.1, 8.4, 8.5, 8.8, 10.1, 10.3

2. M.Morris Mano, “*Computer System Architecture*”, Pearson Publications, 3rd Edition, 2007.

Chapters:

- Unit – III** : 5.1 to 5.3, 5.5, 5.7, 6.3, 6.4, 6.7
- Unit – IV** : 8.1 to 8.6, 8.8, 9.1, 9.2, 9.4
- Unit – V** : 11.1, 11.2, 11.6, 12.1 to 12.6

Books for Reference:

1. Floyd, Jain, “*Digital Fundamentals*”, Pearson Education, New Delhi, 8th Edition 2009.
2. Godse A.P, “*Digital Principles and System Design*”, Technical Publications Pune, Pune 1st Edition, 2009.
3. John Hennessy L, David Patterson A, “*Computer Architecture*”, Morgan Kaufmann Publishers, India, 4th Edition, 2007.
4. John Hennessy L, David Patterson A, “*Computer Organization and Design*”, Morgan Kaufmann Publishers, India, 3rd Edition, 2007.

5. William Stallings, “Computer Organization & Architecture”, Prentice Hall of India
New Delhi, 7th Edition, 2009.

Web Resources / E.Books:

1. <https://padeepz.net/cs3351-digital-principles-and-computer-organization/>
2. [https://mrcet.com/downloads/digital_notes/IT/COMPUTER%20ORGANIZATION%20\(R17A0510\).pdf](https://mrcet.com/downloads/digital_notes/IT/COMPUTER%20ORGANIZATION%20(R17A0510).pdf)
3. <https://www.gacwrmd.in/learning/Computer/7BCEE2A-Digital%20Principles%20and%20Computer%20Organization.pdf>

Pedagogy:

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

Rationale for nature of Course:

Knowledge and Skill: To make the students to know the basic concepts of digital programming.

Activities to be given: students shall be practiced with different types of circuits and memory organization.

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	Understand the basic concepts of gates.	K1 to K3
CLO2	Apply the conversion method in number system.	K1 to K3
CLO3	Learn the concept of instruction cycle and Assembly language.	K1 to K4
CLO4	Understand the Concepts instruction format and pipelining.	K1 to K3
CLO5	Examine the concept of input and output memory organization.	K1 to K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	3	2	3	2	1
CLO2	3	3	3	2	2	1
CLO3	2	3	2	2	1	2
CLO4	3	3	2	1	3	2
CLO5	3	3	1	2	2	1

1-Basic Level

2- Intermediate Level

3- Advanced Level

LESSON PLAN : TOTAL HOURS(60HRS)

UNIT	DESCRIPTION	HRS	MODE
I	Digital Logic: The Basic Gates - NOT, OR, AND – Universal Gates-NOR, NAND. Combinational logic Circuits: Boolean Laws and Theorem – Sum-of-Product Method – Truth Table to Karnaugh Map – Pairs, Quads and Octets – Karnaugh Simplifications – Don't care Conditions. Data Processing Circuits: Multiplexers – Demultiplexer – 1-of-16 Decoder – Encoders.	10	Chalk and Talk, PPT, quiz, on the spot test
II	Number Systems and Codes: Binary Number System – Binary-to-decimal Conversion – Decimal-to-binary Conversion – Octal Numbers – Hexadecimal Numbers- The ASCII Code – The Excess-3 Code – The Gray Code. Arithmetic Circuits: Binary Addition – Binary Subtraction – 2's Complement Representation – 2's Complement Arithmetic. Flip-Flops: RS FLIP-FLOPs – Edge-triggered D FLIP-FLOPs – Edge-triggered JK FLIP-FLOPs – JK Master Slave FLIP-FLOPs. Counters: Asynchronous Counters – Synchronous Counters.	10	Chalk and Talk, quiz, on the spot test
III	Basic Computer Organization and Design: Instruction Codes – Computer Registers – Computer Instructions – Instruction Cycle – Input-Output Interrupt. Programming the Basic Computer: Assembly Language – The Assembler – Subroutines.	12	Chalk and Talk, PPT, group discussion and You tube Links

IV	Central Processing Unit : Introduction – General Register Organization – Stack Organization – Instruction Formats – Addressing Modes – Data Transfer and Manipulation – Reduced Instruction Set Computer(RISC). Pipeline and Vector Processing: Parallel Processing – Pipelining – Instruction Pipelining	14	Chalk and Talk, PPT, quiz
V	Input-Output Organization: Peripheral Device – Input-Output Interface – Direct Memory Access (DMA) – Memory Organization: Memory Hierarchy - Main Memory – Auxiliary Memory – Associative Memory – Cache Memory – Virtual Memory.	14	Chalk and Talk, PPT, group discussion, quiz, open book test

Course Designer
Mrs. P.RUBY STELLA MARY

Department of Computer Science				Class: II B.Sc.,				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	External Exam	Total
III	Core	22OUCS32	RDBMS	4	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓		

Course Objectives:

1. To learn the physical and logical database designs, database modeling, relational, hierarchical, and network models.
2. To understand how a real world problem can be mapped to schemas.
3. To understand and use data manipulation language to query, update, and manage a database.
4. Acquire the Knowledge of Cursor and Trigger Operation.
5. To learn to design the Database to implement the concept of database security, integrity and concurrency.

Course Content:

Unit – I

Introduction to Database Management System (DBMS): Introduction – Characteristics of Data in Database – Database Management System – Why DBMS – Types of Database Management Systems. **Introduction to Relational Database Management System (RDBMS):** Introduction – RDBMS Terminology – The Relational Data Structure – Relational Data Integrity – Relational Data Manipulation. **Database Architecture and Data Modeling:** Introduction – Conceptual, Physical and Logical Database Models – Database Design – Design Constrains – Functional Dependencies.

Unit – II

Entity-Relationship model (E-R) Modeling: Introduction – E-R Model, Components of an E-R Model – E-R Modeling Symbols. **Data Normalization:** Introduction – First Normal Form(1NF) – Second Normal Form(2NF) – Third Normal Form(3NF) – Boyce-Codd Normal Form(BCNF) – Forth Normal Form(4NF) – Fifth Normal Form(5NF) – Domain-key Normal Form(DKNF) – Denormalization. **Relational Algebra and Relational Calculus:** Relational Algebra – Relational Calculus.

Unit – III

Introduction to Structured Query Language (SQL): Introduction – Characteristics of SQL – Advantages of SQL – SQL Data Types and Literals – Types of SQL commands – SQL Operators – Arithmetic Operators – Comparison Operators – Logical Operators – Set Operators. **Tables, Views and Indexes:** Tables – Views – Indexes – **Queries and Subqueries:** Queries – Subqueries – **Aggregate Functions:** Introduction–General Rules – COUNT () and COUNT (*) – SUM () – AVG () – MAX () and MIN ().

Unit – IV

Insert, Update and Delete Operations: Introduction – INSERT statement – Bulk insert of Data – UPDATE Statement – Delete Statement – **Cursor:** Introduction – Cursor Operations – Cursor Positions – **Joins and Unions:** Joins – Unions – **Triggers:** Introduction – What is Trigger? – Types of Triggers – Trigger Syntax – Combining Trigger Types – Setting Inserted Values – Disabling and Enabling Triggers – Advantages and Limitations of Triggers.

Unit – V

Database Security: Introduction – Database Environment – Data Security Risks – Dimensions of Database security – Data Security Requirements – Protecting the Data within the Database – Granting and Revoking Privileges and Roles – **Data Integrity:** Introduction – Types of Integrity Constrains – **Transaction Management and Concurrency Control:** Introduction – Transactions, Transaction Properties – Transaction States – Concurrency Control – Serializability, Recoverability – Concurrency Control Schemes – The COMMIT Command – The ROLLBACK Command – The SAVEPOINT Command.

Book for Study:

Alexis Leon, Mathews Leon, *Database Management Systems, L&L Consultancy Services Pvt. Ltd*, Leon vikas, 1999.

Chapters:

Unit I : 5, 7, 8

Unit II : 9, 11, 12

Unit III : 14, 15, 17, 18

Unit IV : 19, 20, 21, 25

Unit V : 27,28, 29

Books for Reference:

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan , *Database System Concept*, McGraw-Hill Education , 1st Edition, 2005.
2. Bipin C. Desai, *An Introduction to Database Systems*, West Publishing Company 1st Edition , 1997.
3. Jeffrey A. Hoffer, Mary B. Prescott, Fred R. McFadden, *Modern Database Management*, Prentice Hall, 10th Edition, 2006.

Web Resources / E.Books:

<https://www.tutorialspoint.com/dbms/index.html>

<https://www.jbiet.edu.in/coursefiles/cse/HO/cse2/DBMSI-III.pdf>

<https://www.pdfdrive.com/dbms-books.html>

Pedagogy:

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

Rationale for nature of Course:

Knowledge and Skill: To make the students to know the basic concepts of query language.

Activities to be given: students shall be practiced with different programming concepts.

Course learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	Understand the basic concepts of Data Base Management System.	K1 to K3
CLO2	Design the database using normalization and relationships within database.	K1 to K3
CLO3	Construct the database using SQL to attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML).	K1 to K4
CLO4	Develop the programs using cursor and Trigger Operation.	K1 to K3
CLO5	Impart the Knowledge of transaction processing and concurrency control concepts.	K1 to K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	3	2	3	2	1
CLO2	3	3	3	2	2	1
CLO3	2	3	2	2	1	2
CLO4	3	3	2	1	3	2
CLO5	3	3	1	2	2	1

1-Basic Level**2- Intermediate Level****3- Advanced Level****LESSON PLAN : TOTAL HOURS(60HRS)**

UNIT	DESCRIPTION	HRS	MODE
I	Introduction to Database Management System (DBMS): Introduction – Characteristics of Data in Database – Database Management System – Why DBMS – Types of Database Management Systems. Introduction to Relational Database Management System (RDBMS): Introduction – RDBMS Terminology–The Relational Data Structure – Relational Data Integrity – Relational Data Manipulation. Database Architecture and Data Modeling: Introduction – Conceptual, Physical and Logical Database Models – Database Design – Design Constrains – Functional Dependencies	10	Chalk and Talk, PPT, quiz, on the spot test
II	Entity-Relationship model (E-R) Modeling: Introduction – E-R Model, Components of an E-R Model – E-R Modeling Symbols. Data Normalization: Introduction – First Normal Form(1NF) – Second Normal Form(2NF) – Third Normal Form(3NF) – Boyce-Codd Normal Form(BCNF) – Forth Normal Form(4NF) – Fifth Normal Form(5NF) – Domain-key Normal Form(DKNF) – Denormalization. Relational	10	Chalk and Talk, quiz, on the spot test

	Algebra and Relational Calculus: Relational Algebra – Relational Calculus.		
III	Introduction to Structured Query Language (SQL): Introduction – Characteristics of SQL – Advantages of SQL – SQL Data Types and Literals – Types of SQL commands – SQL Operators – Arithmetic Operators – Comparison Operators – Logical Operators – Set Operators. Tables, Views and Indexes: Tables – Views – Indexes – Queries and Subqueries: Queries – Subqueries – Aggregate Functions: Introduction–General Rules – COUNT () and COUNT (*) – SUM () – AVG () – MAX () and MIN ().	12	Chalk and Talk, PPT, group discussion and You tube Links
IV	Insert, Update and Delete Operations: Introduction – INSERT statement – Bulk insert of Data – UPDATE Statement – Delete Statement – Cursor: Introduction – Cursor Operations – Cursor Positions – Joins and Unions: Joins – Unions – Triggers: Introduction – What is Trigger? – Types of Triggers – Trigger Syntax – Combining Trigger Types – Setting Inserted Values – Disabling and Enabling Triggers – Advantages and Limitations of Triggers.	14	Chalk and Talk, PPT, quiz

V	Database Security: Introduction – Database Environment – Data Security Risks – Dimensions of Database security – Data Security Requirements – Protecting the Data within the Database – Granting and Revoking Privileges and Roles – Data Integrity: Introduction – Types of Integrity Constrains – Transaction Management and Concurrency Control: Introduction – Transactions, Transaction Properties – Transaction States – Concurrency Control – Serializability, Recoverability – Concurrency Control Schemes – The COMMIT Command – The ROLLBACK Command – The SAVEPOINT Command.	14	Chalk and Talk, PPT, group discussion, quiz, open book test
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Course Designer
Ms.K.SHALINI

Department of Computer Science				Class: II B.Sc.,				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	External Exam	Total
III	Core	22OUCS3P	SQL and PL/SQL Lab	3	3	40	60	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
✓		

PROGRAM LIST

QUERY

1. Data Definition Language
2. Data Manipulation Language
3. Retrieving records from the table
4. Rollback and Commit
5. Constraints
6. Simple Queries
7. Built-in-Queries

PL/SQL

8. Sum of digits
9. Reverse number
10. Adam Number
11. Odd number generation
12. Biggest of three Numbers
13. Reverse the String
14. Armstrong Number
15. Multiplication table
16. Prime number or not
17. Palindrome

EXCEPTION HANDLING

18. Predefined Exception
19. User defined Exception

CURSOR

20. Explicit cursor
21. Implicit cursor

TRIGGERS

22. Trigger-Deletion
23. Trigger-Updation

Books for Reference:

1. Steven Feuerstein, *Oracle PL/SQL Programming*, Orelly Publication, Sixth Edition, 2014.
2. P.S.Deshpande, *SQL & PL/SQL For Oracle 11g Black*, Wiley India Pvt. Limited, July 2011.
3. Sharad Maheswari, Ruchin Jain, *Introduction SQL and PL/SQL*, Firewall Media Publisher, 2014.

Web Resources / E.Books:

1. https://datubaze.files.wordpress.com/2015/09/s_feuerstein_oracle-pl_sql-programming_6th-edition_2014.pdf
2. <https://www.oreilly.com/library/view/oracle-plsql-programming/9781449324070/>
3. <https://www.goodreads.com/book/show/50022109-database-management-systems>

Pedagogy

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

LESSON PLAN FOR PRACTICAL: TOTAL HOURS (45HRS)

Cycle	Description	Hrs	Mode
1	QUERY Data Definition Language Data Manipulation Language Retrieving records from the table Rollback and Commit Constraints Simple Queries Built-in-Queries	8	Writing and executing the program in a system
2	PL/SQL Sum of digits Reverse number Adam Number Odd number generation Biggest of three Numbers Reverse the String Armstrong Number Multiplication table Prime number or not Palindrome	8	Writing and executing the program in a system

3	EXCEPTION HANDLING Predefined Exception User defined Exception	9	Writing and executing the program in a system
4	CURSOR Explicit cursor Implicit cursor	10	Writing and executing the program in a system
5	TRIGGERS Trigger-Deletion Trigger-Updation	10	Writing and executing the program in a system

Course Designer

Ms.K.SHALINI

EVALUATION (PRACTICAL)
Core Lab / Skill Enhancement Course Lab

Internal (Formative) : 40 marks

External (Summative) : 60 marks

Total :100 marks

Question Paper Pattern for Internal Practical Examination: 40 Marks

- ✓ There will be Two Internal Practical Examination.
- ✓ Duration of Internal Examination will be 2 hours.

S.No	Components	Marks
1.	I – Writing the Program (2x8)	16
2.	II – Test and Debug the Program (2x4)	08
3.	III - Printing the Correct Output (2x4)	08
4.	IV- Viva	03
5.	V –Record book	05
	Total	40

Question Paper Pattern for External Practical Examination: 60 Marks

- ✓ Duration of External Examination will be 3 hours.

S.No	Components	Marks
1.	I – Writing the Program (2x10)	20
2.	II – Test and Debug the Program (2x10)	20
3.	III- Printing the Correct Output (2x5)	10
4.	IV – Viva	5
5.	V - Record book	5
	Total	60

Department of Computer Science				Class: II B.Sc.,				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	SE	Total
III	Skill Enhancement Course	22OUCSSE3P	VB.Net and ASP.Net Programming Lab	2	2	40	60	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
✓	✓	

PROGRAM LIST

VB.NET

1. Mathematical Functions using ComboBox
2. Change Font and color of text using Dialog Controls
3. Pressure and Sugar level using Track Bar
4. Date of birth Calculation using DateTimePicker
5. Accessing a Web page using LinkLabel
6. Add or Remove Items using ListBox
7. ZoomIn and ZoomOut an image using MouseEvents
8. Word pad Manipulation using MenuStrip
9. Filter data from Employee Database using OLEDB
10. Animation of a car using Graphic Device Interface

ASP.NET

11. Display three images in a line
12. To connect to the master database in SQL Server, in the Page Load event
13. To create a table emp in the master database
14. To implement paging feature in the customer table
15. To accept a character from keyboard and check whether it is vowels or not.
16. To display a calendar
17. To get a user input such as the boiling point of water and test it to the appropriate value using Compare Validator.
18. Create an application that illustrates how a content can be buffered.
19. Select the names of the employees from the emps table. Retrieve the result in a DataSet and display it in a CheckBoxList.

20. Displays a button in green color and it should change into yellow when the mouse moves over it

Books for Reference:

1. Francesco Balena, *Programming Microsoft Visual Basic Net (Core Reference)*, Microsoft Press, India, 2nd Edition, 2002.
2. Gary Bronson J & David Rosenthal, *Introduction to Programming with Visual Basic.Net*, Jones & Bartlett Learning, Canada, 1st Edition, 2004.

Web Resources / E.Books:

1. https://www.w3schools.com/asp/webpages_examples.asp
2. <https://visualstudio.microsoft.com/vs/features/net-development/>
3. <https://support.syncfusion.com/kb/article/10294/how-to-create-asp-net-web-forms-application-in-vb-net-and-how-to-add-syncfusion-controls-in>

Pedagogy

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

LESSON PLAN FOR PRACTICAL: TOTAL HOURS (30HRS)

Cycle	Description	Hrs	Mode
1	VB.NET Mathematical Functions using ComboBox Change Font and color of text using Dialog Controls Pressure and Sugar level using Track Bar Date of birth Calculation using DateTimePicker Accessing a Web page using LinkLabel	6	Writing and executing the program in a system
2	Add or Remove Items using ListBox ZoomIn and ZoomOut an image using MouseEvents Word pad Manipulation using MenuStrip Filter data from Employee Database using OLEDB Animation of a car using Graphic Device Interface	10	Writing and executing the program in a system

3	ASP.NET Display three images in a line To connect to the master database in SQL Server, in the Page Load event To create a table emp in the master database To implement paging feature in the customer table To accept a character from keyboard and check whether it is vowels or not.	8	Writing and executing the program in a system
4	To display a calendar To get a user input such as the boiling point of water and test it to the appropriate value using Compare Validator. Create an application that illustrates how a content can be buffered. Select the names of the employees from the emps table. Retrieve the result in a DataSet and display it in a CheckBoxList. Displays a button in green color and it should change into yellow when the mouse moves over it	6	Writing and executing the program in a system

Course Designer
Mrs. P.KRISHNA GEETHA

EVALUATION (PRACTICAL)
Core Lab / Skill Enhancement Course Lab

Internal (Formative) : 40 marks

External (Summative) : 60 marks

Total :100 marks

Question Paper Pattern for Internal Practical Examination: 40 Marks

- ✓ There will be Two Internal Practical Examination.
- ✓ Duration of Internal Examination will be 2 hours.

S.No	Components	Marks
6.	I – Writing the Program (2x8)	16
7.	II – Test and Debug the Program (2x4)	08
8.	III - Printing the Correct Output (2x4)	08
9.	IV- Viva	03
10.	V –Record book	05
	Total	40

Question Paper Pattern for External Practical Examination: 60 Marks

- ✓ Duration of External Examination will be 3 hours.

S.No	Components	Marks
6.	I – Writing the Program (2x10)	20
7.	II – Test and Debug the Program (2x10)	20
8.	III- Printing the Correct Output (2x5)	10
9.	IV – Viva	5
10.	V - Record book	5
	Total	60

Department of Computer Science				Class: II B.Sc.,				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	External Exam	Total
IV	Core	22OUCS41	Data Structures	3	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓		

Course Objectives:

1. Understand basic concepts of data structures and algorithms.
2. Ability to describe stack, queue and linked list operation.
3. Implement the different types of trees and apply them to problem solutions.
4. Develop the graph structure and understand various operations on graphs and their applicability.
5. Analyze the various sorting and searching algorithms.

Course Content:**Unit I:**

Introduction and Overview: Introduction – Basic Terminology; Elementary Data Organization – Data Structures – Data Structure Operations – Algorithms: Complexity, Time – Space Tradeoff. **Preliminaries:** Algorithmic Notation– Complexity of Algorithms. **Arrays, Records and Pointers:** Linear Arrays – Traversing Linear Arrays – Inserting and Deleting - Sorting: Bubble Sort – Searching: Linear Search – Binary Search.

Unit II:

Linked Lists: Introduction – Linked Lists – Representation of Linked Lists in Memory–Traversing a Linked List – Searching a Linked List – Memory Allocation; Garbage Collection–Insertion into a Linked List – Deletion from a Linked List – Header Linked Lists – **Stacks, Queues, Recursion:** Introduction – Stacks – Array Representations of Stacks – Linked Representations of Stacks – Arithmetic Expressions; Polish Notation – Quick sort, an Applications of Stacks – Recursion – Queues – Linked representation of Queues – Deques.

Unit III:

Trees: Introduction – Binary Trees – Representing Binary Trees in Memory – Traversing Binary Trees – Binary Search Trees – Searching and Inserting in Binary Search Trees – Deleting in Binary Search Tree – AVL Search Trees- Insertion in an AVL Search Tree

– Deletion in an AVL Search Tree – B Trees – Searching, Insertion and Deletion in a B-tree – Heap; Heap sort.

Unit IV:

Graphs and Their Applications: Introduction – Graph Theory Terminology – Sequential Representation of Graphs: Adjacency Matrix; Path Matrix – Warshall's Algorithm; Shortest Paths – Linked Representation of a Graph – Operations on Graphs- Traversing a Graph – Spanning Tree.

Unit V:

Sorting and Searching: Introduction – Sorting – Insertion Sort – Selection Sort – Merging – Merge Sort – Radix Sort – Searching and Data Modification – Hashing.

Book for Study:

Seymour Lipschutz (2014), *Data Structures*, Revised First Edition, McGraw Hill Education (India) Pvt. Ltd.

Chapters:

Unit I : 1.1 to 1.5, 2.3, 2.5, 4.2, 4.4 to 4.8

Unit II : 5.1 to 5.9, 6.1 to 6.7, 6.10 to 6.12

Unit III : 7.1 to 7.4, 7.7 to 7.12, 7.15 to 7.17

Unit IV : 8.1 to 8.7, 8.9

Unit V : 9.1 to 9.9

Books for Reference:

1. Alfred V.Aho, John E.Hopcraft and Jeffrey D.Ullman (2013), *Data Structures and Algorithms*, Fourteenth Impression, Pearson Education.
2. Ananda Raa Akepogu, Radhika Raju Palagiri (2011), *Data structures & algorithms using C++*, Dorling Kindersley(India)Pvt. Ltd, Pearson Education.
3. Subramanyam P.S. (2013), *C and C++ Programming concepts and Data Structures*,BS Publications.

Web Resources / E.Books:

1. <http://online.fliphtml5.com/bvskm/bmsd/index.html>
2. https://en.wikibooks.org/wiki/Data_Structures/Trees
3. https://www.tutorialspoint.com/data_structures_algorithms/index.htm

Pedagogy:

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

Rationale for nature of Course:

Knowledge and Skill: To make the students to provide the knowledge of basic data structures and their implementations

Activities to be given: To develop skills to apply appropriate data structures in problem solving. Student shall be practical knowledge on the applications of data structures.

Course learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	Understanding of basic concept of data structure and algorithmic complexity.	K1 to K3
CLO2	Implement linear data structure such as stacks, queues, linked lists and their applications.	K1 to K3
CLO3	Explore the concept of trees such as binary tree, binary search tree, AVL tree, and B tree.	K1 to K4
CLO4	Demonstrate the representation and traversal techniques of graphs and their applications.	K1 to K3
CLO5	Examine the various algorithm for sorting and searching.	K1 to K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	3	2	3	2	1
CLO2	3	3	3	2	2	1
CLO3	2	3	2	2	1	2
CLO4	3	3	2	1	3	2
CLO5	3	3	1	2	2	1

1-Basic Level**2- Intermediate Level****3- Advanced Level**

LESSON PLAN : TOTAL HOURS (60HRS)

UNIT	DESCRIPTION	HRS	MODE
I	Introduction and Overview: Introduction – Basic Terminology; Elementary Data Organization – Data Structures – Data Structure Operations – Algorithms: Complexity, Time – Space Tradeoff. Preliminaries: Algorithmic Notation– Complexity of Algorithms. Arrays, Records and Pointers: Linear Arrays – Traversing Linear Arrays – Inserting and Deleting - Sorting: Bubble Sort – Searching: Linear Search – Binary Search.	10	Chalk and Talk, PPT, quiz, on the spot test
II	Linked Lists: Introduction – Linked Lists – Representation of Linked Lists in Memory– Traversing a Linked List – Searching a Linked List – Memory Allocation; Garbage Collection– Insertion into a Linked List – Deletion from a Linked List – Header Linked Lists – Stacks, Queues, Recursion: Introduction – Stacks – Array Representations of Stacks – Linked Representations of Stacks – Arithmetic Expressions; Polish Notation – Quick sort, an Applications of Stacks – Recursion – Queues – Linked representation of Queues – Deques.	10	Chalk and Talk, quiz, on the spot test
III	Trees: Introduction – Binary Trees – Representing Binary Trees in Memory – Traversing Binary Trees – Binary Search Trees – Searching and Inserting in Binary Search Trees – Deleting in Binary Search Tree – AVL Search Trees- Insertion in an AVL Search Tree – Deletion in an AVL Search Tree – B Trees –	12	Chalk and Talk, PPT, group discussion and You tube Links

	Searching, Insertion and Deletion in a B-tree – Heap; Heap sort.		
IV	Graphs and Their Applications: Introduction – Graph Theory Terminology – Sequential Representation of Graphs: Adjacency Matrix; Path Matrix – Warshall's Algorithm; Shortest Paths – Linked Representation of a Graph – Operations on Graphs- Traversing a Graph – Spanning Tree.	14	Chalk and Talk, PPT, quiz
V	Sorting and Searching: Introduction – Sorting – Insertion Sort – Selection Sort –Merging – Merge Sort – Radix Sort – Searching and Data Modification – Hashing.	14	Chalk and Talk, PPT, group discussion, quiz, open book test

Course Designer
Mrs.V. JAYAVANI

Department of Computer Science				Class: II B.Sc.,				
Sem	Category	Course Code	Course Title	Credits	Hours/Week	CIA	External Exam	Total
IV	Core	22OUCS42	Programming in JAVA	4	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	✓

Course Objectives:

1. Understand the basic concepts and fundamentals of platform independent object oriented language.
2. Ability to illustrate the operators, branching and looping statement.
3. Implement the classes, objects, arrays and Interface method.
4. Idea to approach the package & multithread programming.
5. Demonstrate the concepts of exception handling techniques and Applet.

Course Content:

Unit-I

Java Evolution: Java history - Java Features - Java Environment. **Over view of Java Language:** Simple Java Program - Java program Structure - Java Tokens - Installing and Configuring Java - Implementing a Java program - Java Virtual Machine. **Constants, Variables and Data Types:** Introduction – Constants – Variables - Data types - Declaration of variables- Giving Values to Variables- Scope of Variables- Symbolic Constants- Type Casting.

Unit-II

Operators and Expressions: Introduction - Arithmetic Operators - Relational Operators - Logical Operators - Assignment Operators - Increment and Decrement Operators - Conditional Operators - Bitwise Operators - Special operators - Arithmetic Expressions - Evaluation of Expression - Operator precedence and Associativity. **Decision Making and Branching:** Introduction - Decision Making with If Statement - Simple If Statement - The If...Else Statement - Nesting of If...Else Statements - Switch Statement – The ?: Operator. **Decision Making and Looping:** Introduction - While Statement - do Statement - for Statement - Jumps in Loops – return Statement.

Unit-III

Classes, Objects and Methods: Introduction - Defining a Class - Methods Declaration - Creating Objects - Accessing Class Members – Constructors - Method Overloading- Static Members- Nesting of Methods- **Inheritance:** Extending a Class- Overriding Methods- Final Variables and Methods- Final Classes- Finalizer Methods- Abstract Methods and Classes- Visibility Control. **Arrays, Strings and Vectors:** Introduction-One-dimensional Arrays- Creating an Array-Two-dimensional Arrays- Strings- Vectors- Wrapper Classes. **Interfaces: Multiple Inheritances:** Introduction-Defining Interfaces-Extending Interfaces-Implementing Interfaces-Accessing Interface Variables.

Unit-IV

Packages: Putting Classes Together: Introduction-Java API Packages-Using System packages-Naming conventions-Creating Packages-Accessing a package-Using a Package- Adding a Class to a Package-Hiding Classes-Static Import. **Multithreaded Programming:** Introduction-Creating Threads-Extending the thread Class-Stopping and Blocking a Thread- Life Cycle of a Thread-Using Thread Methods-Thread Exceptions-Thread Priority- Synchronization-Implementing the ‘Runnable’ Interface-Inter-Thread Communication.

Unit-V

Managing Errors and Exceptions: Introduction-Types of Errors-Exceptions-Syntax of Exception Handling Code-Multiple Catch Statements-Using Finally Statement-Throwing our own Exceptions- Improved Exception Handling in Java SE 7-Using Exceptions for Debugging. **Applet Programming:** Introduction-How Applets Differ from Applications- Preparing to Write Applets-Building Applet Code-Applet Life Cycle-Creating an Executable Applet-Designing a Web Page-Applet Tag-Adding Applet to HTML File-Running the Applet- More about Applet tag-Passing parameters to Applets-Aligning the Display-More about HTML tag-Displaying Numerical values-Getting Input from the user-Event Handling. **Managing Input/Output Files in Java:** Byte Stream Classes-Character Stream Classes- Other Stream Classes.

Book for Study:

E Balagurusamy (Reprint 2022), *Programming with JAVA*, McGraw Hill Education (India) Private Limited, New Delhi, Sixth Edition.

Chapters:

Unit - I : 2.1, 2.2, 2.9,3.2, 3.5, 3.6,3.8, 3.9, 3.10,4.1 to 4.9

Unit - II : 5.1 to 5.11, 5.13, 6.1 to 6.8, 7.1 to 7.6

Unit - III : 8.1 to 8.16, 8.18, 9.1 to 9.7 , 10.1 to 10.5

Unit - IV : 11.1 to 11.10, 12.1 to 12.11

Unit - V : 13.1 to 13.9, 14.1 to 14.17, 16.4, 16.5, 16.17

Books for Reference:

1. Danny Goodman(2005) ,*Java Script Bible*, 4thedition, WILEYdreamtech India Pvt.ltd, India.
2. Herbert Schildt(2006) ,*The Complete Reference Java*, 5th Edition, TMH Publication, New Delhi.
3. John Gorney W(1985), *Java Script Professional Projects*, , 2nd edition Thomson Course Technology, Canada.

Web Resources / E.Books:

<https://www.javatpoint.com/java>

<https://www.javacodegeeks.com>

<https://docs.oracle.com/en/java>

Pedagogy:

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

Rationale for nature of Course:

Knowledge and Skill: To make the students to know the basic concepts of programming language.

Activities to be given: Students shall be practiced with different programming concepts.

Course learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	Understand the basic concepts of object oriented language.	K1 to K3
CLO2	Apply the Operators and Control statements to solve the mathematical problems.	K1 to K3
CLO3	Develop reusable programs using the concepts of inheritance, polymorphism and interfaces.	K1 to K4
CLO4	Develop the Packages and Multithread programming languages.	K1 to K3
CLO5	Able to develop interactive programs using Applets.	K1 to K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	3	2	3	2	1
CLO2	3	3	3	2	2	1
CLO3	2	3	2	2	1	2
CLO4	3	3	2	1	3	2
CLO5	3	3	1	2	2	1

1-Basic Level**2- Intermediate Level****3- Advanced Level****LESSON PLAN : TOTAL HOURS(60HRS)**

UNIT	DESCRIPTION	HRS	MODE
I	Java Evolution: Java history - Java Features - Java Environment. Over view of Java Language: Simple Java Program - Java program Structure - Java Tokens - Installing and Configuring Java - Implementing a Java program - Java Virtual Machine. Constants, Variables and Data Types: Introduction – Constants – Variables - Data types - Declaration of variables- Giving Values to Variables- Scope of Variables- Symbolic Constants- Type Casting	10	Chalk and Talk, PPT, quiz, on the spot test
II	Operators and Expressions: Introduction - Arithmetic Operators - Relational Operators - Logical Operators - Assignment Operators - Increment and Decrement Operators - Conditional Operators - Bitwise Operators - Special operators - Arithmetic Expressions - Evaluation of Expression - Operator precedence and Associativity. Decision Making and Branching: Introduction - Decision Making with If Statement - Simple If Statement - The If...Else Statement - Nesting of If...Else Statements - Switch Statement - The? : Operator. Decision	10	Chalk and Talk, quiz, on the spot test

	Making and Looping: Introduction - While Statement - do Statement - for Statement - Jumps in Loops – return Statement		
III	Classes, Objects and Methods: Introduction - Defining a Class - Methods Declaration - Creating Objects - Accessing Class Members – Constructors - Method Overloading- Static Members- Nesting of Methods- Inheritance: Extending a Class- Overriding Methods- Final Variables and Methods- Final Classes- Finalizer Methods- Abstract Methods and Classes- Visibility Control. Arrays, Strings and Vectors: Introduction-One-dimensional Arrays-Creating an Array-Two-dimensional Arrays- Strings- Vectors- Wrapper Classes. Interfaces: Multiple Inheritances: Introduction-Defining Interfaces- Extending Interfaces-Implementing Interfaces- Accessing Interface Variables.	12	Chalk and Talk, PPT, group discussion and You tube Links
IV	Packages: Putting Classes Together: Introduction-Java API Packages-Using System packages-Naming conventions-Creating Packages-Accessing a package-Using a Package- Adding a Class to a Package-Hiding Classes- Static Import. Multithreaded Programming: Introduction-Creating Threads-Extending the thread Class-Stopping and Blocking a Thread- Life Cycle of a Thread-Using Thread Methods- Thread Exceptions-Thread Priority- Synchronization-Implementing the ‘Runnable’ Interface-Inter-thread Communication.	14	Chalk and Talk, PPT, quiz

V	Managing Errors and Exceptions: Introduction-Types of Errors-Exceptions-Syntax of Exception Handling Code-Multiple catch Statements-Using Finally Statement-Throwing our own Exceptions- Improved Exception Handling in Java SE 7-Using Exceptions for Debugging. Applet Programming: Introduction-How Applets Differ from Applications-Preparing to Write Applets-Building Applet Code-Applet Life Cycle-Creating an Executable Applet-Designing a Web page-Applet tag-Adding Applet to HTML File-Running the Applet-More about Applet tag-Passing parameters to Applets-Aligning the Display-More about HTML tag-Displaying Numerical values-Getting Input from the user-Event Handling. Managing Input/Output Files in Java: Byte Stream classes-Character Stream Classes- Other Stream Classes.	14	Chalk and Talk, PPT, group discussion, quiz, open book test
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Course Designer
Mrs. R. CHINTHAMANI

Department of Computer Science				Class: II B.Sc.,				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	External Exam	Total
IV	Core	22OUCS4P	Programming in JAVA Lab	3	3	40	60	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
✓	✓	✓

PROGRAM LIST

SIMPLE PROGRAMS

1. Sum of Digits
2. Reverse the Digits
3. Sum of First Number
4. Fibonacci Series
5. Even Number

CONSTRUCTOR

6. Constructor Overloading
7. Parameterized Constructor

INHERITANCE

8. Employee Details Using Inheritance
9. Multilevel Inheritance

INTERFACE

10. Simple Exception Handling Program-1
11. Exception Handling

THREAD

12. Simple Thread using runnable() Method
13. Multiplication Table Using Multithreading

PACKAGES

14. Book Details using Package
15. Student Marklist using Package

APPLET

16. Control Loops in Applet
17. Display the Circle Color

FILE

18. File Properties

Books for Reference:

1. Surbhi Kakar, *Java Programming*, K. International Publishing House Pvt. Ltd, 2017.
2. Uttam K. Roy, *Advanced Java Programming*, Oxford University Press, May 2015.
3. Dr. K. Somasundram, *Introduction to Java Programming*, Jaico Publishing House, First Edition 2013.

Web Resources / E.Books:

<https://www.programiz.com/java-programming>

<https://www.geeksforgeeks.org/java/>

Pedagogy

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

LESSON PLAN FOR PRACTICAL: TOTAL HOURS (45HRS)

Cycle	Description	Hrs	Mode
1	SIMPLE PROGRAMS 1. Sum of Digits 2. Reverse the Digits 3. Sum of First Number 4. Fibonacci Series 5. Even Number	8	Writing and executing the program in a system
2	CONSTRUCTOR 1. Constructor Overloading 2. Parameterized Constructor INHERITANCE 3. Employee Details Using Inheritance 4. Multilevel Inheritance	9	Writing and executing the program in a system
3	INTERFACE 1. Simple Exception Handling Program-1 2. Exception Handling THREAD 3. Simple Thread using runnable() Method 4. Multiplication Table Using Multithreading	9	Writing and executing the program in a system

4	PACKAGES 1. Book Details using Package 2. Student Marklist using Package	9	Writing and executing the program in a system
5	APPLET 1. Control Loops in Applet 2. Display the Circle Color FILE 3. File Properties	10	Writing and executing the program in a system

Course Designer
Mrs. R. CHINTHAMANI

EVALUATION (PRACTICAL)
Core Lab / Skill Enhancement Course Lab

Internal (Formative) : 40 marks

External (Summative) : 60 marks

Total :100 marks

Question Paper Pattern for Internal Practical Examination: 40 Marks

- ✓ There will be Two Internal Practical Examination.
- ✓ Duration of Internal Examination will be 2 hours.

S.No	Components	Marks
1.	I – Writing the Program (2x8)	16
2.	II – Test and Debug the Program (2x4)	08
3.	III - Printing the Correct Output (2x4)	08
4.	IV- Viva	03
5.	V –Record book	05
	Total	40

Question Paper Pattern for External Practical Examination: 60 Marks

- ✓ Duration of External Examination will be 3 hours.

S.No	Components	Marks
1.	I – Writing the Program (2x10)	20
2.	II – Test and Debug the Program (2x10)	20
3.	III- Printing the Correct Output (2x5)	10
4.	IV – Viva	5
5.	V - Record book	5
	Total	60

Department of Computer Science				Class: II B.Sc.,				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	SE	Total
IV	Skill Enhancement Course	22OUCSSE4P	Data Structures Lab	2	2	40	60	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
✓	✓	

PROGRAM LIST

STACKS AND QUEUES

1. Implementation of Stacks
2. Implementation of Queues

LINKED LISTS

3. Single Linked Lists
4. Doubly Linked Lists
5. Circular Linked Lists

TREES AND GRAPHS

6. Binary tree traversals.
7. Binary Search Tree
8. Maximum Depth or Height of a Tree
9. Representation of Graph
10. DFS traversal technique
11. BFS traversal technique
12. Adjacency Matrix

SORTING AND SEARCHING

13. Linear Search
14. Binary Search
15. Polynomial Addition
16. Arithmetic operator using Pointer
17. Insertion Sort
18. Merge Sort

19. Selection Sort

20. Hashing

Books for Reference:

1. Seymour Lipschutz ,”Data Structures with C”, First Edition, Schaum’s outline series in computers, Tata McGraw Hill.
2. R.Krishnamoorthy and G.Indirani Kumaravel, Data Structures using C, Tata McGrawHill – 2008.
3. G. Brassard and P. Bratley, “Fundamentals of Algorithms”, PHI, New Delhi, 1997.

Web Resources / E.Books:

Pedagogy

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

LESSON PLAN FOR PRACTICAL: TOTAL HOURS (30HRS)

Cycle	Description	Hrs	Mode
1	STACKS AND QUEUES Implementation of Stacks Implementation of Queues	6	Writing and executing the program in a system
2	LINKED LISTS Single Linked Lists Doubly Linked Lists Circular Linked Lists	6	Writing and executing the program in a system
3	TREES AND GRAPHS Binary tree traversals. Binary Search Tree Maximum Depth or Height of a Tree Representation of Graph DFS traversal technique BFS traversal technique Adjacency Matrix	9	Writing and executing the program in a system

4	SORTING AND SEARCHING Linear Search Binary Search Polynomial Addition Arithmetic operator using Pointer Insertion Sort Merge Sort Selection Sort Hashing	9	Writing and executing the program in a system
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Course Designer
Mrs. V. JAYAVANI

EVALUATION (PRACTICAL)
Core Lab / Skill Enhancement Course Lab

Internal (Formative)	: 40 marks
External (Summative)	: 60 marks
Total	:100 marks``

Question Paper Pattern for Internal Practical Examination: 40 Marks

- ✓ There will be Two Internal Practical Examination.
- ✓ Duration of Internal Examination will be 2 hours.

S.No	Components	Marks
1.	I – Writing the Program (2x8)	16
2.	II – Test and Debug the Program (2x4)	08
3.	III - Printing the Correct Output (2x4)	08
4.	IV- Viva	03
5.	V –Record book	05
	Total	40

Question Paper Pattern for External Practical Examination: 60 Marks

- ✓ Duration of External Examination will be 3 hours.

S.No	Components	Marks
1.	I – Writing the Program (2x10)	20
2.	II – Test and Debug the Program (2x10)	20
3.	III- Printing the Correct Output (2x5)	10
4.	IV – Viva	5
5.	V - Record book	5
	Total	60