Sadguru Gadage Maharaj College, Karad
Department of Computer Science
B.Sc.-II Computer Science (Optional)
Syllabus

Semester-III

Sr. No.	SUBJECT TITLE	PAPER NO and Paper Code	No. of lectures per week	Credits		No. of lectures Per week	Credits
			Theory			**Practical**	
1	Computer Science	Paper-V: BCST301	6	4	Practical Paper – III : BCSP303	8	4
		Paper-VI: BCST302					

Semester-IV

Sr. No.	SUBJECT TITLE	PAPER NO and Paper Code	No. of lectures Per week	Credits		No. of lectures Per week	Credits
			Theory			Practical	
1	Computer Science	Paper-VII: BCST401	6	4	Practical Paper – IV : BCSP403	8	4
		Paper-VIII: BCST402					

Semester -III
BCST301: Paper V : Data Communications and Computer Networks

Learning Objectives

1. Understand different types of networks, various topologies and application of networks.
2. Understand types of addresses, data communication.
3. Understand the concept of networking models, protocols, functionality of each layer.
4. Learn basic networking hardware and tools.

Unit - I: Data Communication (11)

Introduction, Objectives, Data Communication and Networking for Today's Enterprise, Communication Model and Band limited signal, Maximum data rate & channel. Data Transmission modes: Serial &Parallel, Simplex, Half Duplex, Full Duplex & Simplex. Synchronous& Asynchronous Transmission. Transmission Impairments: Attenuation Distortion, Delay, Dispersion, Noise.

Unit -II: Computer Network types (12)

Introduction, Computer Networks- Goals and applications – Business Application , Home Application, Mobile User, Social Issues , Network Hardware - Broadcast and point-to- point, topologies – star, bus, mesh, ring etc, Network Types-LAN, MAN, WAN, Wireless Networks, ,

Unit-III: OSI Reference Model (10)

Protocols & Standards, Network Software - Protocol Hierarchies -layers, protocols, peers, interfaces Network architecture, ISO-OSI layer, protocol stack, Design issues of the layers –addressing, error control, flow control, multiplexing and multiplexing, routing. Connection-oriented and connectionless service, Service Primitives – listen, connect, receive, send, disconnect and Berkley Socket.

Unit-IV: Windows Server 2008 and Managing Active Directory (12)

Managing Windows Server 2008: Working with administrative tool using control panel, Graphical administrative tool& command line utility, Working with computer management: Computer management system tools, storage tools, services and application tools. Active Directory Physical Architecture: Top level view, Local security Authority, Directory service architecture, Data storage architecture. Logical Architecture: Object, Domain, Trees & forests Trust, functional levelManaging Users & Computers, Managing Domain user account, Types of user, User account policies, Password setting, User account capabilities, Properties & Rights, Create computer account.

Learning Outcomes:
1. Understand the fundamentals computer network organization-Networking techniques.
2. Apply the knowledge, concepts and terms related to Data Communication through a Network.
3. Understand the basic concept of OSI layer.
4. Identify Active Directory logical components and infrastructure, create and manage file System access security.

Recommended Books: (Unit wise)

1. Computer Networks By Tennenbaum (Unit-I)
2. Windows Server 2008 By William R. Stanek (Prentice- Hall Publications) (Unit-III, Unit-IV)
3. Data Communications and Networking By Behrouz Forouzan(Unit-I, Unit-II)

BCST302 Paper VI: Algorithms and Data Structures using C

Learning Objectives:
1. To understand the basic concepts such as Linear and Non Linear Data structures.
2. To apply the notations used to analyze the Performance of algorithms.
3. To analyze the behavior of data structures such as stacks queues and their representations.
4. To choose an appropriate data structure for a specified application.
5. To understand and analyze various algorithms.

UNIT – I Basic of Data Structures and algorithms (11)

Data Structures Basics: Structure and Problem Solving, Algorithm Specification-Introduction, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big O, Omega and Theta notations, Complexity Analysis Examples, Introduction to Linear and Non Linear data structures, Applications of linear data structure(Searching & Sorting).

UNIT – II Stack & Queue   (12)

Stack - Introduction, Representation- static & dynamic, Operations, Application - infix to postfix & prefix, postfix evaluation, Concept of Multiple stacks.

Queue **-** Introduction, Representation -static & dynamic, Operations, Circular queue, DeQue, priority queues, Concept of Multiple Queues.

UNIT – III Linked List   (12)

Introduction, Linked lists, Representation of linked lists in Memory, Memory allocation and Garbage collection, Types of linked list., Operations on singly linked list, Traversing a linked list, Searching a linked list, insertion into linked list, Deletion from a linked list.

UNIT – IV Graph and Tree   (10)

Graphs – Introduction, Isomorphism, Sub graphs, Walks, Paths, Circuits, Connectedness, Components, Euler graphs, Hamiltonian paths and circuits

Trees – Introduction, important terms, tree traversal, binary search tree, B-tree, B+ tree

Learning Outcomes:-
1. Understand the fundamentals of c and ability to choose appropriate data structures to represent data items in real world problems.
2. Ability to analyze the time and space complexities of algorithms.
3. Able to analyze and implement various kinds of linked list.
4. Ability to design programs using a variety of data structures such as stacks, queues,

Recommended Books: (Unit wise)
1. "Data Structure Through C" by Yashavant P Kanetkar(Unit-I, Unit-IV)
2. "Data Structures Through C in Depth" by Deepali Srivastava and S K Srivastava (Unit-III)
3. An Introduction to Data Structures and Algorithms (Progress in Theoretical Computer Science)" by J A Storer and John C Cherniavsky(Unit-III)
4. Data Structures and Algorithms Made Easy: Data Structures and Algorithmic Puzzles" by Narasimha Karumanchi(Unit-I, Unit-II, III, IV)

BCSP303:Lab Course I (Data Communications and Computer Networks And Algorithms and Data Structures using C)

Learning Objectives:
1. Understand the concept of networking models, protocols, functionality of each layer.
2. Learn basic networking hardware and tools.
3. To understand the notations used to analyze the Performance of algorithms.
4. To understand the behavior of data structures such as stacks queues and their representations.

Part A:

Exercise No. 1. Windows Server Installation
1. Installation of windows server.
2. Create node and connect it to server including crimping.

Exercise No.2. Active Directory
1. Installation of active directory.
2. Create use after installation of active directory

Exercise No.3. User Account
1. Study of properties of user account
2. Time restriction for user login.

Exercise No.4.Creation of account and security
1. Password security policy experiment.
2. Create computer account

Exercise No.5. Creation of Domain

1.Create organization unit and different experiment related to it.

2.Show demonstration of creation of new domain

Part B:

Exercise No.1 Programs on Data Structures and algorithms.
(Sample Programs)
1. Write Pseudo code algorithm to find summation of given n numbers.
2. Problems on Big O, Omega and Theta notations.

Exercise No.2 Programs on Stack
(Sample Programs)
1. STACK Implementation using Array with PUSH, POP, TRAVERSE Operations.
2. STACK Implementation using C Structure with more than One Item.
3. STACK Implementation using C with PUSH, POP, TRAVERSE Operations.

Exercise No.3 Programs on Queue
(Sample Programs)
1. Perform Queues operations using Circular Array implementation. Use Templates.
2. Create and perform different operations on Double-ended Queues using Linked List implementation.

Exercise No.4 Programs on Linked List
(Sample Programs)
1. STACK Implementation with Linked List using C Program.
2. Linked List Implementation using C Program.

 Exercise No.5 Programs on Tree and Graph
1.Tree implementation with linked list, Tree traversal
2. Graph implementation.

Learning Outcomes:-
1. Prepare and perform an installation of Windows Server 2008 and identify the various types of file Systems and their components.
2. Identify Active Directory logical components and infrastructure, create and manage file System access security
3. Understand the fundamentals of c and ability to choose appropriate data structures to represent data items in real world problems.
4. Ability to analyze the time and space complexities of algorithms.

Recommended Books:
1. "Data Structure Through C" by Yashavant P Kanetkar
2. "Data Structures Through C in Depth" by Deepali Srivastava and S K Srivastava
3. An Introduction to Data Structures and Algorithms (Progress in Theoretical Computer Science)" by J A Storer and John C Cherniavsky
4. Data Structures and Algorithms Made Easy: Data Structures and Algorithmic Puzzles" by Narasimha Karumanchi

BCST401 Paper VII: Operating System

Learning Objectives:

1. Understand the basic organization of operating system.
2. To give a brief about OS organization.
3. Understand memory management techniques.
4.To understand Shell operating system.

UNIT I – Fundamental Concepts   **(11)**
 System Software, Resource Abstraction, OS strategies. Types of operating systems -
Multiprogramming, Batch, Time Sharing, Single user and Multiuser, Process Control & Real Time
Systems.

UNIT II – Operating System Organization   **(10)**
Factors in operating system design, basic OS functions, implementation consideration; process
modes, methods of requesting system services – system calls and system programs.

UNIT III – Process Management and Memory Management   **(12)**
System view of the process and resources, initiating the OS, process address space, process
abstraction, resource abstraction, process hierarchy, Thread model, Scheduling: Scheduling
Mechanisms, Strategy selection, non-pre-emptive and pre-emptive strategies. Mapping address space
to memory space, memory allocation strategies, fixed partition, variable partition, paging, virtual
memory.

UNIT IV– Shell introduction and Shell Scripting   **(12)**
What is shell and various type of shell, Various editors present in linux, Different modes of operation
in vi editor ,What is shell script, Writing and executing the shell script ,Shell variable (user defined
and system variables) ,System calls, Using system calls, Pipes and Filters ,Decision making in Shell
Scripts (If else, switch), Loops in shell ,Functions ,Utility programs (cut, paste, join, tr , uniq utilities)
,Pattern matching utility (grep).

Learning Outcomes:-
1. Understand the fundamentals of Operating systems and its types.
2. To understand the basic Operating System organization.
3. To understand the process & memory management in Operating System.
4. Ability to design programs using a Shell Scripting.

Books Recommended:
1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley
   Publications 2008.(Unit-I,Unit-II)
2. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.G. Nutt,
   Operating Systems: A Modern Perspective, 2nd Edition Pearson Education 1997.
3. W. Stallings, Operating Systems, Internals & Design Principles, 5th Edition, Prentice Hall of
   India. 2008. (Unit-I,Unit-III)
4. M. Milinkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992. (Unit-II-
   Pg No.190 to 220,Pg No.223 to 235),(Unit-IV)
5. System Programming and Operating System – D. M. Dhamdhere(Unit-I,Unit-II,Unit-III)
6. Unix concept and applications------ Sumitabha Das (Unit-IV)
7. Linux programming- Foreword By- Alan Cox (Unit-I,Unit-III)RedHalt Linux 718 Bill Ball ,
   David Pitts
8. Unix shell programming- YashwantKanetkar(Unit-I,Unit-II,UnitIII,Unit IV)

BCST402 Paper VIII: Object Oriented Concepts using JAVA

Learning Objectives:
1. This subject will help to improve the analytical skills of object orientedProgramming.
2. Formal introduction to Java programming language
3. To learn Object Oriented Programming language
4. To handle abnormal termination of a program using exception handling
5. To design User Interface using Swing and AWT

Unit- I- Introduction To Java ,Objects and Classes   (10)
Introduction to object oriented programming, Basic concepts of OOP(Object, class, inheritance, polymorphism etc,) Advantages of OOP over Procedure oriented programming, History and features of Java Programming, Java Environment Java tokens, constants, variables, data types, type casting, Operators and Expressions, Implementing Java Program, Branching and looping statements, Class, objects, methods, Constructors and destructor

Unit-II- Inheritance, Polymorphism and Packages   (10)
Defining sub class, subclass constructor, Inheritance-Multiple and hierarchical, Defining packages, system packages, Creating& accessing packages, Adding a class to package, Polymorphism-function overloading and over ridding, its difference

Unit-III- Multithreading and Exception Handling   (12)
Concept of thread, Life cycle of thread, Creating threads, extending a thread class- declaring the class, run() method, Stopping and blocking threads, Using thread method, Thread priority, Introduction to exception, Syntax of exception handling code, Multiple catch statement, Using finally statement, Throwing exception, user defined exception.

Unit-IV- Applets Programming & Event and GUI programming   (13)
Introduction to applets, Building applet code, Applet life cycle, Adding applet code to HTML file Introduction to Abstract Window Toolkit (AWT),Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box.

Learning Outcomes:-
1. Show competence in the use of the Java programming language in the development of small to medium-sized application programs that demonstrate professionally acceptable coding and performance standard
2. Understand the basic principles of the object-oriented programming
3. Demonstrate an introductory understanding of graphical user interfaces, multithreaded programming, and event-driven programming.
4. Understand the principles of the applets and its GUI programming

Recommended Books: (Unit wise)
1. Complete reference Java by Herbert Schildt (5th edition) (Unit-II, Unit-IV-)
2. Java 2 programming black books, Steven Horlzner (Unit-I,Unit-IV-)
3. Programming with Java , A primer ,Forthedition, By E. Balagurusamy(Unit-I, Unit-III-,Unit-IV)
4. Core Java Volume-I-Fundamentals, Eighth Edition, Cay S. Horstmann, Gary Cornell, Prentice Hall, Sun Microsystems Press(Unit-II, Unit-III)
5. Java Programming- Rajendra Salokhe (Aruta Pub) (Unit I,II,III and IV)

BCSP403: Lab Course II(Operating System and Object Oriented Concepts using JAVA) **Learning**

Objectives:

1. Understand memory management techniques.
2. To understand Shell operating system.
3. Identify the need to create the special purpose operating system
4. Present case studies to demonstrate practical applications of different concepts.
5. Provide a scope to students where they can solve small, real life problems.

Part A:

Software Lab based on Operating Systems
Note: Following exercises can be performed using Linux or Unix
1. Write a program to check status of keyboard using interrupt handler
2. Write a program to implement copy command of DOS.
3. Write a program to display date and time of system
4. Write a program to implement pwd command of linux.
5. Write a program to implement wccommand oflinux.
6. Usage of following commands: ls, pwd, tty, cat, who, who am I, rm, mkdir, rmdir, touch, cd.
7. Usage of following commands: cal, cat(append), cat(concatenate), mv, cp, man, date.
8. Usage of following commands: chmod, grep, tput (clear, highlight), bc.
9. Write a shell script to check if the number entered at the command line is prime or not.
10. Write a shell script to modify "cal" command to display calendars of the specified months.
11. Write a shell script to modify "cal" command to display calendars of the specified range of months.
12. Write a shell script to accept a login name. If not a valid login name display message – "Entered login name is invalid".
13. Write a shell script to display date in the mm/dd/yy format.
14. Write a shell script to display on the screen sorted output of "who" command along with the total number of users .
15. Write a shell script to display the multiplication table any number.

Part B :
Exercise No.1 Programs on JAVA Basics
(Sample Programs)
1 Program to define a structure of a basic JAVA program
2 Program to define the data types, variable, operators, arrays and control structures.

Exercise No.2 Programs on Constructor and Overloading
(Sample Programs)
1.Program to define class and constructors. Demonstrate constructors.
2.Program to define class, methods and objects. Demonstrate method overloading

Exercise No.3 Programs on Inheritance
(Sample Programs)
1.Program to define inheritance and show method overriding.
2.Program to demonstrate Packages.

Exercise No.4 Programs on Exception Handling And Multithreading
(Sample Programs)

1. Program to demonstrate Exception Handling.
2.Program to demonstrate Multithreading.

Exercise No.5 Event Handling
(Sample Programs)
1.Program to demonstrate Applet structure and event handling.
2.Program to demonstrate Layout managers

Learning Outcomes:-

1. Student understood the basic Operating System organization.
2. Students identify the process & memory management in Operating System.
3. Ability to design programs using a Shell Scripting.
4. Show competence in the use of the Java programming language in the development of small to medium-sized application programs that demonstrate professionally acceptable coding and performance standard.
5. Demonstrate an introductory understanding of graphical user interfaces, multithreaded programming, and event-driven programming.

Books Recommended:
1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.
2. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.
3. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education 1997.
4. W. Stallings, Operating Systems, Internals & Design Principles, 5th Edition, Prentice Hall of India. 2008.
5. M. Milinkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992.
6. Operating System Concepts – Silberschatz, Galvin and Gagne (8th edition)
7. System Programming and Operating System – D. M. Dhamdhere
8. Operating System by a God bole Tata Mcgraw-Hill Publishing
9. Unix concept and applications ----- Sumitabha Das
10. Linux programming- Foreword By- Alan Cox
11. RedHalt Linux 718 Bill Ball , David Pitts
12. Unix shell programming- YashwantKanetkar
13. Complete reference Java by Herbert Schildt(5th edition)
14. Java 2 programming black books, Steven Horlzner
15. Programming with Java , A primer ,Forth edition , By E. Balagurusamy
16. Core Java Volume-I-Fundamentals, Eighth Edition, Cay S. Horstmann, Gary Cornell, Prentice Hall,Sun Microsystems Press
17. Java Programming- RajendraSalokhe (Aruta Pub)
18. The Complete Reference, Java 2 (Fourth Edition), Herbert Schild, TMH.

Nature of Question Paper:

1. ISE-I : Marks =10: Unit 1 : Descriptive short questions (2X5)
2. ISE-II: Marks =10: Unit 2 and3: Multiple Choice questions : Online Examination: (1X10)
3. ESE: Marks =50: Unit 1 to 4:
   Multiple Choice questions (1 X10)
   Attempt any two out of three (2X10=20)
   Attempt any four out of six(4X5=20)

   (ISE- Internal Semester Evaluation, ESE – End Semester Examination)