Yashavantrao Chavan Institute of Science Satara
Department of Computer Science

Syllabus for Bachelor of Science Part-II

STRUCTURE OF COURSE :
1. **THIRD SEMESTER**—(NO.OF PAPERS2)

Sem-III

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

2. **FOURTH SEMESTER**—(NO.OF PAPERS- 2)

Sem-IV

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

3. STRUCTURE AND TITLES OF PAPER OF B.Sc. COURSE:

B.Sc. II Semester III

Paper V : Computer Networks and Cloud computing-I
Paper VI : Algorithms and Data Structures using C
Practical Paper-III: Computer Networks and cloud computing-I
And Algorithms and Data Structures using C

B.Sc. II Semester IV

Paper VII : Operating System and cloud computing-II
Paper VIII : Object Oriented Concepts using JAVA
Practical Paper-IV : Operating System and cloud computing-II
andObject Oriented Concepts using JAVA

Semester -III

Theory: BCST301: Paper V : Computer Networks and Cloud computing-I

Learning Objectives

1. To understand different types of networks, various topologies and application of networks.
2. To learn the concept of networking models, protocols, functionality of each layer and Learn basic networking hardware and tools.
3. To learn Basics of cloud computing, Key concepts of virtualization
4. To analyze different Cloud Computing services

Unit - I: Basics of Data Communication and Network types   (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 , Synchronous& Asynchronous Transmission. Transmission Impairments: Attenuation Distortion, Delay, Dispersion, Noise, Introduction, Computer Networks- Goals and applications – Business Application , Home Application, topologies – star, bus, mesh, ring etc, Network Types-LAN, MAN, WAN, Wireless Networks.

Unit-II: OSI Reference Model and Windows Server 2008   (10)

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, 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, Managing Domain user account, Types of user, User account policies, Password setting, User account capabilities, Properties & Rights, Create computer account.

Unit -III: Cloud Computing Fundamental   (12)

Cloud Computing definition, Types of cloud, Cloud services: Benefits and challenges of cloud computing, Evolution of Cloud Computing , usage scenarios and Applications , Business models around Cloud – Major Players in Cloud Computing - Issues in Cloud - Eucalyptus - Nimbus - Open Nebula, CloudSim.

Unit -IV: Cloud Services And File System   (12)

Types of Cloud services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service - Monitoring as a Service – Communication as services. Service providers-Google App Engine, Amazon EC2, Microsoft Azure, Sales force. Introduction to MapReduce, GFS, HDFS, Hadoop Framework.

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. And Understand the basic concept of OSI layer.
3. Characterize the distinctions between various cloud models and services
4. Compare the functioning and performance of virtualization of CPU, memory and I/O with traditional systems

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 BehrouzForouzan(Unit-I,Unit-II)

4. Bloor R., Kanfman M., Halper F. Judith Hurwitz "Cloud Computing " Wiley India Edition,2010

5. John Rittinghouse & James Ransome, "Cloud Computing Implementation Management and Strategy", CRC Press, 2010

6. Antohy T Velte ,Cloud Computing : "A Practical Approach", McGraw Hill,2009

Theory: 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 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 – III Stack   **(12)**
Introduction, Representation-static & dynamic, Operations, Application - infix to postfix & prefix, postfix evaluation, Concept of Multiple stacks

UNIT – IV Queue   **(10)**
Introduction, Representation -static &dynamic,Operations,Circular queue, DeQue, priority queues , Concept of Multiple Queues.

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 NarasimhaKarumanchi(Unit-I,Unit-II,III,IV)

<div align="center">**Practical-I**</div>

<div align="center">**BCSP303: Lab Course I (Computer Networks and cloud computing-I
And Algorithms and Data Structures using C)**</div>

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. Active Directory
1. Installation of active directory.
2. Create use after installation of active directory

Exercise No.2. User Account and security
1. Study of properties of user account
2. Time restriction for user login.
3. Password security policy experiment.
4. Create computer account

Exercise No.3. Creation of Domain
1. Create organization unit and different experiment related to it.
2. Show demonstration of creation of new domain

Exercise No.4 Create virtual machines
1. Create virtual machines that access different programs on same platform.
2 .Create virtual machines that access different programs on different platforms.

Exercise No.5 Exploring Google cloud for the following
a) Storage
b) Sharing of data
c) Manage your calendar, to-do lists,
d) A document editing tool

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 Linked List
(Sample Programs)
1. STACK Implementation with Linked List using C Program.
2. Linked List Implementation using C Program.

Exercise No.3 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.4 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.

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 NarasimhaKarumanchi

Theory: BCST401 Paper VII: Operating System and cloud computing-II

Learning Objectives:

1. To understand the basic organization of operating system.
2. To learn memory management techniques and understand Shell operating system.
3. To understand Cloud Implementation, Programming and Mobile cloud computing.
4. To get knowledge about Key components of Amazon Web Services ,Cloud Backup and solutions.

UNIT I – Fundamental Concepts and OS Organization **(10)**
 System Software, Resource Abstraction, OS strategies. Types of operating systems -
Multiprogramming, Batch, Time Sharing, Single user and Multiuser, Process Control & Real Time
Systems,Factors in operating system design, basic OS functions, implementation consideration;
process modes, methods of requesting system services – system calls and system programs.

UNIT II – Process , Memory Management and Shell Scripting **(12)**
System view of the process and resources, 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, 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).

Unit - III: Collaborating With Cloud **(12)**
Collaborating on Calendars, Schedules and Task Management – Collaborating on Event
Management, Contact Management, Project Management – Collaborating on Word Processing,
Databases – Storing and Sharing Files- Collaborating via Web-Based Communication Tools –
Evaluating Web Mail Services – Collaborating via Social Networks – Collaborating via Blogs and
Wikis. 185 CS-Engg&Tech-SRM-2013

Unit-IV: Virtualization for Cloud **(11)**
Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization – System Vm,
Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation and binary
translation, HLL VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V.

Learning Outcomes:-
1. To get the knoweldge about fundamentals of Operating systems and its types.
2. To understand the process & memory management in Operating System and Ability to design
   programs using a Shell Scripting.
3. Familiar with OpenStack components and other cloud platforms to create a cloud
   infrastructure and services
4. Analyze the security risks associated with cloud computing and evaluate how to address
   them.

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)

Theory :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,polymorphismetc,) Advantages of OOP over Procedure oriented
programming,History and features of Java Programming,Java EnvironmentJava 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,Threadpriority,Introduction to
exception,Syntax of exception handling code,Multiple catch statement,Using finally
statement,Throwingexception,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 developmentof small
   to medium-sized application programs that demonstrate professionallyacceptable 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,ByE.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- RajendraSalokhe (Aruta Pub) (Unit I,II,III and IV)

BCSP403:Lab Course II(Operating System and cloud computing-II 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 wc command 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. Exploring Microsoft cloud
12. Exploring Amazon cloud

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, multithreadedprogramming, 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. Bloor R., Kanfman M., Halper F. Judith Hurwitz "Cloud Computing " Wiley India Edition,2010
14. John Rittinghouse & James Ransome, "Cloud Computing Implementation Management and Strategy", CRC Press, 2010
15. Antohy T Velte ,Cloud Computing : "A Practical Approach", McGraw Hill,2009
16. Complete reference Java by Herbert Schildt(5th edition)
17. Java 2 programming black books, Steven Horlzner
18. Programming with Java , A primer ,Forth edition , By E. Balagurusamy
19. Core Java Volume-I-Fundamentals, Eighth Edition, Cay S. Horstmann, Gary Cornell, Prentice Hall,Sun Microsystems Press
20. Java Programming- RajendraSalokhe (Aruta Pub)
21. 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:
   Q.1. Multiple Choice questions (1 X10)
   Q.2. Attempt any two out of three (2X10=20)
   Q.3. Attempt any four out of six(4X5=20)

   (ACCE- Comprehensive Continuous Evaluation,   ESE – End Semester Examination)

Syllabus for Bachelor of Science Part-III

Sem-V

| Sr. No. | SUBJECT TITLE | Theory | | | | Practical | |
		PAPER NO and Paper Code	No. of lectures per week	Credits		No. of lectures Per week	Credits
1	Computer Science	Paper-IX: BCST501	12	8	Practical Paper V & VI (BCSP 505,BCSP 506)	20	8
		Paper-X: BCST502					
		Paper-XI: BCST503 (Elective)					
		Paper-XII: BCST504 ((Elective)					

STRUCTURE AND TITLES OF PAPER OF B.Sc. COURSE:

B.Sc. III Semester V

Paper IX: Python Programming
Paper X: Introduction to .NET using C#
Paper XI: Advanced JAVA Programming
Paper XII: Elective

Elective :
1. Software Project Management
2. IOT
3. Multimedia Computing

Practical Paper-V: Python Programming and Introduction to .NET using C#
Practical Paper-VI: Based on Advanced JAVA Programming & P-XII

Skill Development program : Mobile Application Programming

4. SIXTH SEMESTER—(NO.OF PAPERS - 4)

Sem-VI

Sr. No.	SUBJECT TITLE	Theory					Practical	
		PAPER NO and Paper Code	No. of lectures per week	Credits			No. of lectures Per week	Credits
1	Computer Science	Paper-XIII: BCST601	12	8	Practical Paper VII & VIII (BCSP 605,BCSP 606)		20	8
		Paper-XIV: BCST602						
		Paper-XV: BCST603 (Elective)						
		Paper-XVI: BCST604 (Elective)						

STRUCTURE AND TITLES OF PAPER OF B.Sc. COURSE:

B.Sc. III Semester VI

Paper XIII: Software Engineering
Paper XIV: Advanced C# Programming
Paper XV: E – Commerce
Paper XVI: Elective

Elective:
1. Artificial Intelligence(AI)
2. Web technology
3. Computer Graphics

Practical Paper-VII : Software Engineering and Advanced C# Programming
Practical Paper-VIII: Based on E – Commerce & P-XVI

Entrepreneurship Development program: Entrepreneurship Development

Head
Department of Computer Science