



VIRUDHUNAGAR HINDU NADARS' SENTHIKUMARA NADAR COLLEGE
(An Autonomous Institution Affiliated to Madurai Kamaraj University)
Virudhunagar – 626 001.

Course Name : Bachelor of Science
 Discipline : Computer Science
 (Those who joined in 2023-24)
COURSE SCHEME:

II year B.Sc. COMPUTER SCIENCE

Semester	Part	Subject Name	Hours	Credit	Int + Ext = Total	Local	Regional	National	Global	Professional Ethics	Gender	Human Values	Environment & Sustainability	Employability	Entrepreneurship	Skill Development	Subject Code	Revised / New / No Change / Interchanged & Percentage of Revision
III	Part I	Tamil	6	3	25+75=100												U24PT31	Interchanged from II semester
	Part II	English	6	3	25+75=100												U24PE31	New
	Core	Java Programming	4	4	25+75=100				✓					✓		✓	U24CSC31	Mark Change
	Core	Data Structures	4	4	25+75=100				✓							✓	U24CSC32	Mark Change
	Core Lab	LAB: Programming in Java	6	3	40+60=100				✓					✓		✓	U22CSCP31	No Change
	Allied	Resource Management Techniques	4	4	25+75=100				✓							✓	U24MAAC31	Mark Change
	SL	Value Education	-	3	25+75=100					✓		✓					U24VE31	New
	Total			30	23													
IV	Part I	Tamil	6	3	25+75=100												U24PT41	Interchanged from III semester
	Part II	English	6	3	25+75=100				✓								U24PE41	New
	Core	Advanced Java Programming	4	4	25+75=100				✓					✓		✓	U24CSC41	Revised 20%
	Core	Operating Systems	4	4	25+75=100											✓	U24CSC42	Mark Change
	Core Lab	LAB: Programming in Advanced Java	6	3	40+60=100				✓					✓		✓	U24CSCP41	Revised 20%
	Allied	Numerical Methods	4	4	25+75=100				✓							✓	U24MAAC41	Mark Change



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SL	Environmental Science	-	2	25+75=100				✓				✓				U24ES41	New
Total		30	24														
Internship Programme during Vacation																	

Year	Part	Subject	Credit	Int = Total	Code
I & II	Part V	NSS / NCC / Physical Education/ YRC / RRC	3	100 = 100	U22NS4 / U22NC4 / U22PS4 / U22YR4 / U22RR4



TENTATIVE SYLLABUS STRUCTURE

Semester	Part	Name of the Subject	Hours	Credit	Int + Ext= Total	Subject Code	Revised/New/ No Change / Interchanged & Percentage of revision	Courses having focus on employability/ entrepreneurship/ skill development
V	Part III Core	Computer Algorithms	4	4	25+75=100			Skill Development
	Part III Core	LAB: PHP and MYSQL	6	3	40+60=100			Employability, Entrepreneurship
	Part III Core	LAB: Python Programming	5	3	40+60=100			Employability, Entrepreneurship
	Part III Elective	Data Science / Computer Networks/ Information Security	5	5	25+75=100			Employability
	Part III Elective	Data Base Management Systems / Data Mining/Cloud Computing	5	5	25+75=100			Skill Development
	PART III Core	LAB: Full Stack Development	3	2	25+75=100			Employability, Entrepreneurship
	SBE-5	Employability Skills	2	2	25+75=100			Employability
	TOTAL		30	24				
VI	Part III Core	Software Engineering	4	4	25+75=100			Skill Development
	Part III Core	AI and Machine Learning	4	4	25+75=100		NEW	Employability
	Part III Core	Mobile Computing	5	4	25+75=100			Employability
	Part III Elective	Project: Software Development	5	4	Internal 100=100			Employability, Skill Development
	Part III Core	LAB: Mobile APP Development	6	3	40+60=100			Employability, Entrepreneurship
	Part III Core	LAB: Advanced Python Programming	4	2	40+60=100		NEW	Employability, Entrepreneurship
	SBS - 6	LAB: Full Stack Development - II	2	2	40+60=100			Employability, Entrepreneurship
	TOTAL		30	23				



III SEMESTER

JAVA PROGRAMMING

Contact Hours : 4

Contact Hours per semester: 60

Subject Code: U24CSC31

Credit: 4

Course Outcomes:

1. Understanding Java features, Java environment and data types as well as operators
2. Emphasize on control structures and array manipulation in Java
3. Object oriented programming approach using class and object and inheritance implementation
4. Exposure to Strings, Wrapper and Vector Class usages as well as Exception handling
5. Implementation of IO stream classes and Multithreading in java

Uni-1 Introduction : Java History – Java features – Java Environment – Java Language overview simple java programs - Java Program structure – Java tokens – statements - Implementing java program – java virtual machine – constants and variables — data types – variable usage – scope type casting – default values – type of operators – arithmetic expression and evaluation - Operator Precedence and associativity – Math functions.

Unit-2 Control Structure, class and objects: Decision making and branching statements – Switch Statement – ? operator – looping statements – jump in loops – return statement – labeled loops – class – objects – methods – constructors - method overloading – static members – inheritance – method overriding – final and abstract usage – visibility control.

Unit-3 Arrays, strings, vectors : Interface: defining interfaces, extending interfaces and implementation – Arrays – strings – vectors – wrapper classes.

Unit-4 Packages and Multi threading: Java API Packages – using system packages – naming conventions –creating packages – accessing a package – using a package – adding class – hiding class – multithreading – creating threads – life cycle of a thread – thread methods – priority – synchronization – inter thread communication.

Unit-5 Exception and I/O: Type of errors – exceptions – handling – Multiple catch – using finally – throwing our own exceptions – concept of streams – all stream classes - File class – I/O exceptions – file creation – Read / Write Bytes – Read / Write characters – primitive data handling – random access file.

Test Book: Programming with java, E.Balagurusamy TMH, 6th Edition, 2019.

Unit 1: Chapters 2.1,2.2,2.9,3.1,3.2,3.5,3.6,3.7,3.9,3.10,4.1to 4.11, 5.1 to 5.14

Unit 2: Chapters 6.1 to 6.8, 7.1 to 7.7, 8.1 to 8.16, 8.18, 10.1 to 10.4

Unit 3: Chapters 9.1 to 9.7, 10.1 to 10.4

Unit 4: Chapters 11.1 to 11.9, 12.1 to 12.11

Unit 5: Chapters 13.1 To 13.7, 16.1 to 16.15

Ref. Book: Programming in Java2, Dr.K.Somasundaram , Publisher : JAICO Publishing House. First Edition, 2013.

Note : Question Setters are requested to include programming exercises from the text book in addition to theory concepts, in the Summative Examination



[Key concepts, Brief Cases, Review Questions, Debugging & Programming Exercises of each chapter must be read & practiced at home is absolutely necessary to fulfill the objectives. Summer Projects may be assigned to students.]

DATA STRUCTURES

Contact Hours per week : 4

Contact Hours per semester : 60

Subject Code: U24CSC32

Credit: 4

Course Outcomes:

1. Aware of array data structure, operations, representation and applications.
2. Aware of different types of linked list, representation, and operations
3. Aware of stack and queue, representation, operations and applications
4. Aware of Tables and Graphs, representation, operations and applications
5. Aware of Trees, representation, operations and applications

UNIT I

(12 HRS)

Definitions, Concepts, Overview and Implementation of Data Structures – Arrays: Definition, Terminologies, One-Dimensional Array – Various operations on Arrays – Application of arrays – Multi-dimensional Arrays: Representation and types- Pointer Arrays.

UNIT II

(12 HRS)

Linked List: Definition – Single Linked List: Representations and operations on a Single Linked List – Circular Linked List: Searching and merging operations – Double Linked List: Representation and operations on a Double Linked List.

UNIT III

(12 HRS)

Stacks: Definition, Array and Linked List representations, PUSH and POP Operations on Stack – Application of Stack: Evaluation of Arithmetic Expressions – Queues: Definition, Array and Linked List Representations, Insertion and Deletion operations on Queues using array and Linked List representations – Circular Queues: Representation, Insertion and Deletion operations.

UNIT IV

(12 HRS)

Tables: Rectangular Tables, Jagged Tables, Inverted Tables – Hash Tables – Hashing Techniques: Division, Mid square, Folding, Digit Analysis methods. Graphs: Terminologies Representations (Set, Linked, Matrix) – Graph Traversals: BFS and DFS traversals on Linked List Representation of Graphs

UNIT V

(12 HRS)

Trees: Terminologies, Definitions – Binary Trees: Types, Linear Representation, Linked Representation – Insertion, Deletion, Traversal operations on a Binary Tree (Using sequential and Linked representation) – Expression Tree: Construction and Evaluation operation – Binary Search Tree: Searching data in BST.

Text Book:

Classic Data Structures, Debasis Samanta ,Second Edition, PHI, 2009

I Unit – Pages: 1-9, 12-33

II Unit – Pages: 36-60



III Unit – Pages: 105-121, 153-164

IV Unit – Pages: 189-198, 416-425, 438-443

V Unit – Pages: 212-218, 222-228, 230-241, 250-256

Reference Book:

1. Data Structures –Chithra, P.T.Rajan, Vijay Nichole Pvt Ltd, 2006.

LAB: PROGRAMMING IN JAVA

Contact Hours per week : 6

Subject Code: U22CSCP31

Contact Hours per semester : 90

Credit: 3

Course Outcomes:

- Skill to write a computer program to solve specified problems using pure object oriented concepts in Java Language.
1. Program to compute factorial value of N using command line arguments
 2. Program to find biggest value of an array using command line arguments
 3. Program to calculate sum of two complex numbers using class and objects
 4. Program to calculate Euclidean distance between two co-ordinates using class and objects
 5. Program to find area and volume of a rectangle using single inheritance.
 6. Program to process student's marks using multiple inheritance
 7. Program to check the given string is palindrome or not using String Buffer class
 8. Program to insert integer objects into a vector and compute sum by reading from it
 9. Program to add two complex numbers using package and class concept
 10. Program to compute area of circle using package and interface concept
 11. Program to illustrate unchecked exception
 12. Program to illustrate checked exception
 13. Program to illustrate multithreading by extending Thread class
 14. Program to illustrate multithreading by implementing Runnable interface
 15. Program to copy a text file using character stream class
 16. Program to copy an image using a byte stream class
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ALLIED 3 – RESOURCE MANAGEMENT TECHNIQUES

Contact Hours per week : 4

Subject Code: U24MAAC31

Contact Hours per semester : 60

Credit: 4

Course Outcomes:

1. Aware about OR Modeling and Concept of operations research techniques
2. Know to solve the Linear Programming Problems
3. Know to solve the problems using Simplex method and Primal-dual Simplex method
4. Know to solve the Assignment Problem
5. Know to solve the transportation Problem.

Unit-I: Development of OR-Definition of OR-Modeling- Characteristics and Phases-Tools, Techniques & Methods-scope of OR.

Unit-II: Linear Programming Problem-Formulation-Slack& surplus variables-Graphical solution of LPP.

Unit-III: Simplex Method-Computational Procedure-Big-M method- Concept of duality in LPP-Definition of primal dual problems-General rules for converting any primal into its dual.



Unit-IV: Duality Theorems (without proof)- Primal dual correspondence-Duality and Simplex method-Mathematical formulation of assignment problem-Method for solving assignment problem.

Unit-V: Mathematical formulation of Transportation Problem-Methods for finding IBFS for the Transportation Problems.

Text Book:

Operations Research, S.D.Sharma, Kedar Nath Ram Nath & Co., Edition 15, 2008

Unit I: Chapter-1(1.1, 1.2, 1.4,1.5,1.8,1.9,1.10,1.11)

Unit II: Chapter-3 (3.1, 3.2, 3.3,3.3.1,3.3.2,3.3.3.,3.3.4,3.4,3.5)

Unit III: Chapter-5 (5.1,5.2,5.2.1,5.3,5.4,5.5.4)

Chapter- 7 (7.1,7.2,7.3,7.4)

Unit IV: Chapter-7 (7.5) (Statements only); 7.6, 7.7

Chapter 12 (12.2,12.3,12.4)

Unit V: Chapter-11 (11.2 to 11.8)

Reference Book(s):

1. Operation Research, Nita H.Shah, Ravi M.Gor and Hardik soni,Prentice-Hall of India , Pvt Ltd ,New Delhi 2008.

2. R.Sivarethnamohan, Operation Research, Tata McGraw Hill,2005

SEMESTER – IV

CORE 8 – ADVANCED JAVA PROGRAMMING

Contact Hours : 4

Contact Hours per semester: 60

Subject Code: U24CSC41

Credit: 4

Objective: This subject helps the students to understand advanced concepts of JAVA technology such as Graphics, AWT, Swing, AWT Event Handling, Servlet, Networking & RMI and JDBC

Course Outcomes:

1. Explore Applet class and experience different graphics methods
2. Exposes knowledge in GUI based application development
3. Implementation of network application and distributed computing in Java
4. Develop server based applications
5. Provides SQL programming concepts in Java

UNIT I: (12 HRS)

Graphics and AWT: Drawing lines and different Shapes, Clipping. AWT components.

UNIT II: (12 HRS)

Swing and AWT Event Handling: Swing Components, Event handling in Java, Low level event handling, High level event handling and Adapter class.

UNIT III: (12 HRS)

Networking and RMI: TCP/IP, UDP/IP, IP Address, DNS, Port, URL, Socket Programming using TCP/IP and UDP/IP, RMI packages, Programming using RMI.



UNIT IV:

(12 HRS)

JSP: Introduction, JSP Key Components, Directive, Action, Scriptlet, Custom tags, JSP Implicit objects, request and out, JSP Pre defined tags, JSP programs and Java Web Server.

UNIT V:

(12 HRS)

JDBC: Introduction to SQL, Data Base Connectivity, ODBC, JDBC, JDBC architecture, Connection, Statement object, Working with ResultSet.

Text Book: Internet & Java Programming, First edition: 2002, R. Krishnamoorthy and S. Prabhu, Publishers: New Age International, Reprint 2014 & Javatpoint online tutorial

UNIT I: Chapters 16 and 17

UNIT II: Chapters 19 and Swing online Tutorial

UNIT III: Chapters 18 and 21

UNIT IV: JSP online Tutorial

UNIT V: Chapter 23.1 to 23.11

Reference Book: Java Complete Reference, Herbert Schildt, Tata Mc Graw Hill, Edition V, 2007.

Note : Question Setters are requested to include programming exercises from the text book in addition to theory concepts, in the Summative Examination

[Key concepts, Brief Cases, Review Questions, Debugging & Programming Exercises of each chapter must be read & practiced at home is absolutely necessary to fulfill the objectives. Summer Projects may be assigned to students.]

OPERATING SYSTEMS

Contact Hours per week : 4

Contact Hours per semester : 60

Subject Code: U24CSC42

Credit: 4

Course Outcomes:

1. Know the goals and components of operating system and its architecture, know about process, its different states, interrupts and inter process communication
2. Know about critical section, mutual exclusion and implementation, Dekker's algorithm, mutual exclusion with semaphore, Deadlock prevention, avoidance, detection, recovery.
3. Know about different processor scheduling and its algorithms
4. Know about memory hierarchy and management, multiprogramming, virtual memory and management
5. Know about secondary storage evolution, disk scheduling, File system organization and allocation.

Unit 1: (1.1, 1.2, 1.12, 1.13, 3.1 to 3.5) Operating systems introduction - What is an operating system – Operating system component and goals – Operating system architectures – Process introduction - Process states – Process management – Interrupts - Interprocess communication.

Unit 2: (5.1, 5.2.2, 5.2.3, 5.3, 5.4.1, 5.6.1, 5.6.3, 7.5, 7.6, 7.7, 7.8, 7.9, 7.10)



Asynchronous concurrent execution - Critical section – Mutual exclusion primitives – Implementing primitives - Dekker's algorithm – Mutual exclusion with semaphores – Counting semaphores - Four conditions for deadlock – Deadlock solutions – Deadlock prevention – Avoidance – Detection - Recovery.

Unit 3: (8.1 to 8.6, 8.7.1 to 8.7.5)

Processor scheduling – Scheduling levels – Preemptive and non preemptive scheduling – Priorities – Scheduling objectives – Scheduling criteria – Scheduling algorithms – FIFO – RR – SPF – HRRN – SRT.

Unit 4: (9.4, 9.5, 9.6, 9.8, 9.9, 10.2, 10.3, 10.4, 11.2 to 11.5, 11.6.1 to 11.6.6)

Memory hierarchy - Management strategies - Contiguous vs Noncontiguous allocation – Fixed partition multiprogramming – Variable partition multiprogramming – Virtual memory - Block mapping – Paging – Locality – Demand and Anticipatory paging - Page replacement - Replacement strategies.

Unit 5: (12.2 to 12.5, 13.2 to 13.6) Evolution of secondary storage – Characteristics – Why disk scheduling – Disk scheduling strategies – Data hierarchy – Files – File systems – File organization – File allocation

Text book: “*Operating Systems*” by Deitel, Deitel, and Choffnes, Pearson Education, 3rd Edition, 2004.

Reference Book: “*Operating Systems*” by Godbole, TMH 2nd edition, 2005

“*Operating Systems*” by Dhamdere, TMH 2nd edition, 2006.

LAB –PROGRAMMING IN ADVANCED JAVA

Contact Hours per week: 6

Subject Code: U24CSCP41

Credit: 3

Course Outcomes:

- Skill to develop a computer program to solve specified problems using AWT, TCP, UDP, RMI, JSP and JDBC concepts in JAVA

1. Program to display Graphical shapes using Swing
2. Program to display digital clock using Swing
3. Program to display color changing shapes using Swing
4. Program to display Scrolling Text using Swing
5. Program to find factorial value of N using AWT high level event handling
6. Program to illustrate text box event and check box event handling
7. Program to illustrate window closing using AWT low level event handling
8. Program to illustrate TCP based network communication
9. Program to illustrate UDP based network communication
10. Program to find sum of digits using RMI
11. Program to find length of the given string using RMI
12. Program to compute factorial value of N using JSP
13. Program to display book selection using JSP.
14. Program to manipulate with String using JSP
15. Program to illustrate JDBC using connection string
16. Program to illustrate JDBC using Data Source Name



ALLIED 4 – NUMERICAL METHODS

Contact Hours per week : 4

Subject Code: U24MAAC41

Contact Hours per semester : 60

Credit: 4

Course Outcomes: (for students: To know what they are going to learn)

CO1: Know how to solve various problems on numerical methods

CO2: Use approximation to solve problems

CO3: Differentiation and integration concept are applied

CO4: Apply, direct methods for solving linear systems

CO5: Numerical solution of ordinary differential equations

Unit I :

Fundamentals of Algebraic Equation: Solution of algebraic and transcendental equations- Bisection method – Fixed point iteration method – Newton Raphson method – linear system of equations – Gauss elimination method – Gauss Jordan method.

Unit II :

Iterative, Interpolation and Approximation: Iterative methods - Gauss Jacobi and Gauss Seidel – Eigen values of a matrix by Power method and Jacobi's method for symmetric matrices. Interpolation with unequal intervals – Lagrange's interpolation – Newton's divided difference interpolation

UNIT III:

Interpolation with Equal Interval: Difference operators and relations. -Interpolation with equal intervals – Newton's forward and backward difference formulae.

UNIT IV:

Numerical Differentiation and Integration: Approximation of derivatives using interpolation polynomials – Numerical integration using Trapezoidal, Simpson's 1/3 rule

UNIT V:

Initial Value Problems for ordinary Differential Equations: Single step methods – Taylor's series method – Euler's method – Modified Euler's method - Runge Kutta method for solving(first, second, Third and 4th) order equations – Multi step method

Recommended Texts

1. Numerical Methods, by P. Kandasamy, K. Thilagavathy, K. Gunavathi
2. Numerical Methods, by S. Arumugam, A. Thangapandi Issac, A. Somasundaram

Reference Books

1. Mark Lutz, "Learning Python Powerful Object Oriented Programming", O'reilly Media 2018, 5th Edition.
2. Timothy A. Budd, "Exploring Python", Tata McGraw Hill Education Private Limited 2011, 1st Edition.
3. John Zelle, "Python Programming: An Introduction to Computer Science", Second edition, Course Technology Cengage Learning Publications, 2013, ISBN 978- 1590282410
4. Michel Dawson, "Python Programming for Absolute Beginners", Third Edition, Course Technology Cengage Learning Publications, 2013, ISBN 978- 1435455009

Web resources:

https://onlinecourses.swayam2.ac.in/cec22_cs20/preview
