UNIVERSITY 🛡 OF MYSORE

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VishwavidyanilayaKaryasoudha
Crawford Hall, Mysuru- 570 005

No.AC2(S)/55/2024-25   Dated: 20.07.2024

Notification

Sub:- Syllabus and Scheme of Examinations of Bachelor Computer
Application (BCA) (UG) programme (I & II Semester) from the
Academic year 2024-25.

Ref:-1. Decision of Board of Studies in Computer science (CB) meeting
held on 06-06-2024.
2. Decision of the Faculty of Science & Technology meeting
held on 19-06-2024.
3. Decision of the Academic Council meeting held on 28-06-2024.

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The Board of Studies in Computer science (CB) which met on 06-06-2024 has
resolved to recommend & approved the Syllabus and Scheme of examinations of
Bachelor Computer Application (BCA) (UG) programme (I & II Semester) with effect
from the Academic year 2024-25.

The Faculty of Science & Technology and Academic Council at their meetings
held on 19-06-2024 and 28-06-2024 respectively has also approved the above said
Syllabus and Scheme of examinations hence it is hereby notified.

The Syllabus and Scheme of Examinations content may be downloaded from
the University Website i.e., www.uni-mysore.ac.in.

Registrar
Registrar
University of Mysore
Mysore

To;

1. All the Principal of affiliated Colleges of University of Mysore, Mysore.
2. The Registrar (Evaluation), University of Mysore, Mysuru.
3. The Chairman, BOS/DOS in Computer Science, Manasagangothri, Mysore.
4. The Dean, Faculty of Science & Technology, DOS in Mathematics, MGM.
5. The Director, Distance Education Programme, Moulya Bhavan,
Manasagangotri, Mysuru.
6. The Director, PMEB, Manasagangothri, Mysore.
7. Director, College Development Council,Manasagangothri, Mysore.
8. The Deputy Registrar/Assistant Registrar/Superintendent, Administrative
Branch and Examination Branch, University of Mysore, Mysuru.
9. The PA to Vice-Chancellor/ Registrar/ Registrar (Evaluation), University of
Mysore, Mysuru.
10. Office Copy.

BCA

First and Second Semester Syllabus (SEP) 2024

University of Mysore

Curriculum

Program: BCA
Subject: Computer Applications

Semester	Course No.	Theory/ Practical	Credits	L-T-P	No. of Hours	Paper Title	Marks	
							SEE	CIE
I	CAM11T	**Theory**	03	3-0-0	03	Digital Computer Organization	80	20
	CAM11P	**Practical**	02	0-0-2	04	Office Automation and HTML	40	10
	CAM12T	**Theory**	03	3-0-0	03	Problem Solving using C++	80	20
	CAM12P	**Practical**	02	0-0-2	04	C++ Programming	40	10
	CAM13T	**Theory**	03	3-0-0	03	Mathematical and Statistical Computing	80	20
	CAM13P	**Practical**	02	0-0-2	04	Mathematical and Statistical Computing using R	40	10
II	CAM21T	**Theory**	03	3-0-0	03	Data Structures	80	20
	CAM21P	**Practical**	02	0-0-2	04	Data Structures using C++	40	10
	CAM22T	**Theory**	03	3-0-0	03	Object Oriented Programming with Java	80	20
	CAM22P	**Practical**	02	0-0-2	04	Programming with Java	40	10
	CAM23T	**Theory**	03	3-0-0	03	Operating Systems	80	20
	CAM23P	**Practical**	02	0-0-2	04	Shell Programming	40	10

Semester: I

Course Code: CAM11T	**Course Title:** Digital Computer Organization
Course Credits: 03 (3-0-0)	**Hours/Week:** 03
Total Contact Hours: 44	**Formative Assessment Marks:** 20
Exam Marks: 80	**Exam Duration:** 03

Course Outcomes (COs):

On successful completion of this course, students will be able to:

1. Understand the digital computer system including classification of computers, anatomy of computer, input/output devices ad memory organization of computer.
2. Illustrate the types of Software, Computer languages and Translator programs.
3. Apply Boolean algebra to simplify logical expressions and solve problems using Karnaugh maps and other minimization techniques.
4. Design and analyze combinational and sequential logic circuits, including adders, subtractors, flip-flops, encoders, decoders, multiplexers, and counters.
5. Perform conversions between decimal, binary, octal, and hexadecimal number systems and carry out arithmetic operations in binary.

Course Contents

Unit-1	
Fundamentals of Computers: Introduction to Computers - Computer Definition, Characteristics Of Computers, Evolution And History Of Computer, Types Of Computer, Basic Organization Of A Digital Computer. **Input / Output Organization:** Peripheral Devices, Input – Output Interface. **Memory Organization:** Computers Memory System Overview- Characteristics And Types of Memory System. **Types Of Software**: System Software, Application Software and Utility Software; **Computer Languages:** Machine Level, Assembly Level & High-Level Languages, **Language Translators:** Assembler, Interpreter and Compiler.	11 Hours
Unit-2	
Number Systems: Introduction, Decimal, Binary, Octal and Hexadecimal. Inter-Conversions, Addition, Subtraction, Multiplication and Division In Binary Number System. 1's and 2's Complement Method in Binary Number System. Subtraction Using 1's and 2's Compliment, Weighted Number System, Binary Coded Decimal (BCD), Addition of BCD Numbers. Non-Weighted Number System, Applications, Excess-3, Gray Code Conversions, Gray and Binary Codes.	11 Hours

Unit-3	
Boolean Algebra: Basic Laws, De'Morgans Theorem, Duality Theorem, Sum of Product Method and Products of Sum Method. Karnaugh Map (Upto 4 Variables, Don't Care Condition). **Fundamentals Of Gates:** Basic Gates, Derived Gates and Universal Gates (Design).	11 Hours
Unit-4	
Combinational And Sequential Logic Circuits: Half Adder, Full Adder, Half - Subtractor and Full-Subtractor. **Flip-Flops**: SR, JK, Master-Slave JK , T Flip-Flops, Decoders - 3 To 8 Lines, Encoders-Octal To Binary. **Multiplexer:** 4 To 1 Line, Counters-3 Bits Binary Ripple Counter, 3 Shift Registers-Serial-In-Parallel-Out, Parallel-In-Serial-Out.	11 Hours

Reference:

1. Computer Fundamentals, V Rajaraman.

2. Computer System Architecture (3rd edition) Morris Mano PHI.

3. Computer Organization – by V.Carl Hamacher, Z.G.Vranesic, and S.G.Zaky, 3rd Edition. McGraw Hill,

4. Computer Organization & Design, (3rd Edition) by – D.A.Patterson & J.L.Hennessy – Morgan Kaufmann Publishers (Elseviers)

Course Code: CAM11P	**Course Title:** Office Automation and HTML
Course Credits: 02 (0-0-2)	**Hours/Week:** 04
Total Contact Hours: 60	**Formative Assessment Marks:** 10
Exam Marks: 40	**Exam Duration:** 03

Course Outcomes (COs):
On successful completion of this course, students will be able to:
1. Confidently work on Office Automation software such as word processor, spreadsheet and power point.
2. Understand the Web Programming basics and create simple web pages using HTML**.**

Laboratory Program List
Part A:
1.Using Word processor with suitable examples, write the steps and execute the following with respect to table handling
    i. Creating a table (At least 4 Columns and 6 Rows).
    ii. Entering appropriate data into the table.
    iii. Sort the table.
    iv. Apply the formulas on table numeric values.

2. Using Word processor write the steps and execute for creating "Mail Merge" document for "FORMLETTERS".

3. Using spread sheet, with suitable example, write steps and create worksheet called "Employee" and calculate the following using formulas
    i. Enter Employee Code, Name and Basic Salary.
    ii. Calculate DA (20% of Basic Salary).
    iii. Calculate HRA (10% of Basic Salary).
    iv. Calculate CCA (8.5% of Basic Salary).
    v. Calculate Total Salary (Basic Salary + DA + HRA + CCA)
    vi. Calculate Deductions (10% of Total Salary).
    vii. Calculate Net Salary (Total Salary – Deductions).

4. Using spread sheet draw X-Y Line Chart and Bar Charts based on the following worksheet data and write the steps
    ITEM MONTHLY SALES
    (in Thousands)
    Cotton 2,750
    Wool 3,100

Yarn 2,975
Jute 2,100
Fiber 3,010

5. Using spread sheet write the steps and execute the following:
Roll,No,StudName,Marks1, Marks2, Mark3 ,Total Percentage, Result
  i. Create appropriate records
  ii. Calculate total and marks using formula.
  iii. Update result column using IF function.
  (Result: Distinction, First Class, Second Class, Pass, Fail).

6. Using Power Point with suitable examples write steps and execute the following:
  i. Create presentation slides with Titles, Sub Titles and Charts choosing different slide layouts.
  ii. Use Design templates for background.
  iii. Format the slide design.

7. Using PowerPoint , Create the presentation for
  i) "Components of PC" using organization chart.
  ii. Use different views such as slide view, slide sorter view and slide show view.
8. Using PowerPoint , Create the presentation to demonstrate
  i) Insert Images, Shapes.
  ii) Charts for tabulated data
9. Using PowerPoint, Create the presentation to demonstrate Transitions ,animations and Slide show.

Part B:
1. Design a page having suitable background colour and text colour with title "My First Web Page" using all the attributes of the Font tag.
2. Write HTML code to design a page containing some text in a paragraph by giving suitable heading style
3. Write a HTML program for the demonstration of Lists.
   i. Unordered List
   ii. Ordered List
4. Write a HTML program for demonstrating Hyperlinks.
   i. Navigation from one page to another.
   ii. Navigation within the page.
5. Write a HTML program for time-table using tables.
6. Write a HTML program to develop a static Registration Form.

7. Write a HTML program to develop a static Login Page.
8. Write a HTML code to create a web page with pink color background and display moving message in red color.
9. Write a HTML program to develop a static Web Page for Shopping Cart.
10. Write a HTML program to develop simple calculator.

Evaluation Scheme for Lab Examination [Marks: 40]

- **Writing:** One program from both Part A and Part B (15 Marks each): 15 x 2 = 30
- **Execution:** Any one of the written Program: 05 Marks
- **Viva:** 05 Marks

Course Code: CAM12T	Course Title: Problem Solving using C++
Course Credits: 03 (3-0-0)	Hours/Week: 03
Total Contact Hours: 44	Formative Assessment Marks: 20
Exam Marks: 80	Exam Duration: 03

Course Outcomes (COs):
On successful completion of this course, students will be able to:

1. Understand the fundamental concepts and benefits of Object-Oriented Programming (OOP) and how it differs from Procedure-Oriented Programming paradigms.
2. Interpret and apply C++ syntax and structure, including input-output statements, keywords, identifiers, constants, variables, data types, operators, expressions and file handling to create basic programs and solve problems.
3. Describe the control structures, functions, and different parameter passing methods and write programs to solve problems.
4. Demonstrate the concepts of classes and objects , access specifiers, constructors, destructors, and OOP features like polymorphism, inheritance with the help of programs.

Course Contents

Unit-1	
Introduction to Programming: Program development life cycle, Introduction to Procedure Oriented Programming and Object-Oriented Programming (OOP) paradigms, basic concepts of OOP, benefits and applications of OOP. **Introduction to C++:** Overview of C++, Structure of C++ Program, Input-Output statements, Keywords, Identifiers, Constants, Variables, Data types, Operators, Types of operators, Expressions, Precedence of Operators, Type Conversion, Storage classes.	11 Hours
Unit-2	
Control statements: Selection And Iteration Statements, Loop Control Statements. **Modular Programming:** Functions and Its Types, Recursion, Functions with Default Arguments, Inline Functions, Function Overloading, Call by Value and Reference, Math Library Functions.	11 Hours
Unit-3	
Derived Data Types: Arrays, Array Types, Strings, String Manipulation Functions, Pointers, Pointer Arithmetic. **Managing Console, I/O Operations:** C++ Stream, C++ Stream Classes,	11 Hours

Unformatted I/O Operations, Formatted Console I/O Operations, Managing Output with Manipulators.	
User Defined Data Type: Class Definition, Instance Variables, Member Methods, Accessing Members, Access specifiers, this pointer, Friend Function, Constructors, Types of Constructors, Destructor.	
Unit-4	
Polymorphism: Operator Overloading, Rules for Operator Overloading, Overloading Unary and Binary Operators. **Inheritance:** Inheritance, Types of Inheritance, Virtual Functions and Abstract Classes. **File Handling:** Introduction To Files and File Handling, File Opening Modes, Classes For File Stream Operations, File I/O Operations (Opening, Reading, Writing, Append And Closing).	11 Hours

Reference Books:

1. Object-Oriented Programming With C++, By M. T. Somashekara, D. S. Guru, H. S. Nagendraswamy, K. S. Manjunatha, PHI Learning Pvt. Ltd.

2. Object-Oriented Programming With C++, By E Balaguruswamy, Tata McGraw-Hill Publicationm Company Ltd.

3. The C++ Programming Language, By Stroustroup, Bjarne, Addison Wesley.

4. How To Solve It by Computer - R G Dromey, Prentice-Hall International.

Course Code: CAM12P	Course Title: C++ Programming
Course Credits: 02 (0-0-2)	Hours/Week: 04
Total Contact Hours: 60	Formative Assessment Marks: 10
Exam Marks: 40	Exam Duration: 03

Course Outcomes (COs):

On successful completion of this course, students will be able to:

1. Demonstrate fundamental C++ programming concepts by writing programs for simple problems.
2. Utilize features of C++, such as recursion, function overloading, and friend functions, to enhance the functionality and efficiency of programs.
3. Design and construct classes and objects in C++ to model real-world entities, demonstrate inheritance, operator overloading, constructors, and file handling operations.

Laboratory Program List

Part -A

1. Program to swap 2 numbers with and without using temporary variable.
2. Program to convert the Fahrenheit to Celsius and vice-versa.
3. Program to compute to add and multiply two complex numbers.
4. Program to demonstrate functions of simple calculator.
5. Program to display multiplication table of a given number.
6. Program to check whether a number is a palindrome or not.
7. Program to generate Fibonacci series.
8. Program to compute sum of principle diagonal, lower diagonal and upper diagonal elements of a matrix.
9. Program to reverse a given string without using built-in function.
10. Program to demonstrate the usage of any five Math.h library functions.

Part-B

1. Program to demonstrate call by value and call by reference.
2. Program to generate factorial of a given number using recursion.
3. Program to create a Class for representing student details with appropriate member functions to accept and display the details.
4. Program to demonstrate function overloading.
5. Program to demonstrate friend function.
6. Program for single inheritance.
7. Program to demonstrate multilevel inheritance.
8. Program to demonstrate operator overloading.

9. Program to demonstrate the usage of default and parameterized constructors.
10. Program to read and display the contents of a text file.

Evaluation Scheme for Lab Examination [Marks: 40]

- **Writing:** One program from both Part A and Part B (15 Marks each) : 15 x 2 = 30
- **Execution:** Any one of the written Program: 05 Marks
- **Viva:** 05 Marks

Course Code: CAM13T	Course Title: Mathematical and Statistical Computing
Course Credits: 03 (3-0-0)	Hours/Week: 03
Total Contact Hours: 44	Formative Assessment Marks: 20
Exam Marks: 80	Exam Duration: 03

Course Outcomes (COs):

On successful completion of this course, students will be able to:

1. Construct, evaluate, and apply logical statements and truth tables, understand the principles of set theory, perform various set operations, and effectively use Venn diagrams for solving complex problems.
2. Understand Cartesian products, relations, and their properties, including equivalence relations and partitions. They will also gain skills in function composition, inverse functions, and representing relations through matrices and directed graphs.
3. Organize and interpret data using statistical methods, calculate measures of central tendency and dispersion, analyze correlation between variables, and perform linear regression analysis.

Course Contents

Unit-1	
Mathematical Logic Introduction: Statements Connectives - Negation, Conjunction, Disjunction- Statement Formulas and Truth Tables- Conditional and Bi Conditional Statements- Tautology, Contradiction. **Set Theory:** Sets And Subsets, Set Operations and The Laws of Set Theory, Counting and Venn Diagrams.	11 Hours
Unit-2	
Cartesian Products and Relations, Properties of Relations. **Computer Recognition**: Relation Matrices and Directed Graphs, Equivalence Relations and Partitions. **Functions**: One-to-One, Onto Functions, Function Composition and Inverse Functions.	11 Hours
Unit-3	
Statistical methods: Introduction, Definitions, Classifications, Frequency Distribution, Mean - Arithmetic Mean for Grouped and Ungrouped Data. **Median**: Meaning, Calculations of Median for Ungrouped.	11 Hours

Mode: Meaning, Calculations of Mode for Discrete Series and Continuous Series.	
Unit-4	
Standard Deviation: Meaning, Standard Deviation for Actual Mean Method, Assumed Mean Method and Step Deviation Method Using Discrete Series And Continuous Series. **Coefficient of Variation:** Meaning and Problems. **Correlation:** Meaning, Types, Rank Correlations and Problems. **Simple Linear Regression**: Meaning, Properties of Regression Coefficients.	11 Hours

Reference Books:

1. Ralph P. Grimaldi, "Discrete and Combinatorial Mathematics", 5th Edition, Pearson Education, 2004.

2. Kenneth H. Rosen, "Discrete Mathematics and its Applications", 6th Edition, McGraw Hill, 2007.

3. Jayant Ganguly, "A Treatise on Discrete Mathematical Structures", Sanguine Pearson, 2010.

4. D.S. Malik and M.K. Sen, "Discrete Mathematical Structures: Theory and Applications", Thomson, 2004.

5. Thomas Koshy, "Discrete Mathematics with Applications", Elsevier, 2005, Reprint 2008.

6. Fundamentals of Mathematical Statistics by Gupta and Kapoor (Sultan Chand).

7. Mathematical Statistics by John Freund (Prentice Hall India Pvt. Ltd.)

Course Code: CAM13P	**Course Title:** Mathematical and Statistical Computing using R
Course Credits: 02 (0-0-2)	**Hours/Week:** 04
Total Contact Hours: 60	**Formative Assessment Marks:** 10
Exam Marks: 40	**Exam Duration:** 03

Course Outcomes (COs):
On successful completion of this course, students will be able to:

1. Develop practical skills in implementing set operations and function operations using R programming.
2. Implement logic gates using R and perform comprehensive statistical analysis including calculations of central tendency and conduct linear regression analysis.
3. Compute Cartesian products and analyze relations for properties such as reflexivity, symmetry, and transitivity through R scripts.

Laboratory Program List
Part A

1. R program to implement operations of set (union, intersection, difference, subset).
2. R program to implement inverse function.
3. R program to implement one-to-one function.
4. R program to implement cartesian product of two sets.
5. R program to check whether the given relation is reflexive.
6. R program to check whether the given relation is transitive.
7. R program to implement logic gates (not, and, or, xor).
8. R program to check whether the given relation is symmetric.

Part B

1. R program to calculate central tendency (mean, median, mode).
2. R program to calculate standard deviation and variance for discrete & continuous series.
3. R program to calculate coefficient of variance for discrete & continuous series.
4. R program to calculate simple linear algebra operations.
5. R program to calculate arithmetic mean for grouped and ungrouped data.
6. R program to calculate cumulative sums, and products, minima, maxima.
7. R program to calculate frequency distribution for discrete & continuous series.
8. R program to calculate simple linear regression.

Evaluation Scheme for Lab Examination [Marks: 40]

- **Writing:** One program from both Part A and Part B (15 Marks each) : 15 x 2 = 30
- **Execution:** Any one of the written Program: 05 Marks
- **Viva:** 05 Marks

Semester II

Course Code: CAM21T	**Course Title:** Data Structures
Course Credits: 03 (3-0-0)	**Hours/Week:** 03
Total Contact Hours: 44	**Formative Assessment Marks:** 20
Exam Marks: 80	**Exam Duration:** 03

Course Outcomes (COs):

On successful completion of this course, students will be able to:

1. Understand the basics of Data Structures.
2. Identify the appropriate data structures and algorithms for solving real world problems.
3. Understand the practical applications of Tree and Graph.
4. Understand the fundamentals of sorting and searching algorithms.

Course Contents:

Unit-1	
Introduction: Data Structure Definition, Basic Terminology and Concepts, Importance of Data Structures in Programming. Classification of Data Structures. Primitive Data Structures, Non-Primitive Data Structures. **Stack:** Definition, Memory Representation, Algorithms for Stack Operations (Push, Pop), Applications of Stack.	11 Hours
Unit-2	
Queue: Definition, Memory Representation, Linear Queue, Circular Queue, Enqueue, Dequeue. Applications of Queue. **Linked Lists**: Definition, Types. **Singly Linked List:** Implementation, Insertion [At the Beginning], Deletion [At the End]. **Doubly Linked List:** Memory Representation of Singly Linked List and Doubly Linked Lists. Applications of Linked List.	11 Hours
Unit-3	
Tree: Definition, Memory Representation Using Array and Linked List. **Binary Tree:** Definition, Traversal Algorithms [Pre-Order, In-Order, Post-Order], Construction of Tree from In-Order and Pre-Order, In-Order and Post-Order. **Binary Search Trees:** Insertion of a Node, Deletion of A Node. **Advanced Tree Structures AVL And B-Trees:** Definition and Applications.	11 Hours

Unit-4	
Graph: Definition, Memory Representation of Graph. Adjacency Matrix, Adjacency List. Graph Traversal Algorithms: Breadth-First Search (BFS), Depth-First Search (DFS).	11 Hours
Sorting Techniques: Bubble Sort, Selection Sort [Algorithm, Time & Space Complexity].	
Searching Techniques: Linear And Binary Search Sort [Algorithm, Time & Space Complexity].	
Heap: Heap Operations and Applications.	

Reference Books:

1. Data Structures Through C++ (4th Edition) Yashvant Kanetkar.

2. Data Structures and Algorithm Analysis in C++" by Mark Allen Weiss.

3. Data structure and Algorithms using C++ by Sachi Nandan Mohanty, Pabitra Kumar Tripathy.

4. Data Structures and Algorithms in C++, Second Edition by Adam Drozdek.

Course Code: CAM21P	Course Title: Data Structures using C++
Course Credits: 02 (0-0-2)	Hours/Week: 04
Total Contact Hours: 60	Formative Assessment Marks: 10
Exam Marks: 40	Exam Duration: 03

Course Outcomes (COs):
On successful completion of this course, students will be able to:
1. Implement data structures using C++.
2. Demonstrate searching and sorting techniques using C++.
3. Demonstrate advanced programming skills through C++ programming language.

Laboratory Program List
Part A:
1. Program to find GCD of two numbers.
2. Program to implement Tower of Hanoi.
3. Program to print Fibonacci series.
4. Program to find largest and smallest element in an array.
5. Program to perform stack operations.
6. Program to perform Linear queue operations
7. Program to insert a node at the beginning of a singly linked list.
8. Program to delete a node at the end of a singly linked list.

Part B:
1. Program to construct a binary search tree
2. Program for Binary Tree traversal.
3. Program to implement DFS
4. Program to implement BFS
5. Program to sort an array (selection sort)
6. Program to sort an array (bubble sort)
7. Program to perform linear search of an element in an array.
8. Program to perform binary search of an element in an array.

Evaluation Scheme for Lab Examination [Marks: 40]

- **Writing:** One program from both Part A and Part B (15 Marks each) : 15 x 2 = 30
- **Execution:** Any one of the written Program: 05 Marks
- **Viva:** 05 Marks

Course Code: CAM22T	Course Title: Object Oriented Programming with Java
Course Credits: 03 (3-0-0)	Hours/Week: 03
Total Contact Hours: 44	Formative Assessment Marks: 20
Exam Marks: 80	Exam Duration: 03

Course Outcomes (COs):

On successful completion of this course, students will be able to:

1. Understand the Java programming fundamentals.
2. Describe with examples of basic Java OOP concepts.
3. Understand the Java Interfaces and Packages.
4. Deliberate the Details of Multithreading, Exception Handling & File Handling
5. Design GUI applications using tools like AWT.

Course Contents:

Unit-1	
Fundamentals of Object-oriented Programming: Object-oriented Paradigm, Basic Principles of Object-oriented Programming, Advantages of Object-Oriented Programming, Applications of Object-Oriented Programming. **Introduction to Java Language:** Java History, Features, Overview, Difference between C, C+ + and Java, Java Environment- JDK, JVM, JRE and API, Java Program Structure, Java Tokens, Implementing a Java Program, Command Line Arguments. **Java Programming Fundamentals:** Data types, Variables & Constants, Keywords & Naming Conventions, Type Casting, Operators and Expressions, Control Structures, Jumping Statements.	11 Hours
Unit-2	
Classes & Objects Basics of Objects and Classes, Constructors, Access Modifiers, Method Overloading, Overloading Constructors, Static members, this keyword. **Arrays** : One dimensional Arrays, Two dimensional Arrays, Array of Objects. **Strings**: String Handling functions.	11 Hours

Unit-3	
Multithreading in Java	11
Concepts of Thread, Thread Life Cycle, Creating Threads & Implementing Runnable Interface, Thread Synchronization & Thread Priority.	Hours
Exception Handling	
Concepts of Exception, Different Types of Exceptions, Creating User-Defined Exceptions Using Try-Catch-Finally-Throw Blocks, Nested Try, Catch, Throw, and Throws Blocks.	
Unit-4	
File Handling	11
I/O Handling, I/O Streams, Types of Files, Byte Stream, Binary I/O Classes & Its Hierarchy, FileInputStream & FileOutputStream Classes, Object I/O Classes.	Hours
Event Handling & GUI programming	
Event Handling, Event Types, Event Handling Mechanism, Keyboard & Mouse Handling, Introduction to AWT & GUI basics, AWT hierarchy of classes, AWT controls – Frames, Panels, Layout managers & other controls of AWT.	

Reference Books:

1. D.S. Guru, M.T. Somashekara, & K.S. Manjunatha, Object Oriented Programming with Java, PHI Learning, 2017.
2. E Balagurusamy , Programming with JAVA, TMH, 2007
3. Herbert Schildt , Java 7, The Complete Reference, , 8th Edition, 2009

Course Code: CAM22P	Course Title: Programming with Java
Course Credits: 02 (0-0-2)	Hours/Week: 04
Total Contact Hours: 60	Formative Assessment Marks: 10
Exam Marks: 40	Exam Duration: 03

Course Outcomes (COs):

On successful completion of this course, students will be able to:

1. Implement simple programs using Java Fundamental concepts.
2. Identify classes, objects, members of class and the relationships among them needed for finding the solution to specific problems using Objected Oriented Programming concepts of Java.
3. Design & Develop simple GUI programs using AWT GUI tool.

Laboratory Program List

Part A:

1. Program to find whether the given number is Positive, Negative or Zero.
2. Program to list the factorial of the numbers 1 to 10.
3. Program to demonstrate classes & objects.
4. Program to demonstrate method overloading.
5. Program to demonstrate single inheritance (simple calculator – base class, Advanced Calculator – derived class).
6. Program to find Maximum & Minimum element in one dimensional array of numbers.
7. Program to check whether the given string is palindrome or not.
8. Program to create a 'Student' class with Reg.no., name and marks of 3 subjects. Calculate the total marks of 3 subjects and create an array of 3 student objects & display the results.

Part B:

1. Program to generate negative array size exception
2. Program to generate NullPointer Exception.
3. Program that reads two integer numbers for the variables a and b. The program should catch NumberFormatException & display the error message.
4. Program to create AWT window with 4 buttons M/A/E/Close. Display M for Good Morning, A for Afternoon, E for evening and Close button to exit the window.
5. Program to demonstrate the various mouse handling events.
6. Program to read and write Binary I/O file.
7. Program to create window with three buttons father, mother and close. Display the

respective details of father and mother as name, age and designation using AWT controls.

8. Program to create menu bar and pull-down menus.

Evaluation Scheme for Lab Examination [Marks: 40]

- **Writing:** One program from both Part A and Part B (15 Marks each) : 15 x 2 = 30
- **Execution:** Any one of the written Program: 05 Marks
- **Viva:** 05 Marks

Course Code: CAM23T	Course Title: Operating Systems
Course Credits: 03 (3-0-0)	Hours/Week: 03
Total Contact Hours: 44	Formative Assessment Marks: 20
Exam Marks: 80	Exam Duration: 03

Course Outcomes (COs):

On successful completion of this course, students will be able to:

1. Understand the fundamentals of the operating system.
2. Describe the concepts of process, process management, CPU Scheduling, process synchronization, Dead locks, memory management and Virtual Memory management.
3. Illustrate the file system and structure.
4. Understand the UNIX OS, Shell Programming, Conditional Control Structures in Shell Programming.

Course Contents:

Unit-1	
Introduction: Definition, Computer System Components , User View , System View And System Goals , Batch Systems, Multi Programmed Systems, Time-Sharing Systems, Real-Time Systems, System Components, Operating System Services. **Process**: Process Concept, Process State Diagram Process Control Block, Process Scheduling- Scheduling Queues, Scheduler, Cooperating Process, Interprocess Communication.	11 Hours
CPU Scheduling: Basic Concepts, Preemptive And Non-Preemeptive Scheduling, Scheduling Criteria, Scheduling Algorithms-FCFS, Shortest Job First Priority Scheduling, Round Robin Scheduling.	
Unit-2	
Process Synchronization: The Critical Section Problem, Solution For Critical Section Problem, Bakery Algorithm, Semaphores-Meaning, Types Of Semaphores, Synchronization Problems- Bounded Buffer Problem, Readers-Writers Problem .	11 Hours
Deadlocks: Deadlock Characterization, Methods For Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery From Deadlock.	

Unit-3	
Memory Management: Introduction, Logical Versus Physical Address Space, Dynamic Loading, Dynamic Linking, Swapping, Contiguous Allocation, Partitioned Memory Allocation, Paging, Virtual Memory Management-Segmentation, Segmentation With Paging.	11 Hours
File System: File Concepts, File Attributes, File Operations, File Types, File Structure, Access Methods, Directorystructure, File-System Structure, Allocation Methods- Contiguous Allocation, Linked Allocation and Indexed Allocation, Free-Space Management.	
Unit-4	
Introduction to Unix System: The Unix Operating System, The UNIX architecture.	11 Hours
Shell Programming: Vi editor, shell types, shell command line processing, shell script features, executing a shell script, system and user-defined variables, expr command, shell screen interface, read and echo statement, command substitution, escape sequence characters, shell script arguments, positional parameters, test command, file test, string test, numeric test.	
Conditional Control Structures: if statement, case statement Looping Control Structure-while, until, for, statements. Jumping Control Structures – break, continue, exit. Shell Programs covering the above concepts.	

Reference Books:

1. Operating System Concepts – 5th edition by Abraham Silberschartz and Peter Galvin, McGraw Hill,2000

2. Modern Operating Systems – Andrew S Tanenbaum, Prentice Hall

3. Operating Systems : Internals and Design Principles, William Stallings, Prentice Hall

4. Sumitabha Das: UNIX – Concepts and Applications, 4th Edition, Tata McGraw Hill, 2006.

Course Code: CAM23P	Course Title: Shell Programming
Course Credits: 02 (0-0-2)	Hours/Week: 04
Total Contact Hours: 60	Formative Assessment Marks: 10
Exam Marks: 40	Exam Duration: 03

Course Outcomes (COs):
On successful completion of this course, students will be able to:
1. Develop skill in shell scripting to perform simple operations and problems.

2. Perform file manipulation using shell scripts.

3. Understand and implement shell scripts for system information.

Laboratory Program List

Part A:
1. Write a shell script to swap 2 values.
2. Write a shell script to check if the given number is even or odd.
3. Write a shell script to find the largest of 3 numbers.
4. Write a shell script to perform arithmetic operations.
5. Write a shell script to find the sum of first 10 natural numbers.
6. Write a shell script to display multiplication table of a given number.
7. Write a shell script to find the length of a given string.
8. Write a shell script to find factorial of a given number.
9. Write a shell script which counts the numbers of lines and number of words present in a given file.
10. Write a shell script to display the Fibonacci series upto N number.

Part B:
1. Shell script to search for particular element from an array of elements.
2. Shell script to calculate the TA, HRA and DA of an employee.
3. Shell script that displays a list of all files in the current directory to which the user has read write and execute permissions.
4. Develop an interactive script that asks for a word and file name and then tells how many times that word occurred in the file.
5. Shell script to extract a sub string from a given string.
6. Shell script to perform the following operations
   a. Concatenate 2 strings
   b. Rename a file
   c. Delete a file

d. Copy the file

7. Shell script to display the

   a)Version of the shell

   b) The user information

   c) Login date and time

   d) List of processes running on the system

   e) User home directory

8. C program to display PID of parent and PID of child process.

9. Shell script that takes two filename as arguments. It should check whether the contents of two files are same or not, if they are same then second file should be deleted.

10. Assume a file with the given information

First Name Middle Name   Age

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Write a shell script to

a. Sort the first name in alphabetical order

b. Sort the age in terms of ascending order

c. Sort the age in terms of descending order

d. Sort the middle name in alphabetical order

Evaluation Scheme for Lab Examination [Marks: 40]

- **Writing:** One program from both Part A and Part B (15 Marks each) : 15 x 2 = 30
- **Execution:** Any one of the written Program: 05 Marks
- **Viva:** 05 Marks

CIE, SEE and QP Pattern for Theory Courses

Total Lecture hours per paper: 44
No. of Units 4 (11 Hours Each)
Internal Assessment C1 = 10 Marks, C2 = 10 Marks
Semester End Theory Exam C3 = 80 Marks

Question paper pattern

Instructions: Answer Part-A and Part-B:
Part-A
Answer any 10 out of 12 Questions (3 Questions drawn from each unit). Each question carries 2 Marks. (10 X 2 =20)
Q. No. 1 to Q. No. 12.
Part-B
Answer all the Questions. Each question carries 15 Marks. (4 X 15 =60)
(Each question with internal choice and with maximum of 3 sub questions)